Usage Patterns and Conservation Practices of Wild Palm Species (Arecaceae) in Western Burkina Faso

Aboubacar-Oumar Zon[1,2], Edouard Konan Kouassi[2], Fanta Reine Sheirita Tiétiambou[1,3], and Amadé Ouédraogo[1]

[1] Laboratoire de Biologie et Ecologie Végétales, Université Joseph KI-ZERBO, Ouagadougou 03 BP 7021, Burkina Faso
[2] West African Science Service on Climate Change and Adapted Land Use (WASCAL), Graduate Research Program in Climate Change and Biodiversity, UFR-Biosciences, University Felix Houphouët Boigny, 31BP165 Abidjan, Côte d'Ivoire
[3] Centre universitaire de Gaoua, Université Nazi BONI, Bobo-Dioulasso 01 BP 1091, Burkina Faso
*Corresponding author; e-mail: abouzon1@gmail.com

Wild palms provide high-value resources and contribute to generating income for rural people. This study documents the usage patterns and conservation practices of wild palms in Western Burkina Faso. An ethnobotanical survey was conducted with 258 participants across five different communities. The participants cited seven palm species. The number of palm species cited per participant varied according to their ethnic group, gender, and age category. *Elaeis guineensis* and *Borassus akeassii* were the most cited and useful species. The influence of ethnic group, gender, and age on use values depended on the specific palm species among the communities. Local people adopted natural assisted regeneration (watering, protecting, and taking care of seedlings that germinate naturally) and cultivation to conserve *Borassus akeassii* and *Elaeis guineensis*. Local conservation practices and sustainable exploitation of wild palms are needed for their successful and effective conservation in the semi-arid climatic context of Burkina Faso.

Keywords: Conservation, Local knowledge, Palm diversity, Semi-arid areas, Sociocultural factors, Uses

Introduction

The human dimension of conservation science is crucial to addressing various ongoing and upcoming conservation crises (Byg and Balslev 2001; IPCC 2022; Poe et al. 2014; Tiétiambou et al. 2020). Solutions to these conservation crises must be selected and implemented by and with the local people that co-exist with the biodiversity to be conserved (Cunningham 2001; IPCC 2022). Therefore, an in-depth understanding of how local people use and conserve biodiversity can be an important basis for effective and successful conservative actions.

Arecaceae (the palm family) is ranked as the third most useful plant family in the world after the Poaceae and the Fabaceae (Dransfield et al. 2008). Palms provide resources that rank among the most appreciated non-timber forest products and contribute significantly to household incomes, particularly in rural areas (Ouattara et al. 2015; Stauffer et al. 2017). Indeed, palms are important multipurpose plants in rural communities (Byg and Balslev 2001; Yaméogo et al. 2008). They provide food, traditional medicine,

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material for construction, and trade opportunity to rural communities (Mogue Kamga et al. 2020; Ouattara et al. 2015). Thus, palms are heavily harvested, making their populations more vulnerable at the local scale (Cosiaux et al. 2018; Mollet et al. 2000). Climate change is also an important threat to palms. Indeed, climate change may cause the decline of 70% of their existing ranges by 2080 (Blach-Overgaard et al. 2015). Despites their usefulness and their vulnerability, palms are understudied especially in semi-arid and arid areas. Within the context of continued palm resource depletion and vulnerability, data are urgently needed on the local knowledge distribution and conservation practices of palms growing in semi-arid environments.

In semi-arid areas, wild palms are less diversified. For instance, Burkina Faso has only seven wild native species, namely *Borassus akeassii* Bayt., Ouédr. & Guinko, *Borassus aethiopum* Mart., *Calamus deerratus* G.Mann. & H.Wendl., *Elaeis guineensis* Jacq., *Hyphaene thebaica* Mart., *Phoenix reclinata* Jacq., and *Raphia sudanica* A.Chev. (Ouédraogo 2010; Thiombiano et al. 2012). The uses of the native palms in Burkina Faso were explored by many scientists in West Africa (Camara et al. 2017; Donou Hounsodé et al. 2016; Guinko and Ouédraogo 2005; Ouattara et al. 2015; Salako et al. 2018; Yaméogo et al. 2008; Zongo et al. 2018). However, information on the local practices of conservation remains scarce (Camara et al. 2019; Zon et al. 2020). Local practices of conservation may vary from natural assisted regeneration to the cultivation, where the seed of the species is purposely sowed (Tiétiambou et al. 2020; Yaméogo et al. 2016). Thus, understanding what people conserve, why, where, when, and how is a crucial step in minimizing conflict with current conservation goals (Cunningham 2001). In addition, the socioeconomic importance of plants may be an opportunity for their conservation by local people (Tiétiambou et al. 2020). Most of the studies highlighting the socioeconomic importance of palms in arid and semi-arid areas rarely employed quantitative approaches to analyze the complex relationships between different palm species and humans (Donou Hounsodé et al. 2016; Martins and Shackleton 2021; Salako et al. 2018). Thus, there is a knowledge gap regarding the variation in the number of palms known and used by local communities and how this knowledge is distributed among them, particularly in a semi-arid climatic context where palms are known to be less diversified and vulnerable. Such knowledge is of practical importance for the sustainable management and conservation of palms (Paniagua-Zambrana et al. 2007). It helps to determine which groups in the society rely most on the natural palm resources, which parts are most frequently harvested, and what attributes make some palm species more important than others (Araujo and Lopes 2012; Byg and Balslev 2001; Byg and Balslev 2004). Thus, examining both the usage patterns and the local conservation practices of palms aids in designing solutions for the conservation of this major plant taxon (Balima et al. 2018; Byg and Balslev 2001; Tiétiambou et al. 2020).

