Assessment of ethnobotanical knowledge about *Flemingia faginea* (Guill. & Perr.) Baker around the protected areas of Bontioli and Tiogo (Burkina Faso)

Raymond Nana, Hugues Roméo Bazié, Assan Gnoumou

Correspondence

Raymond Nana[1*], Hugues Roméo Bazié[1], Assan Gnoumou[2]

[1]Plant Ecophysiology research team (EcoPV), Biosciences Laboratory (Labios), Life and Earth Sciences Training and Research Unit, Joseph Ki-Zerbo University (UJKZ), 03 BP 7021 Ouagadougou 03, Burkina Faso.
[2]Training and Research Unit, Applied Sciences and Technologies (UFR/SAT), Daniel Ouezzin Coulibaly University, D´ edougou, Burkina Faso.

*Corresponding Author: nana_raymond22@yahoo.fr

Ethnobotany Research and Applications 35:64 (2026) - http://dx.doi.org/10.32859/era.35.64.1-16
Manuscript received: 23/05/2026 - Revised manuscript received: 16/09/20x26 - Published: 17/09/2026

Research

Abstract

Background: *Flemingia faginea* is a riparian species restricted to riverbanks and currently facing population decline. Its limited natural regeneration results from the combined effects of climate variability and anthropogenic disturbances. Ethnobotanical surveys serve as a vital bridge between scientific and local knowledge, supporting sustainable management and conservation. This study aimed to explore endogenous knowledge and practices related to *F. faginea*.

Methods: Data were collected from 205 respondents using simple random sampling to ensure an unbiased representation of local knowledge. A semi-structured interview based on a questionnaire was conducted with populations living near the Tiogo and Bontioli classified forests, which are home to the species. The data collected focused on sociodemographic characteristics, knowledge of the plant, its parts, areas of use, threats, solutions, and conservation strategies.

Results: Six factors explain the presence of *F. faginea* across different habitats, primarily related to ambient humidity, water availability, and soil fertility. The abundance of *F. faginea* was significantly associated with the rainy season. Reported regeneration modes include both sexual and asexual reproduction. However, the species faces intense exploitation pressure, mainly linked to traditional medicine (use value of 0.521), involving all of its organs. Bushfires, grazing, and drought are cited as major constraints limiting its natural regeneration and long-term sustainability in its habitat. Consequently, local communities advocate conservation measures through planting, awareness-raising, and law enforcement.

Conclusions: This study will help to preserve certain endogenous knowledge about *F. faginea* and contribute to its sustainable conservation.

Keywords: Conservation, Classified forest, Ethnobotany, *Flemingia faginea*, Traditional medicine

Background

Biodiversity, particularly woody plant diversity, provides ecosystem goods and services to humans and the environment (Hussein 2021). These plants are used for fodder, soil fertility management, energy and timber, income generation, human food, and human health (Traore *et al.* 2023). Due to their importance, some plants are overexploited in their natural habitats, causing various threats, the most significant of which are climatic and anthropogenic (Taonda *et al*. 2024). Biodiversity loss not only impoverishes ecosystems in terms of species and ecological balance but can also compromise human and animal health and food security. Ecosystems are changing due to human activities undertaken to meet the socio-economic needs of populations (Taonda *et al.* 2024).

Despite their status, protected forests, whose access and use are legally regulated, continue to experience significant structural and functional alterations (Dimobe *et al.* 2015; Sawadogo *et al.* 2022). However, any regressive change in plant dynamics also has an impact on the climate. This climate change, which manifests itself in several phenomena, including drought due to lower rainfall, flooding caused by exceptional rainfall, heatwaves, strong winds, and sand or dust storms, is a phenomenon that significantly affects populations and ecosystems (Belem *et al.* 2019). Furthermore, endogenous knowledge is a valuable source of information, as rural populations are in closer daily contact with nature. Hence, the importance of taking into account their perceptions and level of knowledge about the ecology, uses, and sustainable management of biological resources.

Furthermore, *F. faginea* is a species found only in specific environments, including riverbanks (Thiombiano *et al.* 2012), which are threatened by anthropogenic pressure and the effects of climate change. This situation makes it vulnerable in its area of occurrence, especially in terms of its renewal (Nana *et al*. 2025). In this context, work has been carried out on *F. faginea* to document and preserve traditional knowledge about it. Previous studies have already shown the importance and use of *F. faginea* in Senegal (Cisse *et al.* 2016). Other phytochemical studies have been added to verify this traditional knowledge (Coulibaly 2006; Ouedraogo *et al*. 2023a; 2023b; 2025). Its ex-situ regeneration has also been verified by seeds (Gnoumou *et al*. 2021a; Nana *et al.* 2025) and cuttings (Gnoumou *et al*. 2021b). Additionally, an ethnobotanical approach would facilitate the documentation of endogenous knowledge while identifying the primary threats facing *F. faginea* Populations. The information gathered in this way could serve as a valuable scientific basis for the design and implementation of conservation strategies aimed at improving the sustainable management of this species. It is in this context that this study was conducted with the overall objective of understanding the perceptions of local populations regarding the exploitation, regeneration, and threats associated with *F. faginea* in two locations in Burkina Faso following a phytogeographic gradient.

Specifically, the aim was to (1) document the main uses of the species and their relative importance, (2) identify threats to *F. faginea*, and (3) identify practices or initiatives for the conservation of *F. faginea*.

Materials and Methods

Study area

The study was conducted according to the phytogeographic gradient of Burkina Faso. The study focused on villages near the Tiogo classified forest (Ténado municipality) and the Bontioli partial reserve and classified forest (Zambo and Diébougou municipalities) (Figure 1). These sites were chosen because of their accessibility and the presence of *F. faginea* in these forests. In the commune of Tenado, the study was conducted in the villages of Tiogo, Boaw, and Tiogo Mouhoun. In Zambo, it concerned the villages of Djikologo and Tamplan V1, and in the commune of Diébougou, surveys were conducted in the village of Bougouriba. The Bontioli classified forest and partial reserve site is located in the North Sudanian sector and benefits from rainfall of between 900 and 1100 mm. Average annual temperatures in this sector vary between 20.8°C and 34.8°C(Kabore et al. 2013). In addition, this sector contains numerous forest galleries and a diversity of plants, mainly *Vitellaria paradoxa* C. F. Gaertn., *Combretum collinum* Fresen., *Sarcocephalus latifolius* (Sm.) E. A. Bruce, and *Terminalia macroptera* Guill. & Perr. (Kaboré *et al*. 2015) . The site, located in the Tiogo classified forest, is situated between the 600 mm and 900 mm isohyets (Dipama 2011). The most common formations are mainly located on the banks of the Mouhoun River and its tributaries and consist of (Sawadogo 2009): *Mitragyna inermis* (Wild.)Kuntze, *Pterocarpus santalinoides* L'Hér. Ex DC., *Cola laurifolia* Mast. and herbaceous (*Vetiveria nigritana* (Benth.) Stapf, *Paspalum scrobuculatum* (Linn.)).

According to the results of the 5th General Population and Housing Census, the municipality of Tenado has a resident population of 60,190537 (RGPH 2022). The majority ethnic group in this municipality is the Lyelé. The municipalities of Diébougou and Zambo have a total population of 83,537 (RGPH 2022). The majority ethnic group in these municipalities is

the Dagara. In these three municipalities, the main activities carried out by the population are agriculture, livestock farming, and hunting.