Prior studies have demonstrated that the selection and utilization of a specific plant species or family are influenced by the socioeconomic factors of its users (Gaoue et al. 2017; Ouédraogo et al. 2013; Tiétiambou et al. 2016). Indeed, age, gender, and ethnic groups are factors that affect the uses and conservation practices of plant species (Ouédraogo et al. 2013; Ouédraogo et al. 2019; Salako et al. 2018; Tiétiambou et al. 2020). Other factors such as educational level, profession, distance to market, and residence status affect plant usage and knowledge (Tiétiambou et al. 2020). In rural areas and especially in Burkina Faso, age, gender, and ethnic group are known as main factors that are usually considered in ethnobotany because these factors were easy-to-get. Therefore, it is crucial to consider these sociocultural factors in ethnobotanical studies that deal with the use and conservation practices of local plants.

The overall objective of this study is to document the usage patterns and conservation practices of wild palms in Burkina Faso, in order to guide and promote future effective conservation actions. Specifically, the study aims to (i) assess the diversity of wild palm species known and used by local people, (ii) identify the influence of sociocultural factors on wild palm uses, and (iii) identify the conservation practices used by local people to conserve the different palm species.

Material and Methods

Study Area

The study was conducted in Western Burkina Faso, particularly the Cascades and Hauts-Bassins regions (Fig. 1). Both regions belong to the Sudanian climatic zone characterized by 900-1,100 mm range of mean annual rainfall and two contrasting seasons, a dry and rainy season (Dipama 2010; Fontès and Guinko 1995). This climatic zone is the most diverse in the country, influencing the flora in general and especially the palm flora (Schmidt et al. 2017; Thiombiano et al. 2012). Western regions of Burkina Faso host 6 out of the 7 currently known palm species (Thiombiano et al. 2012). The vegetation is dominated by savannas, dry forests and gallery forests (Fontès and Guinko 1995). More than 15 ethnic groups live in the study area, with Bobo, Senoufo and Gouin as the dominant ones. Agriculture (subsistence and cash crops) and raising livestock are the two main human activities. In addition to these two sources of income, the utilization of renewable natural resources contributes significantly to the direct and indirect wealth of local people.

Sampling Scheme and Data Collection

In the study area, 258 participants were interviewed in ten villages from December 2020 to June 2021, using individual semi-structured questionnaires. The interviews were carried out in the local language by the first author. The villages were selected based on the presence of at least one palm species in the surrounding vegetation. The participants were selected in the village based on their knowledge of at least one palm species. Before the interview, the consent of each participant was obtained. Six palm species were used for the interviews, based on the literature. Prior to the interview, local names of the palm species were recorded through a walk in the field with participants and a local field guide. New palm species could be added by participants, following Ouédraogo et al. (2013). Participants were questioned about the different uses they knew about each palm species and the traditional management practices they had adopted to conserve them. The ethnic group, gender, and age of each participant were also collected.

Data Analyses

The collected data were reorganized according to sociocultural factors, such as ethnic group, gender, and age category (Table 1). Participants were classified according to age categories as younger than 30 years, adult (30–60 years), and older than 60 years, following previous authors (Salako et al. 2018). The participants belonged to five different ethnic groups, with a dominance of Bobo and Turka (Table 1). They were on average 47 $\pm$15 years old. More than 61% were adults, whereas participants younger than 30 years were the least represented (Table 1). All the participants were Indigenous and most did not receive any formal education (70%). Farming was the main activity they practice.

A Kruskal-Wallis test was used to assess the variation of the number of palms cited according to ethnic group, gender, and age category. Differences in wild palm knowledge among different sociocultural factors were tested through the analysis of similarities (ANOSIM) based on Jaccard's dissimilarity distance using 999 permutations (Clarke 1993). The ANOSIM was implemented in the "*vegan*" R package (Oksanen et al. 2020). The inter-relationships between significant factors (identified from the ANOSIM results) and the palms cited were displayed using chord diagrams generated with the "*circlize*" R package (Gu et al. 2014). Then, five ethnobotanical values and indices related to the usefulness of palms and the distribution of the participants' knowledge of palm uses were computed for each palm species (Table 2). These measures of uses and knowledge of palms were statistically assessed using a Pearson correlation to detect any potential correlation (Araujo and Lopes 2012; Paniagua-Zambrana et al. 2007). The Kruskal-Wallis non-parametric test was performed to assess the influence of sociocultural factors on the use values of palm species followed by a Dunn test (Dunn 1964). The local practices of conservation were presented using a relative frequency of citation of each practice. All the analyses were performed using R software version 4.0.4 (R core Team 2021).