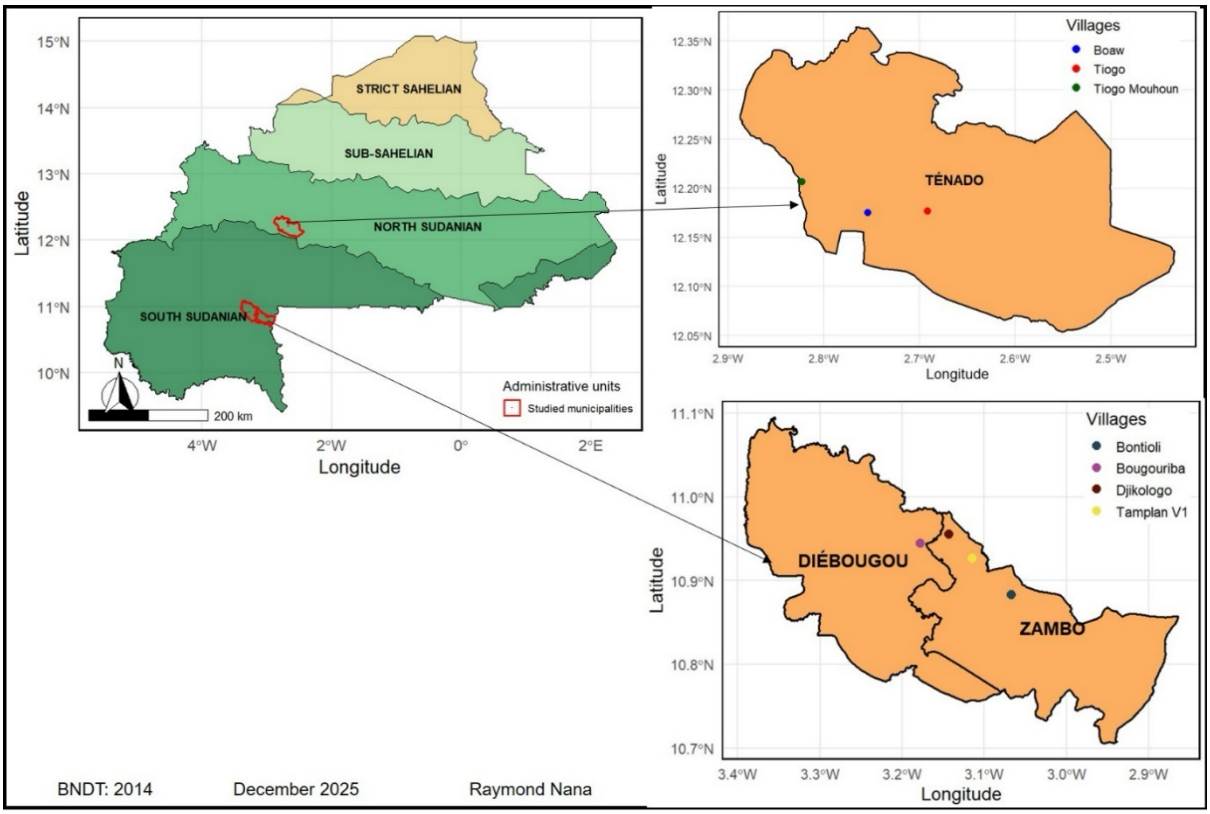

Figure 1. Localization of study sites

Data sampling and collection

The ethnobotanical survey on *F. faginea* was conducted by interviewing a total of 205 individuals, including 104 people in Tiogo and 101 people in Bontioli. The individuals were selected using simple random sampling in each locality. This method limits selection bias and provides more robust estimates of indigenous knowledge (Cámara-Leret *et al*. 2014).

A semi-structured interview based on a questionnaire was conducted without consideration of sociodemographic group, based on their knowledge of the plant. During the surveys, a full explanation of the research objectives was provided to obtain the individual's consent to participate in the interview and data collection procedure. Specimens of *F. faginea,* consisting of a potted plant and collected fruits, were presented to the interviewees to ensure their knowledge of the species. During the administration of the questionnaire, an interpreter was used at each site to translate the interviewees' comments from the local language into French and vice versa.

The questionnaire used comprised two parts: (1) sociodemographic data: gender, ethnicity, age, level of education, and occupation. Age information was grouped into three age categories based on the work of Assogbadjo *et al.* (2008) : young (20 ≥ age <45); adult (45 ≥ age <60); and elderly (age ≥ 60); and the second part (2) ethnobotanical data representing aspects of the goods and services provided by the species: knowledge and use of *F. faginea*, perceptions of threats and the status of populations, and finally conservation methods and future actions.

Data Analysis

All data were entered into Excel 2019. The calculations were also performed in this same Excel spreadsheet. The Relative Frequency of Citation (RFC) was calculated to assess the knowledge and main uses of the species. Visualization was performed using bar plots (ggplot2) (Pedro 2024) and Sankey diagrams (networkD3) (Allaire *et al*. 2014). Statistical tests (Chi-square or Fisher's exact) were conducted to evaluate the effect of sociodemographic groups and study sites. Finally, site mapping was performed using ggplot2 and ggspatial (Dunnington 2017; Wickham 2016). All these analyses were carried out using R 4.5.2.

Relative Frequency citation

The ethnomedicinal data were assessed using a relative frequency citation (RFC, %) index (Houéhanou *et al.* 2016):

$$RFC = 100 X FC/N$$

Where FC: number of citations for the use of the organ concerned; N: total number of informants.

Number of uses

The number of uses (NU) was calculated using the following formula (Houéhanou *et al.* 2016):

$$NU = Ui$$

Where, Ui = the number of uses cited by i informants.

Use value

The use value (UV) was calculated using the following formula (Houéhanou *et al.* 2016):

$$UV = \Sigma Ui)/N$$

Where Ui = number of positive responses per use category, N = total number of informants who mentioned the species.

Importance Value of Causes

The importance Value of Causes (IV) was calculated using the following formula (Houéhanou *et al.* 2016):

$$IV=nis/n$$

Where nis: the number of respondents who cited a cause and n: the total number of respondents.

Informant knowledge diversity index

The informant knowledge diversity index (ID) was determined using the formula below (Kaboré *et al*. 2014):

$$ID=\sum(ni/N)\ln(ni/N)$$

Where ni = the number of uses cited by respondent i and N = the sum of ni.
Diversity is low when ID < 3 bits, average if ID is between 3 and 4, and high when ID ≥ 4 bits. A low index value means that only a small group of respondents holds most of the knowledge about the species.

Informant Evenness Index

The informant Evenness Index (IE) was calculated using the following formula (Kaboré *et al*. 2014):

$$IE=ID/\ln(n)$$

Where ID is the informant knowledge diversity index, n is the total number of respondents.
The closer it is to 1, the more equitable the citation of uses. If IE < 0.5, respondents' knowledge is not homogeneous. If IE ≥ 0.5, there is an equitable distribution of knowledge regarding the uses of the species among the populations surveyed.

Results

Characteristics of sociodemographic groups

A total of 205 people participated in this study, including 104 in the north Sudanian sector and 101 in the south Sudanian sector (Table 1).

Most respondents were Gourounsi (47.80%) in the municipality of Tenado and Dagara (47.80%) in Zambo and Diébougou. The other ethnic groups (4.35%) consisted of Mossi, Samo, Boaba, Wara, and Dafi. Women accounted for 40.48% of our sample, compared to 59.51% men. Young people were the most represented (42.91%), followed by adults (aged 45-60) with a percentage of 37.07%, and the elderly (old). Most of the people surveyed had no education (72.68%). The main activity of

those surveyed was agriculture (71.70%) (Table 1). Other occupations (9.22%) included hunter, trader, fisherman, tailor, driver, and traditional healer. Traditional brewers are women who prepare local beer from grains in villages.

Table 1. Sociodemographic characteristics of survey respondents

Sociodemographic characteristics	Variable modality	Number	Percentage (%)
Study site	North Sudanian	104	51.67
	South Sudanian	101	48.32
Ethnic group	Gourounsi	98	47.80
	Dagara	98	47.80
	Other Ethnicities	9	4.35
Gender	Male	122	59.51
	Female	83	40.48
Age	Young	88	42.91
	Adult	76	37.07
	Old	41	20
Occupation	Farmer	147	71.70
	Traditional brewers	19	9.26
	Gold panner	19	9.26
	Dolomite miner		
	Other professions	19	9.22
Education level	None	149	72.68
	primary	39	19.02
	secondary and higher	17	8.28

Knowledge about *Flemingia faginea*

Local name and meanings of *Flemingia faginea*

In Tenado (North Sudanian sector), *F. faginea* is known by three vernacular names in the Gourounsi language, the most frequently cited of which is “Zouhoula” (2.88%), which means “buzzing in the ear” (Table 2). In the communes of Zambo and Diébougou (South Sudanian sector), *F. faginea* is referred to by two distinct local names by the local populations. The most commonly cited name is “Yimpiorowé” (6.93%), which means “remedy against dental caries,” because the twig is used to brush teeth to treat tooth decay (Table 2). However, the majority of respondents did not cite a local name for the species, with 92.08 % and 94.24 % in the South Sudanian and North Sudanian sectors, respectively.

The informant's knowledge diversity index is low at 1.33 bits, indicating that only a minority of the population has knowledge of the species name. In addition, the informant's evenness index is also low (IE = 0.25), showing heterogeneity in knowledge of the names of *F. faginea* (Table 2).

Table 2. Diversity of vernacular names.