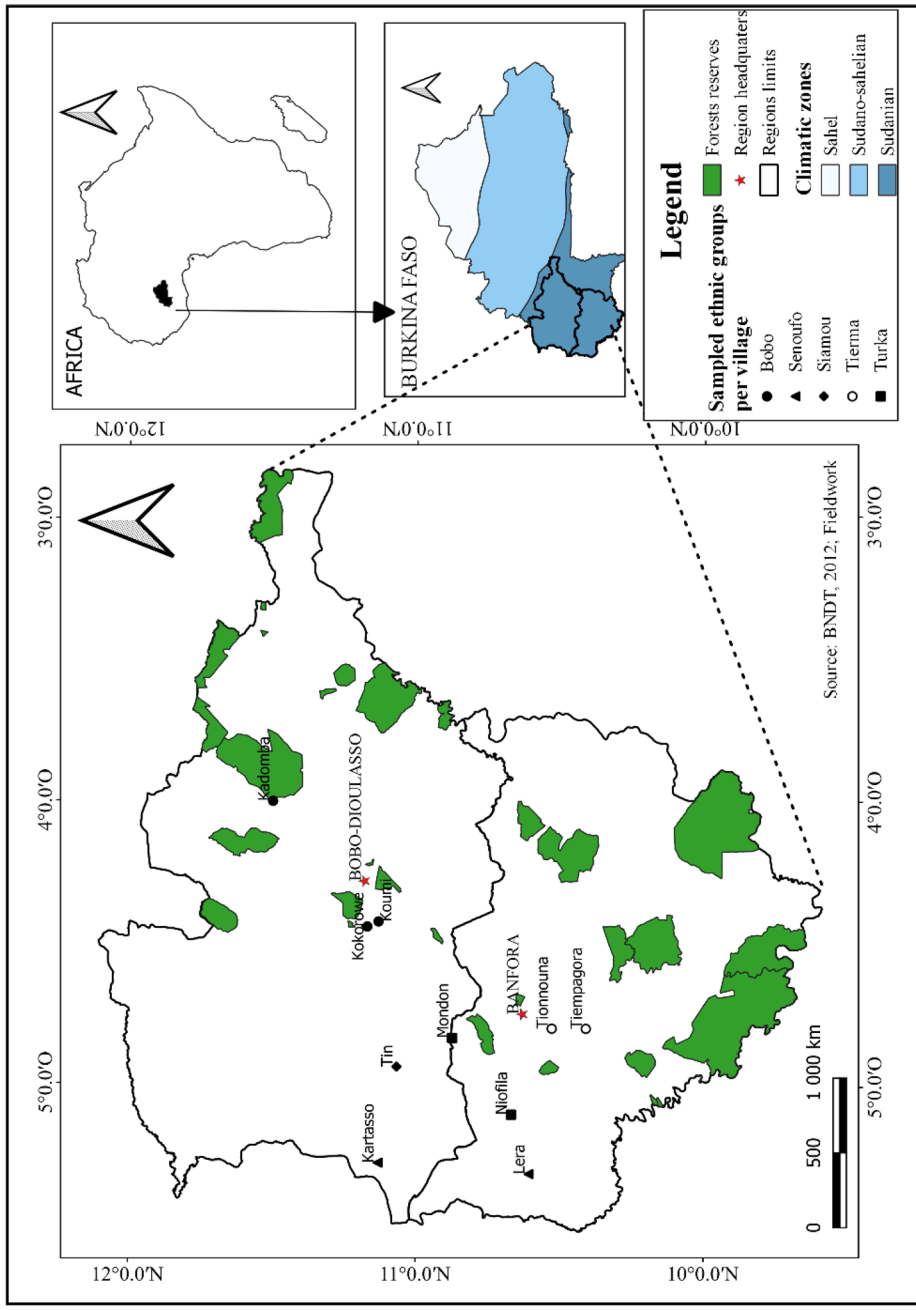

Fig. 1. Location of the study area and sites.

Table 1. Sociodemographic profile of participants.

Factors	Characteristics	Number of participants	Proportion (%)
Ethnic group	Bobo	91	35
	Senoufo	33	13
	Siamou	33	13
	Gouin	40	16
	Turka	61	24
Gender	Men	150	58
	Women	108	42
Age categories	Younger than 30 years	43	17
	Adult (30–60 years)	158	61
	Older than 60 years	57	22

Results

Diversity of Known Palm Species

The 258 participants cited seven different palm species. The number of palm species cited per participant varied significantly among the ethnic groups (χ^2= 47.58, df= 4, p-value<0.01), gender (χ^2= 11.78, df= 1, p-value<0.01), and age category (χ^2= 13.89, df= 2, p-value<0.01). The Gouin, Siamou, and Turka mentioned a significantly higher number of palm species than the Bobo and Senoufo (Fig. 2A). Adults and older participants cited more palm species than younger ones. Men cited more palm species than women (Fig. 2C). The ANOSIM shows that only the ethnic group of the participants accounts for differences seen in their palm knowledge (Table 3). *Borassus akeassii* and *Elaeis guineensis* were cited by all five ethnic groups, while *Calamus deerratus* was only reported by the Senoufo and Bobo (Fig. 3).