Common names	Significance	Frequency NS (%)	Frequency SS (%)	Informant knowledge diversity index (ID)	Informant Evenness Index (IE)
Boukomon	River plant	0.96	0	1.33 bits	0.25
Boussoum	Animal food	1.92	0		
Yimpiorowé	Medicine for tooth decay	0	6.93		
Zouhoula	Ringing in the ears	2.88	0		
Zoumdali	Fish tree	0	0.99		
Not cited		94.24	92.08		

Perception of *Flemingia faginea* habitats

F. faginea was significantly associated with riparian habitats across sociodemographic groups, except for age (Figure 2a) and sex (Figure 2f). Thus, the Dagara (96.94%; Figure 2b) and traditional brewers (100%; Figure 2d) significantly cited riverine environments ($p < 0.001$).

Significant differences ($p < 0.001$) were also observed according to the study site (Figure 2e), with riparian habitats most frequently reported in the South Sudanian sector (97.027%) and the North Sudanian sector (73.09%). Secondary habitats included pond banks and classified forests (Figure 2).

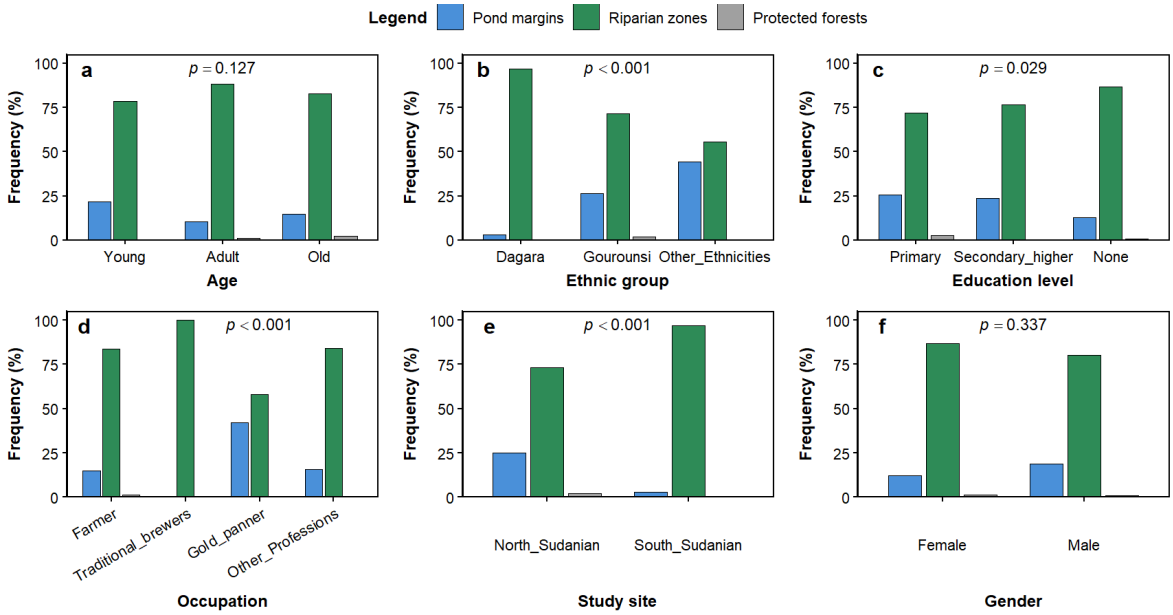

Figure 2. Perception of *Flemingia faginea* habitat according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

Ethnobotanical surveys identified six factors associated with the presence of *F. faginea* in different habitats, primarily related to ambient humidity, water availability, and soil fertility (Figure 3). Significant differences were observed according to study site ($p < 0.001$; Figure 3e) and sociodemographic groups ($p < 0.001$), except for gender ($p = 0.064$; Figure 3f). Youth (63.63%), adults (44.75%), and elders (58.55%; Figure 3a), as well as the Gourounsi (58.17%) and Dagara (66.67%; Figure 3b), significantly attributed the species' occurrence to ambient humidity.

Residents of the North Sudanian sector (59.61%) and South Sudanian sector (47.2%) predominantly cited ambient humidity as the main explanatory factor.

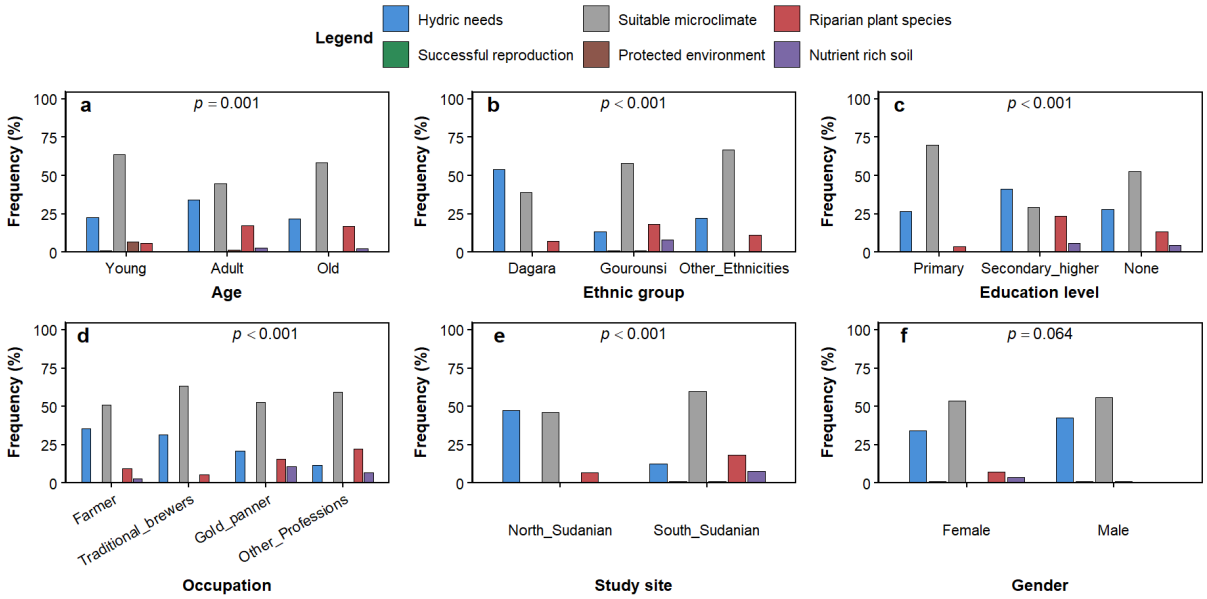

Figure 3. Justification of the preferred habitat of *Flemingia faginea* according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

Perception of the period of abundance of *Flemingia faginea* in its environment

The period of abundance of *F. faginea* stands differs significantly across sociodemographic groups (Figure 4). Young people (82.10%), adults (85.52%), and the elderly (70.73%), as well as the Gourounsi (78.57%) and Dagara (79.59%), significantly cited the rainy season. Similarly, people with a primary education (82.05%), farmers (85.03%), and both men (87.70%) and women (66.26%) cited the same period. However, the least frequently cited period was year-round (Figure 4).

No significant differences were observed at the study site (p = 0.337; Figure 4e).

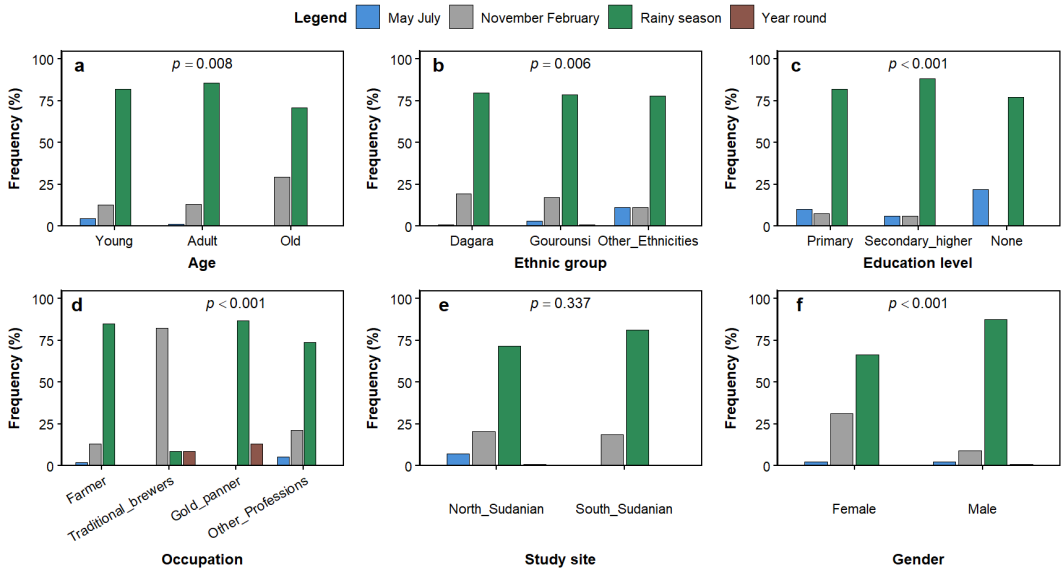

Figure 4. Perception of the period of abundance of *Flemingia faginea* populations according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

Perception of *Flemingia faginea* regeneration method

The methods of *F. faginea* regeneration differ significantly according to sociodemographic groups, except age (p = 0.188; Figure 5). The Dagara (75.51%), the Gourounsi (58.16%), the uneducated (70.46%), and those in other professions (84.21%) significantly cited regeneration by seeds.