Diversity of Palm Uses

In general, *Elaeis guineensis*, *Borassus akeassii*, *Raphia sudanica*, and *Raphia* sp. were the most cited palms, while *Calamus deerratus* and *Hyphaene thebaica* were the least cited (Table 4). *Raphia* sp. is a species of the genus *Raphia* P.Beauv. that can be distinguished from *Raphia sudanica*, and both are called by different local names in the study area. Both *Raphia* species may represent distinct taxa and are thus treated as different species in this paper. The unknown species is thus referred to as *Raphia* sp. until a taxonomic treatment of the genus in Burkina Faso becomes available. The use values varied significantly among species (p <0.05), with *Borassus akeassii* (UV=6.77) and *Elaeis guineensis* (UV=3.90) holding the highest values (Table 4). The use consensus value was low for all species, except for *Borassus akeassii* and *Elaeis guineensis* (Table 4). There was a positive correlation between the importance of palms (in terms of their use value, use diversity value, and use consensus value) and the variability according to participants (relative frequency of citation, informant diversity value). More uses were recorded for palms that were regarded as important. The influence of sociocultural factors on the use values depends on the specific palm species (Table 5). The ethnic group influenced the use value of *Borassus akeassii*, *Elaeis guineensis*, *Raphia* sp., and *Raphia sudanica*. Age had a significant influence on the use value of *Borassus akeassii* and *Calamus deerratus,* while gender influenced *Phoenix reclinata* and *Raphia sudanica* use values (Table 5).

The participants reported the usefulness of 10 different palm parts. The fruits (41%), leaves (29%), sap (12%), and stem (10%) were the most cited parts of palms (Fig. 4B). The parts were used in 10 different use categories. Food (33%), handicrafts (15%), trade (14%), and building (12%) were the most reported use categories (Fig. 4A).

Table 2. Measures of importance and uses of palm species calculated to determine which aspects of palm use contribute to the importance accorded to palms by local people.

Measure	Calculation	Description	References
Use value	$UVs = \sum UV_{is}/n$ n = total number of participants UV_{is}= number of uses participant i knows about species s	Measures the average number of uses participants know for a species.	Phillips and Gentry (1993)
Informant diversity value	$IDs = 1/\sum P_i^2$ P_i= contribution of participant i to the total knowledge pool of species s (number of reports of uses of species s by participant i divided by the total number of reports of uses of species s)	Measures how many participants use a species and how its use is distributed among them.	Byg and Balslev (2001)
Use diversity value	$UDs = 1/\sum P_c^2$ P_c=contribution of use category c to the total uses of a species s (number of times species s was mentioned within each use category, divided by the total number of reports of use of species s across all use categories)	Measures for how many use categories a species is used and how evenly these contribute to its total use.	Byg and Balslev (2001)
Relative Frequency of citation	$RFC = (n_{is}/n) \times 100$ n_{is}= number of participants who cited the species s.	Measures the proportion of participants who cited a species.	-
Use consensus value	$UC_s = 2n_s/n - 1$ n_s= number of people using a species s	Measures the degree of accordance between participants concerning whether they regard a species as useful or not.	Byg and Balslev (2001)

Local Conservation Practices of Wild Palm Species

Four palm species namely *Borassus akeassii*, *Elaeis guineensis*, *Raphia sudanica*, and *Raphia* sp. benefit from conservation practices by local people. *Borassus akeassii* and *Elaeis guineensis* were the species that most benefitted from conservation practices. However, no conservation practice was reported for *Phoenix reclinata* and *Calamus deerratus* (Fig. 5). In general, and independently of species, natural assisted regeneration and cultivation were the conservation practices adopted by local people to conserve palm species. For local people in the study area, natural assisted regeneration can be seen as all actions of watering, protecting, and taking care of seedlings that naturally germinate in the field. Sometimes, local people collect fruits and seeds of the palm and sown it in an appropriate area, that action is define here as cultivation. Sometimes, local people even protect juvenile or adult palm to be able to get some benefit from the plant, which is also plant protection. No conservation practice was highly reported by the majority of participants (64%). The remaining participants adopted plant protection (8%), cultivation

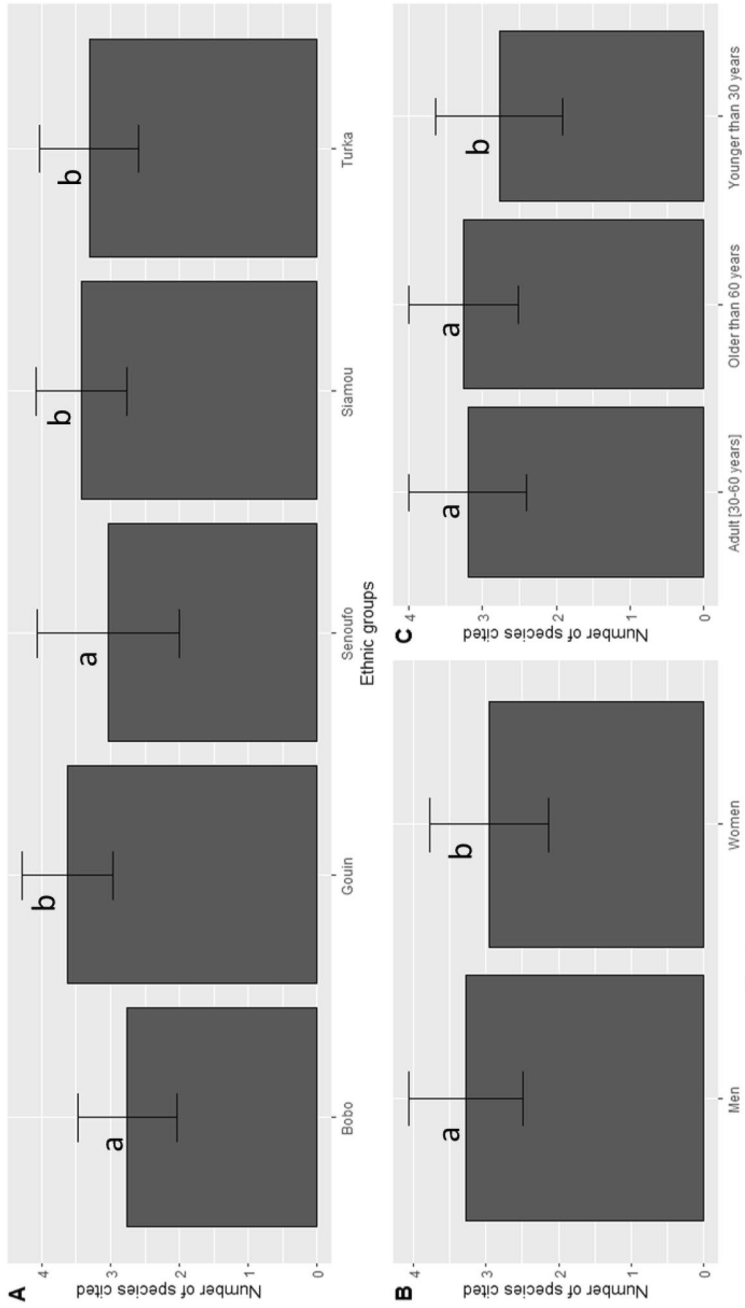

Fig. 2. Distribution of the number of palm species cited by local people according to their ethnic group (**A**), gender (**B**), and age category (**C**). Each bar represents the mean number of palm species cited, and the error bars represent the standard deviation. Different letters (a, b) indicate a significant difference

Table 3. Results of the analysis of similarity (ANOSIM) of the palms composition according to sociocultural factors. The palms composition reffers to the list of palm species cited by participants.

Factors	*R*	*p*-value
Ethnic group	0.29	<0.01
Gender	0.01	0.30
Age category	0.02	0.17

(23%) and natural assisted regeneration (5%) as conservation practices.

Discussion

Diversity of Reported Wild Palm Species

The number of palm species cited varied among ethnic groups, gender, and age. The influence of ethnic group, gender, and age on the knowledge of different species was described in previous studies for native oil plants in Western Burkina Faso (Ouédraogo et al. 2013; Tiétiambou et al. 2016). Scientists have used the species diversity of the local natural environment to explain the diversity of plants used by local communities (Begossi 1996; Camara-Leret et al. 2014; Ouédraogo et al. 2013). Despite the low diversity of wild palms in Burkina Faso, all the palm species were cited by local people. *Elaeis guineensis* and *Borassus akeassii* were cited by all ethnic groups because of their socioeconomic importance, local frequency and abundance. For instance, the oil potential of *Elaeis guineensis* makes it a well-known palm species in Western Burkina Faso (Ouédraogo et al. 2013; Tiétiambou et al. 2016). *Borassus akeassii* is among the most frequent and abundant palm species in Burkina Faso (Bayton and Ouédraogo 2009; Ouédraogo 2010), and it is a socioeconomically important palm whose products are traded in local markets (Yaméogo et al. 2008).

To date, *Raphia sudanica* is the only species of the *Raphia* genus known to occur in Burkina Faso (Thiombiano et al. 2012). Nevertheless, local people distinguished two different types of *Raphia* species, which they called by different local names. The taxonomy of the *Raphia* genus has been problematic (Helmstetter et al. 2020; Mogue Kamga et al. 2019; Otedoh 1982), and there is doubt concerning the occurrence of only *Raphia sudanica* in Burkina Faso. However, *Raphia sudanica* is known to exhibit high

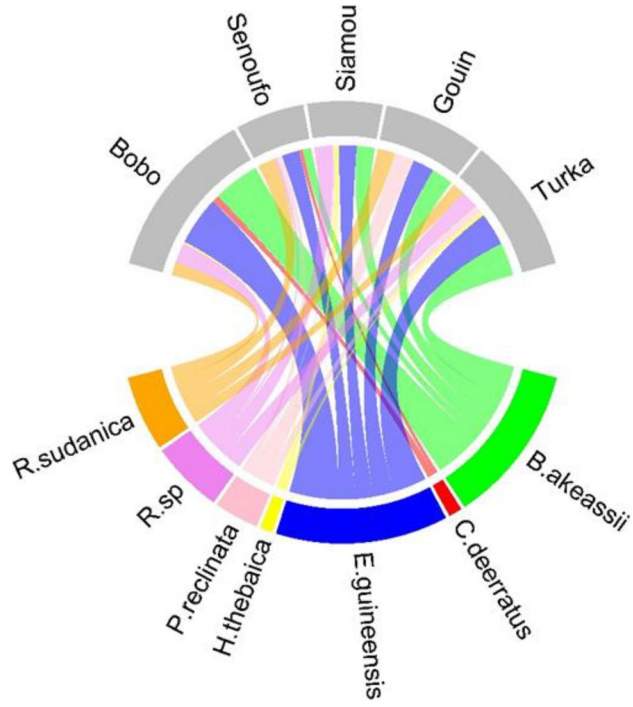

Fig. 3. Association between ethnic groups and palms species cited by the participants in Western Burkina Faso. The diagram shows the five ethnic groups (top half) related to each of the seven palms species (bottom half). Each colored line joining a specific ethnic group and a palm species represents one citation. B.akeassii: *Borassus akeassii*; C.deerratus: *Calamus deerratus*; E.guineensis: *Elaeis guineensis*; H.thebaica: *Hyphaene thebaica*; P.reclinata: *Phoenix reclinata*; R.sp: *Raphia* sp.; R.sudanica: *Raphia sudanica*.