The North Sudan (54.8%) and South Sudan (76.23%) residents, both men (68.03%) and women (69.87%), significantly cited regeneration by seeds. However, suckering and stump sprouts were the least frequently mentioned (Figure 5). In the North Sudanian (NS) sector, 60.57% of interviewees reported observing flowers of the species, and 55.76% reported observing its fruit. In the South Sudanian (SS) sector, 91.05% of respondents had observed flowers, and 90.24% had observed the fruit. Regarding seedling observation, Figure 5 showed 91.86% in SS compared to 70.19% in NS.

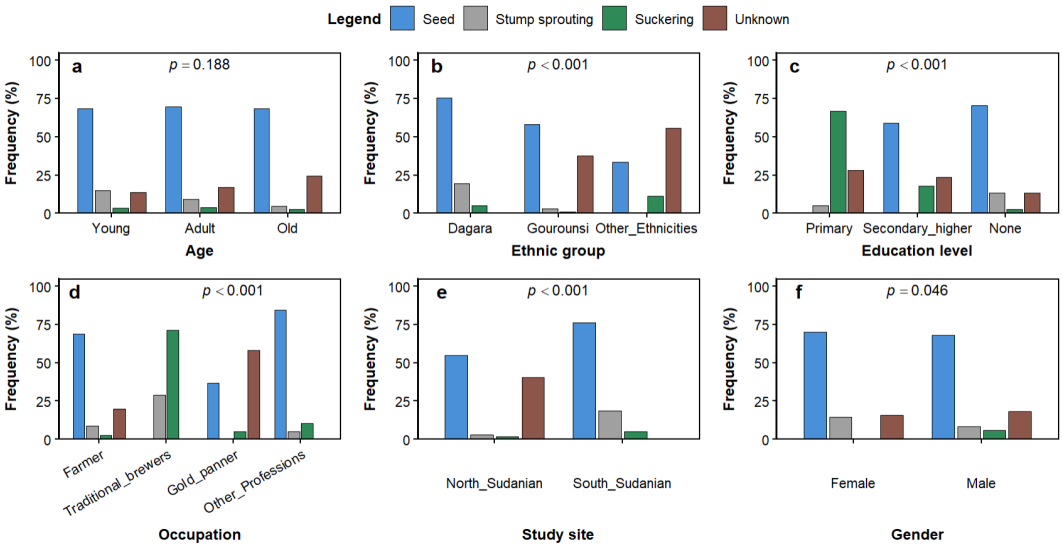

Figure 5. Perceptions of *Flemingia faginea* propagation methods according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

Use of *Flemingia faginea*

The highest use values were recorded for medicine (UV = 0.521), fishing (UV = 0.08), and trade (UV = 0.048; Table 3). Analysis revealed significant differences among sociodemographic groups (Figure 6). Medicinal use was significant across all age groups (43.9-59.2%; p = 0.006). A total of 81.64% of Dagara respondents reported medicinal uses, whereas most Gourounsi (58.17%) significantly reported not using the species for this purpose.

Significant differences were also observed according to the study site, with the species' use more frequently cited in the South Sudanian sector (79.2%) than in the North Sudanian sector (25.96%).

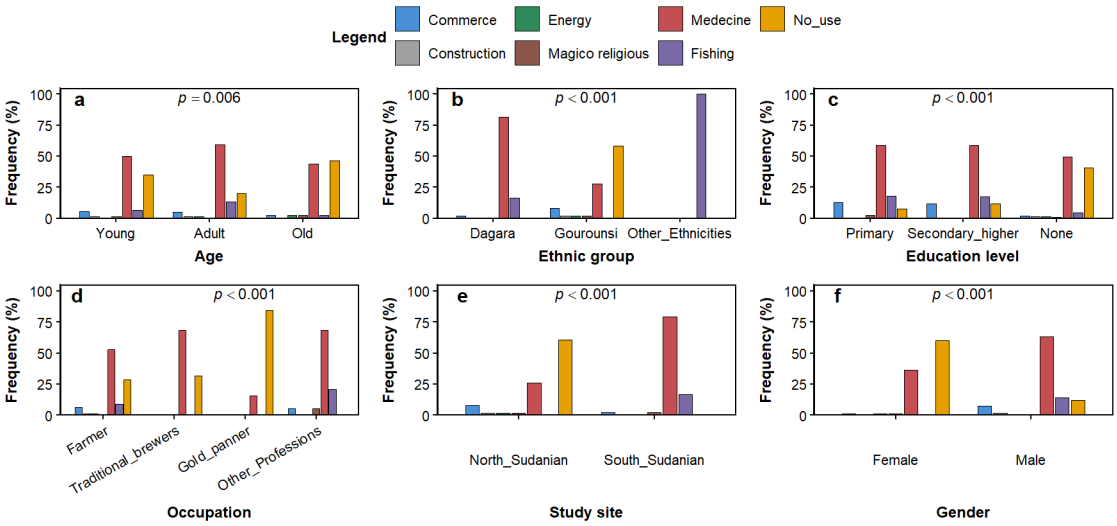

Figure 6. Areas of use of *Flemingia faginea* according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

In practice, seven parts of the species and sometimes even the entire plant are targeted for various ecosystem services (Table 3; Figure 7). The wood is generally used to attach hooks and store catches in fishing, in garden construction, and as firewood (Table 3). Organs such as leaves, roots, or shoots are also used to treat high blood pressure, malaria, rheumatism, stomach aches, and hemorrhoids (Table 3). All users indicate that harvesting is carried out as needed on the relevant part only, except in cases where the entire plant is required. Significant differences were observed across all sociodemographic groups. Leaves, stems, and shoots were the most frequently cited plant parts for use.

The study site also showed significant differences (p < 0.001; Figure 7e), with leaves and stems being the most frequently mentioned parts. The informant knowledge diversity index was low (ID = 0.83 bit), and the informant equitability index indicated a lack of homogeneity (IE = 0.15).

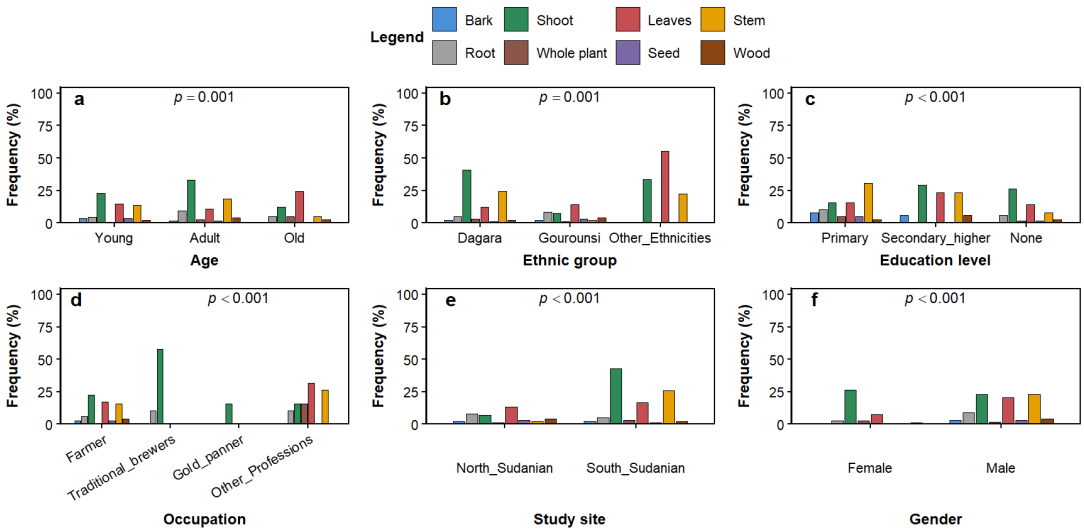

Figure 7. Use value of *Flemingia faginea* organs according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

Table 3. Results on the areas and organs of use of *Flemingia faginea*

Scope of use	Scope of use Use value (UV)	Organs used	Use
Construction	0.009	Wood	Garden construction
Commerce	0.048	Seeds, roots, leafy stems, bark	Traditional medicine and scientific experimentation
Traditional medicine	0.521	Leaves, roots, leafy stems	A drink for high blood pressure, stomachaches, and hemorrhoids. Washing with it, Steam bath, and drinking it treat malaria and rheumatism.
		Leafy stems	Beverage: Fatigue, rejuvenation, and treatment of epilepsy.
		Stem, leaf	Mouthwash and brushing with the Stem: tooth decay. Wash and drink to treat fever in children.
		Leaf, bark	Powder: Wounds.
		Whole plant	Treats epilepsy. Drink: cleanses the blood.
		Bark with other plants	Sterility
		Leaf	Treats children's fever, juice for athlete's foot. As a drink for children's coughs. In powder form: hemorrhoids.
		Root	Treats children's navel problems
Magical-religious	0.009	Whole plant	Protection against evil spirits. In combination with *Vitellaria paradoxa* Gaertn butter against bad dreams.

Relationship between the organs and uses of *Flemingia faginea*

Spearman's rank correlation coefficient analysis revealed significant associations between plant parts and their uses (Figure 8). Wood showed strong positive correlations with commercial (r = 0.80), construction (r = 0.70), and energy (r = 0.56) uses, while seeds and bark were strongly associated with trade (r = 0.68-0.80). Stems were strongly correlated with fishing (r = 0.91). In contrast, leafy stems were negatively associated with commercial, energy, and magico-religious uses. Magico-religious use was primarily correlated with the whole plant (r = 0.62).

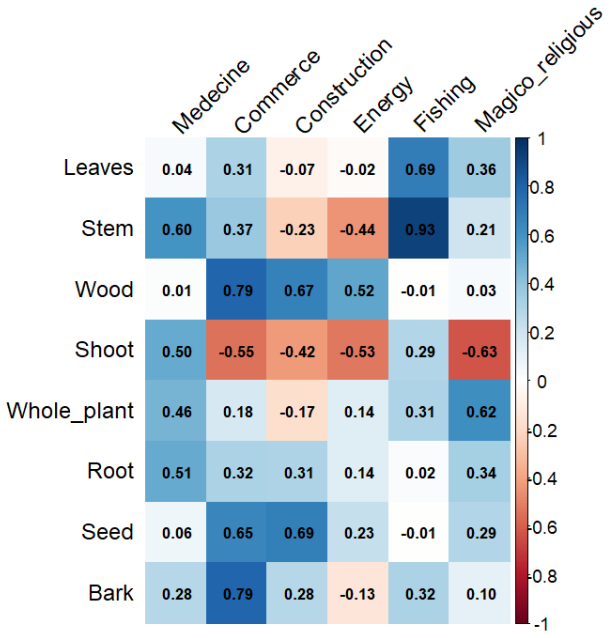

Figure 8. Spearman's correlation between harvested organs and areas of use

Threat factors affecting *Flemingia faginea*

Perceptions of changes in *F. faginea* populations over the past decade varied significantly by study site and sociodemographic group, except for age (p = 0.32; Figure 9). The Dagara reported a substantial increase (52.04%), whereas the Gourounsi indicated a decrease or stagnation. Individuals who had not received formal education (39.59%) were markedly more likely to perceive an increase.

A significant difference was observed at the study-site level ($p < 0.001$). Respondents from the South Sudanian sector reported a substantial increase in the species (51.48%), while those from the North Sudanian sector perceived greater stability (26.92%)..

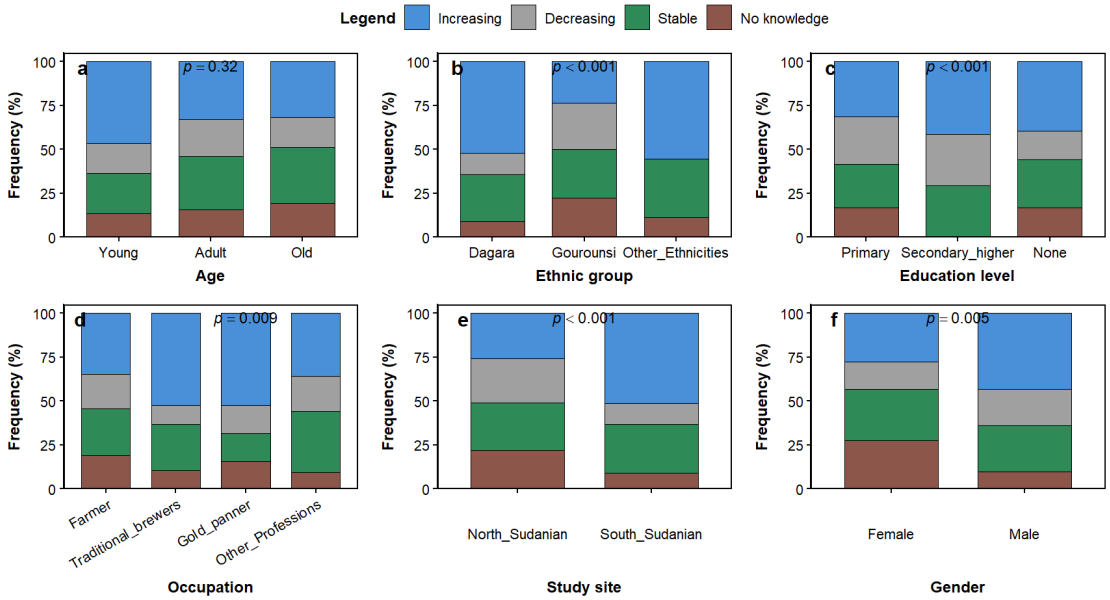

Figure 9. Assessment of the state of the population over the last 10 years according to age (a), ethnicity (b), level of education (c), occupation (d), study site (e), and gender (f).

The various threats to *Flemingia faginea*

The analyses revealed significant differences in the perception of threats according to sociodemographic groups (Table 4). Bushfires, in particular, exhibited maximum frequencies (100%) irrespective of age, ethnic origin and education level, although their variability index (IV) remained moderate (IV = 0.429). Grazing was frequently cited as an important threat factor (98.52%) according to ethnic origin. In addition, livestock farming in these areas and certain animals, such as **agoutis** (*Thryonomys swinderianus*), also contribute to destruction through browsing. Fish were also reported by these populations as seed consumers.

Environmental factors such as drought were likewise perceived as a major constraint (IV = 0.243) according to occupation (100%), education level (84.41%), ethnic affiliation (77.32%), and age (66.33%) (Table 4).

The phytogeographic sector also showed significant differences ($p = 0.002$; Table 4), with bushfires (85.52%) and grazing (77.47%) constituting permanent threats to the species.

Table 4. Assessment of the threats facing *Flemingia faginea*

Threat	IV	Sector (%)	Profession (%)	Gender (%)	Age (%)	Ethnic (%)	Education level (%)
Farmer	0.009	1.98	0	1.63	2.27	3.4	5.12
Climate variability	0.004	0.96	1.69	0.81	1.31	0.68	0
Grazing	0.385	77.47	100	78.23	100	100	87.25
Harvests	0.175	35.12	59.66	31.81	46.74	56.57	100
Water	0.136	27.35	53.32	25.64	42.19	50.11	37.81
bushfires	0.429	85.52	100	83.3	100	100	100
Infrastructure	0.004	0.99	0	2.02	2.43	1.7	5.88
Gold mining	0.009	1.99	0.67	29.73	3.57	2.72	11.14
Pesticides	0.014	8.82	3.06	1.2	3.4	2.04	14.32
Sampling	0.048	39.48	28.48	30.26	13.74	10.2	19.45
Drought	0.243	23.36	100	25.4	66.33	77.32	84.41
Earthworms	0.048	0	7.94	8.19	13.38	26.41	22.02
p-value	-	= 0.002	p < 0.001	p<0.001	=0.002	p<0.001	p< 0.001

Legend: IV = Importance Value of Causes

Local perceptions of conservation and management strategies for *Flemingia faginea*

Four solutions have been proposed for the sustainable conservation of the species (Figure 10). These populations proposed a planting method that involves placing bones (all types of bones) at the bottom of the hole dug to accommodate the seedling before planting. This attracts insects and termites so that the seedling is spared until it grows.