Table 4. Quantitative measures of different aspects of use and importance of wild palm species.

Species	Use value	Informant diversity value	Use diversity value	Relative frequency of citation	Use consensus value
Borassus akeassii	6.77	201.91	5. 50	90.31	0.81
Calamus deerratus	1.11	17.64	1.22	10.47	−0.79
Elaeis guineensis	3.90	212.76	2.90	99.23	0.98
Hyphaene thebaica	1.21	16.03	2.58	4.26	−0.92
Phoenix reclinata	1.60	49.02	3.74	23.26	−0.54
Raphia sp.	3.78	58.11	4.57	43.02	−0.14
Raphia sudanica	2.90	98.95	4.93	41.47	−0.17

morphological variation (Chevalier 1932; Ouattara et al. 2014), which suggests future investigations are needed to look into the variation among *Raphia* individuals in Burkina Faso.

Diversity of Palm Uses

As previously documented, species-specific traits, including morphology, anatomy, and biochemistry, explain how much a palm is used and esteemed by local populations (Byg and Balslev 2001; 2004). This is evidenced by the fact that the various indices of palm importance, including use value and use diversity value, varied among the species. The physical and anatomical traits of species, together with their cultural preferences, are factors that affect their usefulness and desirability for usage (Camara-Leret et al. 2017). Use consensus values showed that few species were used by most informants. This suggests that informants did not agree very much on which species were important (Paniagua-Zambrana et al. 2007). The importance of species may depend on the cultural background of the participants. For example, the customs and beliefs of the Turka make them culturally attached to *Phoenix reclinata*. However, other ethnic groups may just encounter the species in their environment and consider it less important. Our analyses also revealed the intense exploitation of four species in Western Burkina Faso (*Borassus akeassii*, *Elaeis guineensis*, *Raphia sudanica* and *Raphia* sp.), demonstrating potential human influences on these species' population dynamics, which should be assessed and addressed (Araujo and Lopes 2012). In addition to the number of uses, cultural factors also determine the importance of a given resource (Araujo and Lopes 2012; Mogue Kamga et al. 2020). For example, the sap extracted from *Borassus akeassii* is culturally used in different ceremonies, including weddings and funerals in the Gouin and Turka communities. Loss of diversity, such as with the extinction of some species, and a focus on a few distinct applications might be perceived as loss of knowledge, which could then be connected to missed learning opportunities (Anyinam 1995; Salako et al. 2018). Although *Calamus deerratus* is rare and possesses a lower use value in Burkina Faso, it holds interesting uses that are also disappearing. For example, the cane of *C. deerratus* was formerly used to make a utensil culturally used by a bride to carry commodities in the Bobo communities.

Food and construction were the most important use categories. Fruits, leaves, sap, and stems were reportedly the most frequently used parts in our study, similar to other studies on palms (Araujo and Lopes 2012; Byg et al. 2006; Macía et al. 2011; Paniagua-Zambrana et al. 2007). This can be explained by the link between palm parts used and their use categories. For instance, flowers and roots were mainly used in traditional medicine, whereas fruits, sap, and the hypocotyl were used as food and in rites (Zon et al. 2021). Leaves and stems were mainly used as materials for building and handicrafts (Byg and Balslev 2001; Salako et al. 2018).

Influence of Sociocultural Factors on Palm Uses

Our findings confirm that sociocultural factors have an impact on how wild palm species are used. Consequently, the influence of

Table 5. Variation of the use value of each palm species according to sociocultural factors.

Factors		*Borassus akeassii*	*Calamus deerratus*	*Elaeis guineensis*	*Hyphaene thebaica*	*Phoenix reclinata*	*Raphia* sp.	*Raphia sudanica*
Ethnic group	Bobo	6.13	1.00	3.18	1.66		–	2.29
	Senoufo	4.56	1.28	4.46		2	2	4.28
	Siamou	6.69		4.93	1.11		4.27	-
	Gouin	7.77		3.13		1.61		2.29
	Turka	7.59		4.57	1.14	1.5	3.54	3.95
	p-value	**<0.01**	0.06	**<0.01**	0.56	0.65	**0.02**	**<0.01**
Gender	Men	6.76	1.13	3.92	1.37	1.77	3.84	3.28
	Women	6.77	1	3.87	1.09	1.25	3.66	2.44
	p-value	0.93	0.53	0.79	0.33	**0.01**	0.63	**<0.01**
Age	Young	6.07	1.33	3.66	1	1	2.5	2.95
	Adult	7.13	1.05	3.87	1.25	1.52	3.8	2.68
	Old	6.25	1.14	4.12	1.33	1.85	4.2	3.62
	p-value	**0.03**	**0.01**	0.63	0.54	0.20	0.13	0.07

p-values in bold are regarded as significant (*p*-value ˂0.05); "-" denotes the absence of the use value for the concerned cell

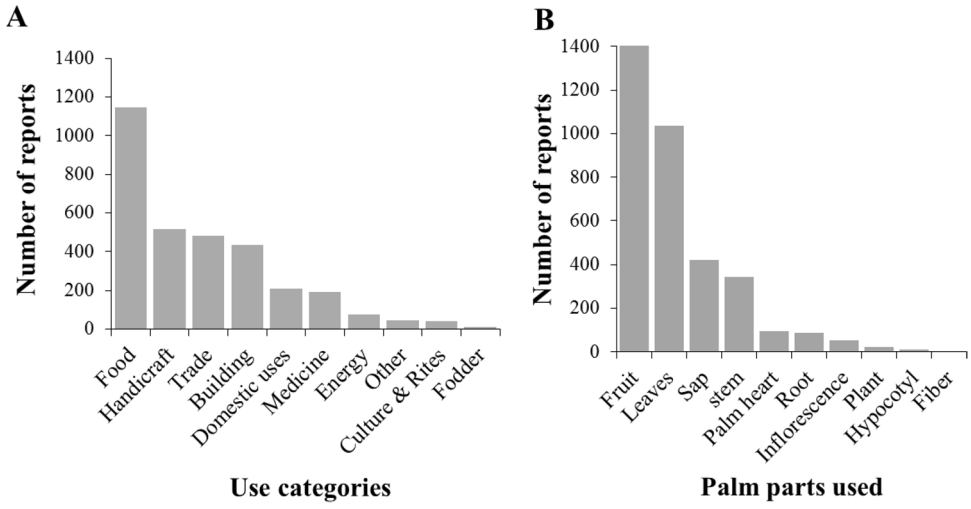

Fig. 4. Number of reports of different use categories (**A**) and different wild palm parts used (**B**) in Burkina Faso.

ethnic affiliation on plant usage has been widely reported in Burkina Faso for many tree species, such as *Afzelia africana* Sm. (Balima et al. 2018), *Gardenia erubescens* Stapf. & Hutch. (Ouédraogo et al. 2019) and native oil plants (Ouédraogo et al. 2013; Tiétiambou et al. 2020). The differences among ethnic groups was likely due to the knowledge from their cultural heritage being transmitted from generation to generation within the same ethnic group (Ouédraogo et al. 2019). However, knowledge may also be transmitted between different ethnic groups in the same locality, which may result in the same species being used, such as is the case for *Borassus akeassii* in Western Burkina Faso (Béné and Fournier 2021). Knowledge may also differ between gender, as far as uses are concerned, with women holding a greater knowledge on

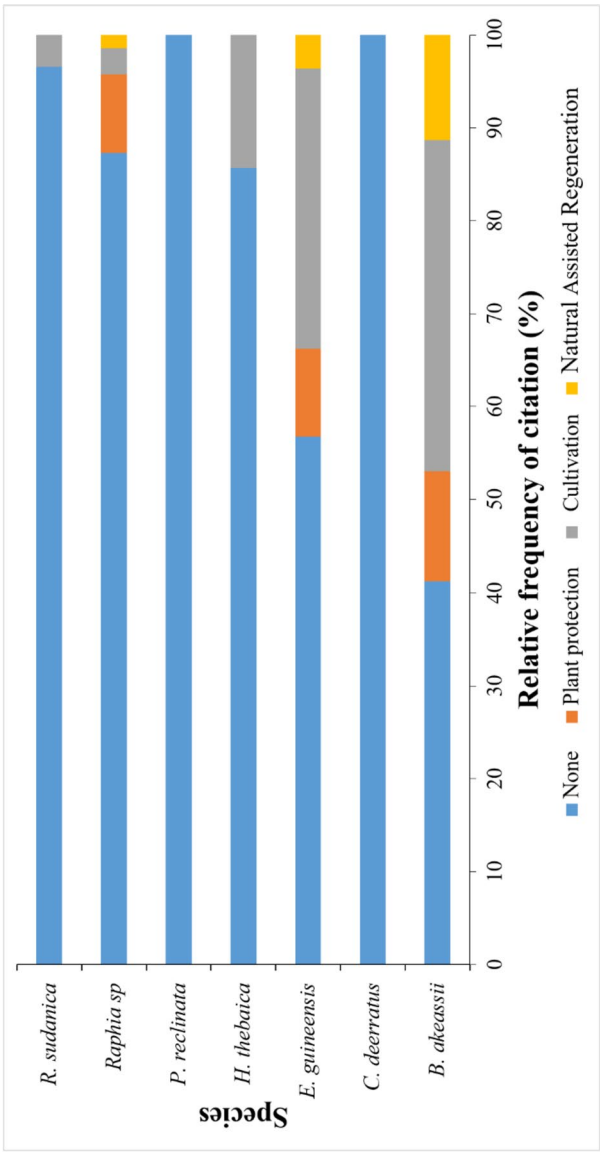

Fig. 5. Conservation practices used by local people to conserve wild palms in Burkina Faso; natural assisted regeneration is all actions to water, protect, and take care of the seedling and plant protection is the action of fencing the seedling. *B. akeassii: Borassus akeassii*; *C. deerratus: Calamus deerratus*; *E. guineensis: Elaeis guineensis*; *H. thebaica: Hyphaene thebaica*; *P. reclinata: Phoenix reclinata*; R. sp: *Raphia* sp.; *R. sudanica: Raphia sudanica.*