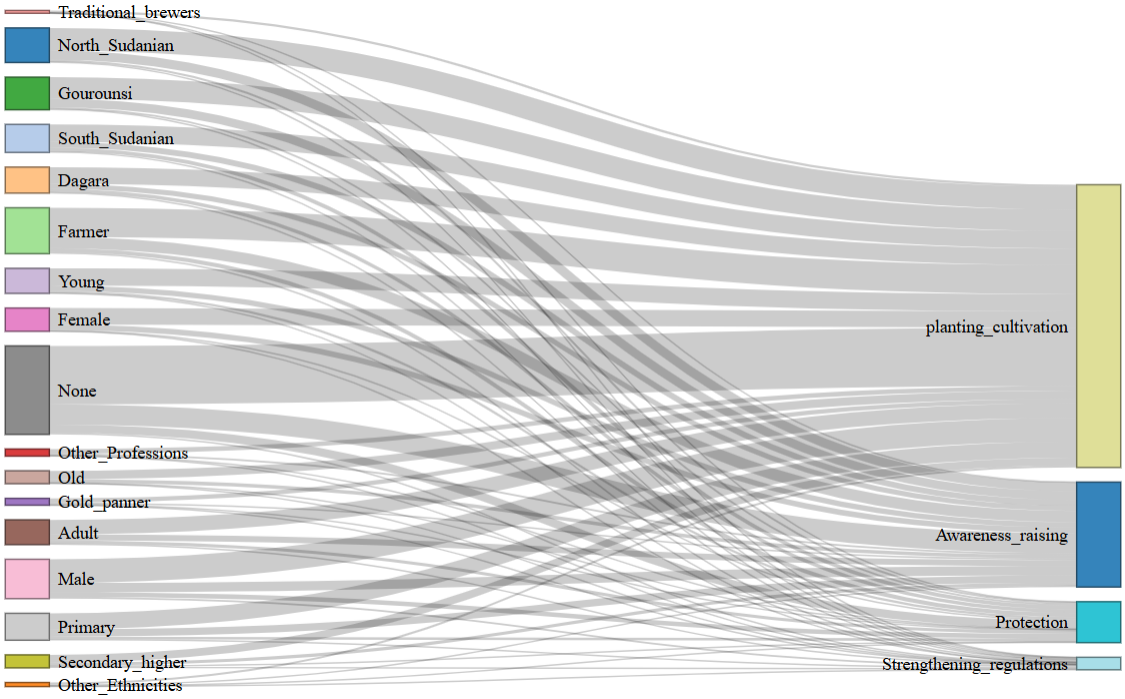

Figure 10. Preservation methods

Local populations proposed three solutions to contribute to the preservation of *F. faginea* (Figure 11). According to these populations, they would be willing to participate in reforestation efforts to help protect the species. They would also agree to help raise awareness among other members of their communities. This awareness-raising would consist of showing these populations the importance of the plant to highlight its significance. Finally, community monitoring was proposed as a contribution.

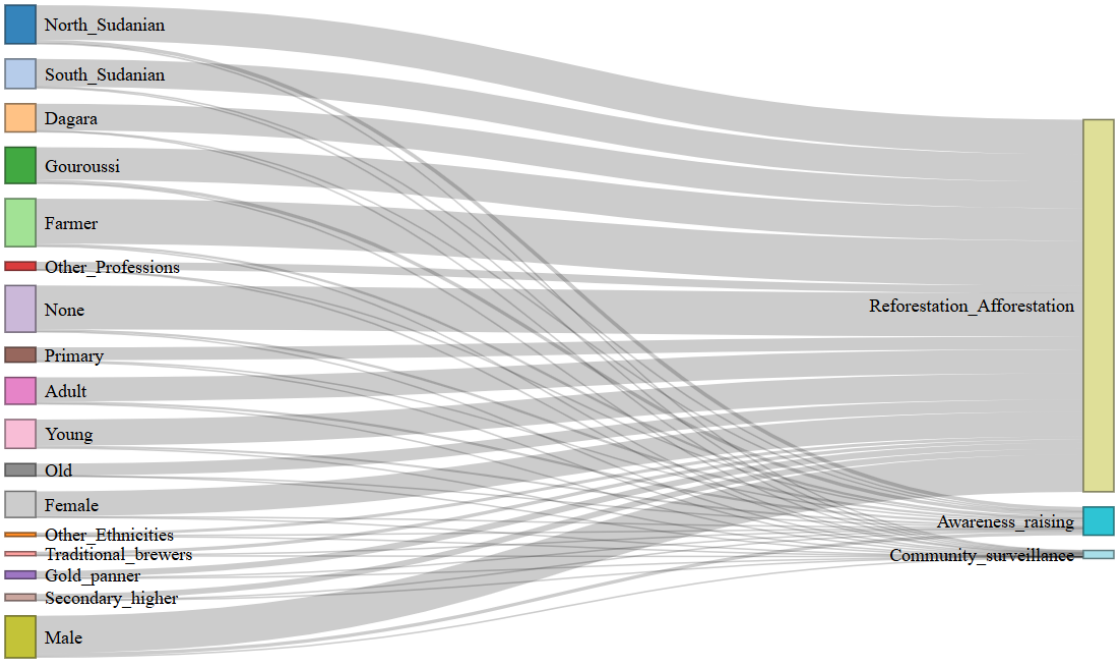

Figure 11. Management method for *Flemingia faginea*.

Discussion

In this study, several vernacular names were proposed for *F. faginea*. These proposed names have a functional and utilitarian dimension. This situation reflects the multiplicity of uses and knowledge associated with *F. faginea*. It could also be a valuable indicator of the sociodemographic importance of the species. This is also the case for *Kigelia africana* (Lam.) Benth., which is known by eight different names in the local language of Benin (Ali *et al*. 2025). Furthermore, these vernacular names serve as a relevant indicator of local knowledge accumulated over generations (Balima *et al*. 2018). However, the vast majority were unaware of the species' vernacular name, despite being able to recognize it visually and using it. This suggested a disconnect between vernacular nomenclature and functional knowledge of *F. faginea*. Indeed, ethnobotanical knowledge of a species is far beyond mere naming; it encompasses habitat-based identification, practical uses, and ecological traits (Gaoue *et al*. 2017). For the respondents, this lack of knowledge of the vernacular name is reflected in the fact that older people often recommend harvesting medicinal plants by starting at the riverbank and working outward. Analyses have shown significant differences in the habitats and abundance period of *F. faginea*. However, these different proposed habitats can be summarized as permanently wet environments with abundant life in winter. This could be explained by the fact that certain specific needs of the species can only be met in these wet habitats. Thus, the specific edaphic and hydrological conditions of these environments would be favorable for its growth and development. Additionally, seed germination is adapted to the hydrochoric conditions of the environment (Nana *et al*. 2025). Similarly, this plant may have certain adaptations, such as hypertrophied lenticels, adventitious roots, and aeration tissues in the stems and roots, to withstand the stresses of flooding. These adaptations to flooding will prevent root hypoxia or anoxia caused by flooding (Xiaoling *et al*. 2011). During these long periods of flooding, plants suffer enormous losses of energy and carbohydrates due to reduced photosynthesis and aerobic respiration (Tamang *et al*. 2014). Finally, *F. faginea* is unable to withstand water deficits, forcing it to adapt to these wet habitats. These communities, capable of identifying conditions that are favorable or unfavorable to growth and development, have extensive field experience. This local knowledge is consistent with previous ecological observations (Bayen *et al*. 2024). These ethnobotanical studies confirm the communities' perceptions and constitute a reliable source of information on the species' habitats (Naah & Braum 2019). The reported periods of abundance are closely linked to the rainfall pattern and the phenological cycle of *F. faginea*. Thus, in both phytogeographic sectors, the availability of leaves appears to depend on the rainy season. This knowledge of the biological cycles of the populations makes it possible to optimize resource harvesting (Zizka *et al*. 2015). Local perceptions of propagation methods demonstrate a good understanding of the reproductive biology of *F. faginea*. Indeed, the survey revealed that seed propagation is the most commonly used method for producing seedlings. This could be explained by the plant's ability to produce viable seeds. This is also the case for species such as *K. africana*, which prefers seed propagation in Benin (Ali *et al*. 2025). In addition to seed propagation, environmental disturbances to individuals lead to vegetative propagation such as suckering and stump sprouting. This is also a strategy to mitigate the instability of its natural habitat. Thus, according to Traore *et al*. (2023), each species has a preferred regeneration mechanism depending on environmental disturbance factors. In *Lannea microcarpa* Engl. & K. Krause, geophytism and stem renewal are used to adapt to environmental factors (Agbogan *et al*. 2017).

F. faginea is a species used by local populations. All parts of the plant are used for medicinal purposes, fishing, energy, and commercialization. This use could be an indicator of the high value of *F. faginea* for this local population. It would, therefore, constitute a critical multifunctional resource for this population. This intensive use highlights the species' vital importance (Taonda et al. 2024). According to Gaisberger *et al*. (2017), it has been described as a versatile resource. Studies on *Detarium microcarpum* and *Detarium senegalense* have revealed their great social value for multiple uses (Taonda *et al*. 2024). The predominance of medicinal uses reflects the enduring importance of traditional medicine in these rural areas. This is true of several species with high ethnomedical value, whose therapeutic properties encourage regular use and the transmission of traditional knowledge (Zizka *et al*. 2015). The preference for using leaves and leafy stems can be explained by their wide availability, the relatively non-destructive nature of their harvest, and their high content of secondary metabolites. Conversely, the harvesting of bark, roots, and wood jeopardizes the survival of stands and contributes to the degradation of natural stands (Traore *et al*. 2023). Such harvesting is believed to cause physiological stress in these damaged individuals. This could compromise reproduction and, consequently, the long-term survival of the species. This phenomenon, already reported by Troare *et al*. (2023), explains that the type of organ and the methods of harvesting are the causes of the species' vulnerability. This vulnerable situation could worsen with the advent of climate change. Phenomena such as drought and flooding have been cited as the most harmful to the survival of *F. faginea*, especially for juveniles. According to Ouattara *et al*. (2022), these climate changes, in addition to soil degradation, are the major causes of the vulnerability of these plants. These phenomena, combined with human activities such as bushfires, logging, and grazing, represent a permanent threat to *F. faginea* populations. For example, drought coupled with bushfires is the most devastating factor according to local populations. In the presence of bushfires, dry plant debris increases in intensity, and increasingly violent winds accelerate the fire, increasing the threat to *F. faginea*. Trotter *et al.* (2022) showed that species of the Fabaceae family are much more

sensitive to fire (*Dichrostachys cinerea* (L.) Wight & Arn., *Acacia nigrescens* Oliv.). In addition, according to Taonda *et al*. (2024), the threats to these plants are mainly linked to human activities in the area, while climate change exacerbates the effects of this pressure by limiting the recruitment of young individuals (Bayen *et al*. 2024). According to Mounkaila *et al*. (2017), root harvesting contributes to the death of medicinal species. In the classified forest and partial reserve of Bontioli and Tiogo, according to Dimobe *et al*. (2015) and Sawadogo *et al.* (2022), human overexploitation is advancing rapidly, even in these humid environments. As for flooding, according to the population, during periods of high water, not all individuals that remain completely submerged for a long time survive. It is in this sense that Dossa *et al.* (2019) showed in their studies that species in forest galleries have survival problems due to the flooding of seedlings.

The widespread use of this species is both the reason for its great value to the population and the cause of its vulnerability. Unfortunately, some local populations are not concerned about the danger to the species. The reason given is that *F. faginea* adapts to various threats. Consequently, despite its destruction, seedlings grow back in favorable humidity conditions. Nevertheless, a few conservation solutions have been proposed, the most commonly cited of which are planting through forestry and strengthening the law with more severe sections, raising public awareness, and strengthening protection. These proposals for conservation by sociodemographic groups and the site showed no significant differences. This would mean that despite the sociodemographic diversity of the populations, they remain aware of the threats to the species. According to Traoré *et al*. (2025), the lack of economic alternatives and the low participation of local populations in decision-making explain this strong pressure on plants. In addition, the population even proposed to contribute to reforestation, awareness-raising, and community monitoring. The integration of local knowledge into national conservation policies has become an essential approach for improving the effectiveness of restoration programs for beneficial species (Bayen *et al*. 2024).

Conclusion

The study reveals the significant influence of sociodemographic parameters and the study site on endogenous knowledge and practices relating to *F. faginea*. *F. faginea* is well known to local populations, as evidenced by its multiple uses in various fields. The most common use is in traditional medicine to treat high blood pressure, malaria, infertility, epilepsy, wounds, etc. Unfortunately, traditional medicine uses all parts of the plant, which could have consequences for the species' conservation in situ. In addition, other factors, such as bushfires and floods, are permanent and worrying threats. Despite the species' great resilience through multiple methods of propagation for its survival, solutions have been proposed for its sustainable use by local populations.

Declarations

List of abbreviations: NS - North Sudanian**;** SS - South Sudanian

Ethics approval and consent to participate: Not applicable.

Consent for publication: Not applicable

Availability of data and materials: All information gathered during this study was reviewed, analyzed, and incorporated into this manuscript.

Competing interests: The authors declare no conflicts of interest.

Funding: Not applicable

Author contributions: R.N. collected the data, analyzed, and wrote the text. H.R.B. and A.G. participated in the theoretical background, monitoring data collection and analysis, helping with discussions, and wrote the final version of the text.

Acknowledgements

We thank the guides and the local people who agreed to participate in this research.

Literature cited

Agbogan A, Bammite D, Wala K, Bellefontaine R, Dourma M, Akpavi S, Woegany A, Tozo K, Akpagana K. 2017. Régénération Naturelle d'un Fruitier Spontané : *Lannea microcarpa* ENGL. ET K. KRAUSE Au Nord Du Togo. Agronomie Africaine 29:279-291.

Ali RKFM, Odjoubéré J, Sagbo EM. 2025. Ethnobotanical Study of the False Baobab (*Kigelia africana* Lam. Benth) in the Issaba District (Pobè Commune). Open Journal of Forestry 15:181-198. doi: 10.4236/ojf.2025.152010.

Allaire JJ, Gandrud C, Russell K, Yetman C. 2014, December 16. networkD3: D3 JavaScript Network Graphs from R. doi: 10.32614/CRAN.package.networkD3.

Assogbadjo AE, Glèlè Kakaï R, Chadare FJ, Thomson L, Kyndt T, Sinsin B, Van Damme P. 2008. Folk Classification, Perception, and Preferences of Baobab Products in West Africa: Consequences for Species Conservation and Improvement. Economic botany:74-84.

Balima LH, Nacoulma BMI, Ekué MRM, Kouamé FN, Thiombiano A. 2018. Use Patterns, Use Values and Management of Afzelia Africana Sm. in Burkina Faso: Implications for Species Domestication and Sustainable Conservation. Journal of Ethnobiology and Ethnomedicine 14:23. doi: 10.1186/s13002-018-0221-z.

Bayen P, Bognounou F, Ganamé M, Balma EN, Lykke AM, Thiombiano A. 2024. Enhancing Tree Species Conservation in Burkina Faso through Indigenous Knowledge. Journal for Nature Conservation 79:126626. doi: 10.1016/j.jnc.2024.126626.

Belem M, Zoungrana M, Nabaloum M. 2019. Les Effets Combinés Du Climat et Des Pressions Anthropiques Sur La Forêt Classée de Toéssin, Burkina Faso. International Journal of Biological and Chemical Sciences 12:2186. doi: 10.4314/ijbcs.v12i5.20.

Cámara-Leret R., Paniagua-Zambrana N, Balslev H, Macía MJ. 2014. Ethnobotanical Knowledge Is Vastly Under-Documented in Northwestern South America. PLoS ONE 9:e85794. doi: 10.1371/journal.pone.0085794.

Cisse A, Gueye M, Ka A, Ndiaye F, Koma S, Akpo LE. 2016. Ethnobotanique Des Plantes Médicinales Chez Les Bergers Peuls de Widou Thiengoly de La Commune de Téssékéré (Ferlo-Nord Sénégal). Journal of Applied Biosciences 98:9301. doi: 10.4314/jab.v98i1.6.

Coulibaly B. 2006. Contribution à l'étude Des Effets Hypotenseurs de *Flemingia faginea* (Gill § Perr), Chez Le Rat Normotendu (Mus Ratus). Mémoire de DEA, Université CHEIKH ENTA DIOP, Dakar, Sénégal.

Dimobe K, Ouédraogo A, Soma S, Goetze D, Porembski S, Thiombiano A. 2015. Identification of Driving Factors of Land Degradation and Deforestation in the Wildlife Reserve of Bontioli (Burkina Faso, West Africa). Global Ecology and Conservation 4:559-571. doi: 10.1016/j.gecco.2015.10.006.

Dipama JM. 2011. Les Risques de Dégradation Des Écosystèmes Liés à La Culture Du Coton Au Burkina Faso : Le Cas Du Parc National de Pô. Revue de l'Université de Moncton 40:29-52. doi: 10.7202/1001387ar.