medicinal and food uses (Gaoue et al. 2017). Women are more specialized in the collection of non-timber forest products in Western Burkina Faso (Tiétiambou et al. 2020). The influence of age on plant uses is explained by the fact that older people are more experienced in their uses than younger ones, and by the transmission of knowledge across generations (Salako et al. 2018).

The influence of sociocultural factors on the use values was species-dependent. These results confirmed previous findings on *Raphia* spp. in Benin (Donou Hounsodé et al. 2016) and native oil plants in Burkina Faso (Tiétiambou et al. 2020). Salako et al. (2018) reported that the pattern of knowledge distribution across age categories depended on the local and regional abundance of the resources they studied in Benin. The more common a species was, the more likely knowledge of its utilization was similar across age categories (Salako et al. 2018). The influence of the abundance of a local resource on its use has been reported in the literature for palm species in Madagascar (Byg and Balslev 2004; Byg et al. 2006). Nevertheless, since human choices are complex, the selection and exploitation of a plant are influenced by ecological or economic factors, as well as social and cultural ones (Gbesso et al. 2017; Salako et al. 2018).

Local Conservation Practices

Local conservation practices could be helpful for management decisions of many plant species (Tiétiambou et al. 2020). Despite the minor recognition of local conservation practices by official conservation policies, local people have used these practices to conserve a variety of plant species for centuries. The adoption of local conservation practices can be encouraged by the spiritual, economic, and ecological values attributed to species (Balima et al. 2018; Millogo-Rasolodimby 1993; Tiétiambou et al. 2020). The conservation practices cited by local populations included natural assisted regeneration and cultivation for *Borassus akeassii* and *Elaeis guineensis*. Such practices were previously reported in Burkina Faso for both species (Béné and Fournier 2021; Yaméogo et al. 2016; Zon et al. 2020). Our result showed that the two frequently cited palms *Borassus akeassii* and *Elaeis guineensis* possessed the highest use values and benefited most from conservation practices. This suggests that conservation practices were motivated by the importance of the species and corroborates the correlation between use values and the adoption of conservation practices (Tiétiambou et al. 2020). Compared to *Borassus akeassii* and *Elaeis guineensis*, which benefit from particular conservation care within farmlands, *Raphia* species seemed to be neglected despite their high use values for local people. This might be due to the swampland conditions where they occur (Stauffer et al. 2014). Indeed, swamplands are used for rice and legume cultivation in Burkina Faso. Their massive growth habit, together with the spinescence of the plant, may discourage the adoption of particular conservation measures for *Raphia.* The destruction of *Raphia* species' habitat for agriculture constitutes a big challenge towards its domestication and its sustainable conservation in agroecosystems. Nevertheless, *Raphia hookeri* G. Mann & H. Wendl and *Raphia vinifera* P.Beauv. were cultivated, respectively, in Benin and Cameroon for exploitation (Cosiaux and Couvreur 2020; Donou Hounsodé et al. 2016;), showing that the conservation and the domestication of *Raphia* species are possible.

Conclusion

Our study revealed the usefulness and local conservation practices of seven wild palm species in Western Burkina Faso. It highlights the species-dependent influence of sociocultural factors such as ethnic group, gender, and age on the usage of palms. This study also provides evidence that fruits, leaves, and sap were the most exploited palm parts, and that food and construction were the most important use categories of palms in Western Burkina Faso. In addition, the most useful palm species (*Borassus akeassii* and *Elaeis guineensis*) were the ones that benefited the most from conservation practices adopted by local people. These conservation practices included natural assisted regeneration (watering, protecting, and taking care of seedlings that germinate naturally), cultivation, and plant protection. However, conservation practices adopted by local communities do not guarantee the effective conservation of

wild palms under the combined effect of human and climate change pressures. The erosion of local knowledge could increase the threats on wild palm species in Western Burkina Faso and become missed learning opportunities for current and future generations. This calls for more effective conservation of both palm populations and local knowledge. Promoting palm products, sustainable exploitation, and local conservation practices could improve the livelihoods of local communities and contribute to the efficient conservation of wild palm species.

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Author Contribution AOZ and AO conceived the work. AOZ collected and processed the data with advices from FRST, EKK, and AO. AOZ drafted the manuscript with assistance of FRST, EKK, and AO. AO and EKK supervised the work. All authors read and approved the final manuscript.

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Data Availability The datasets used in the current study are available from the corresponding author on reasonable request.

Declarations

Ethics Approval and Consent to Participate The research was conducted with respect of individual liberty, customs, and beliefs. We first explained the objectives of the work to chiefs of the village and each participant and got their authorization to conduct the study. Individual consent to participate in the study was obtained prior to the administration of the questionnaire. Only people that consented to participate in the study as volunteers were interviewed.

Competing Interests The authors declare no competing interests.

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