Dossa AKB, Gouwakinnou NG, Sourou BN, Houetchegnon T, Wedjangnon AA, Odjrado KB, Ouinsavi C. 2019. Caractérisation Structurale Des Peuplements Naturels de *Detarium Senegalense* J.F. Gmel. (Caesalpiniaceae) Au Bénin, Afrique de l'Ouest. Science de la vie, de la terre et agronomie 7.

Dunnington D. 2017. Ggspatial: Spatial Data Framework for Ggplot2. doi: 10.32614/CRAN.package.ggspatial.

Gaisberger H, Kindt R, Loo J, Schmidt M, Bognounou F, Da SS, Diallo OB, Ganaba S, Gnoumou A, Lompo D, Lykke AM, Mbayngone E, Nacoulma BMI, Ouedraogo M, Ouédraogo O, Parkouda C, Porembski S, Savadogo P, Thiombiano A, Zerbo G, Vinceti B. 2017. Spatially Explicit Multi-Threat Assessment of Food Tree Species in Burkina Faso: A Fine-Scale Approach. Plos One 12:e0184457. doi: 10.1371/journal.pone.0184457.

Gaoue OG, Coe MA, Bond M, Hart G, Seyler BC, McMillen H. 2017. Theories and Major Hypotheses in Ethnobotany. Economic Botany 71:269-287. doi: 10.1007/s12231-017-9389-8.

Gnoumou A, Nana R, Daboué EMS, Ouédraogo A. 2021a. Evaluation of the Ex-Situ Reproductive Capacity of *Flemingia faginea* (Guill.& Perr.) Baker, a Species of Medicinal Value in Burkina Faso. Journal of Agricultural Studies 9:249. doi: 10.5296/jas.v9i1.18198.

Gnoumou A, Nana R, Lompo D, Ouedraogo A. 2021b. Ex-Situ Propagation by Cutting of *Flemingia faginea* (Guill. Perr.) (Burkina Faso, West Africa). Journal of Horticulture and Forestry 13:15-24. doi: 10.5897/JHF2020.0659.

Houéhanou DT, Assogbadjo AE, Chadare FJ, Zanvo S, Sinsin B. 2016. Approches Méthodologiques Synthétisées Des Études d'ethnobotanique Quantitative En Milieu Tropical. Annales des sciences agronomiques 20:187-205.

Hussein A. 2021. Links Between Biodiversity, Ecosystems Functions and Services: Systematic Review. International Journal of Ecotoxicology and Ecobiology 6:70. doi: 10.11648/j.ijee.20210604.12.

Kabore E, Sambare O, Ouedraogo A, Thiombiano A. 2013. Diversité et Structure Des Cordons Ripicoles Le Long de La Sirba (Nord-Est Du Burkina Faso). International Journal of Biological and Chemical Sciences 7:1929-1950. doi: 10.4314/ijbcs.v7i5.13.

Kaboré SA, Hien M, Ouédraogo D, Diallo TRE, Hahn K, Nacro HB. 2014. Use of Ecosystem Services of *Sarcocephalus latifolius* (Sm.) E.A.Bruce and Induced Effect of Human Pressure on the Species in the Southwestern Region of Burkina Faso. Ethnobotany Research and Applications 12:561. doi: 10.17348/era.12.0.561-570

Kaboré SA, Hahn K, Hien M, Nacro HB. 2015. Does the Description of a Root System Matter for Sustainable Use and Conservation? A Case Study in Burkina Faso. QScience Connect 2015 (1). doi: 10.5339/connect.2015.3.

Mounkaila S, Soukaradji B, Morou B, Karim S, Issoufou HBA, Mahamane A, Ikhiri K, Saadou M. 2017. Inventaire Et Gestion Des Plantes Médicinales Dans Quatre Localités Du Niger. European Scientific Journal, ESJ 13:498. doi: 10.19044/esj.2017.v13n24p498.

Naah JBSN, and Braun B. 2019. Local Agro-Pastoralists' Perspectives on Forage Species Diversity, Habitat Distributions, Abundance Trends and Ecological Drivers for Sustainable Livestock Production in West Africa. Scientific Reports 9:1707. doi: 10.1038/s41598-019-38636-1.

Nana R, Bazié HR, Gnoumou A, Dah PM, Sawadogo M, Zombré G. 2025. Effect of Temperature and Light on Ex Situ Germination of *Flemingia faginea* (Guill. & Perr.) Baker Seeds in Burkina Faso. International Journal of Forestry Research 2025:5585641. doi: 10.1155/ijfr/5585641.

Ouattara B, Sanou L, Koala J, Hien M. 2022. Perceptions Locales de La Dégradation Des Ressources Naturelles Du Corridor Forestier de La Boucle Du Mouhoun Au Burkina Faso. Bois & Forêts des Tropiques 352:43-60. doi: 10.19182/bft2022.352.a36935.

Ouedraogo V, Hackman KO, Thiel M, Dukiya J. 2023a. Intensity Analysis for Urban Land Use/Land Cover Dynamics Characterization of Ouagadougou and Bobo-Dioulasso in Burkina Faso. Land 12:1063. doi: 10.3390/land12051063.

Ouedraogo WRC, Belemnaba L, Nitiéma M, Kaboré B, Belemlilga BM, Koala M, Ouedraogo R, Semdé R, Ouedraogo S. 2025. LC-MS Profile and in Vivo Oral Acute Toxicity, Antihypertensive and Vascular Endothelium Protective Effects of Phenolic Compounds of the Ethyl Acetate Fraction of Leafy Stems of *Flemingia faginea* Guill. & Perr. in L-NAME Induced Hypertensive Mice. Pharmacological Research - Natural Products 6:100189. doi: 10.1016/j.prenap.2025.100189.

Ouedraogo WRC, Belemnaba L, Nitiema M, Kabore B, Compaore S, Koala M, Semde R, Ouedraogo S. 2023b. Evaluation of Acute, Subacute Toxicity and in Vivo Impact of Aqueous Decoction of *Flemingia faginea* Guill. & Perr. (Barker) Leafy Stems on NMRI Mice and Normotensive Wistar Rats. Journal of Drug Delivery and Therapeutics 13:1-10. doi: 10.22270/jddt.v13i1.5819.

Pedro JA. 2024. Ggpmisc: Miscellaneous Extensions to "Ggplot2." Nature Plants 11 (1): 105-117. 10.1038/s41477-024-01859w

RGPH. 2022. Cinquième Recensement Général de la Population et de l'Habitation du Burkina Faso. Institut national de la statistique et de la démographie, Burkina Faso. p. 516. https://www.insd.bf/fr/resultats

Sawadogo B, Yaméogo A, Zabre N, Bonkoungou J. 2022. Impacts Des Actions Anthropiques Sur La Dynamique De La Forêt Classée De Tiogo (FCT) Dans Un Contexte De Gouvernance Centralisée. International Journal of Progressive Sciences and Technologies (IJPSAT) 34:240-250.

Sawadogo L. 2009. Influence de Facteurs Anthropiques Sur La Dynamique de La Vegetation Des Forets Classees de Laba et de Tiogo En Zone Soudanienne Du Burkina Faso. Thèse, Université de Ouagadougou, Ouagadougou, Burkina Faso. P 125.

Tamang BG, Magliozzi JO, Maroof MAS, Fukao T. 2014. Physiological and Transcriptomic Characterization of Submergence and Reoxygenation Responses in Soybean Seedlings. Plant, Cell & Environment 37:2350-2365. doi: 10.1111/pce.12277.

Taonda AI, Zerbo I, AE, N'Dja Kassi J, A. Thiombiano A. 2024. Local Perceptions of Anthropogenic and Climate Factors Affecting the Use and the Conservation of *Detarium microcarpum* and *Detarium senegalense* in Burkina Faso (West Africa). Integrative Conservation 3:58-75. doi: 10.1002/inc3.41.

Thiombiano A, Schmidt M, Dressler S, Ouédraogo A, Hahn K, Zizka G. 2012. Catalogue Des Plantes Vasculaires Du Burkina Faso. Conservatoire et Jardin Botaniques de la Ville de Geneve, Geneve. Boissiera 65: 1-391.

Traore LCG, Ouattara M, Sanou S, Sanon HO, Bougouma-Yameogo V. 2023. Etude Ethnobotanique Des Ligneux Fourragers Dans La Commune de Guibaré Au Burkina Faso. International Journal of Biological and Chemical Sciences 17:77-93. doi: 10.4314/ijbcs.v17i1.6.

Traoré MA, Bissonnette JF, Dossa KF. 2025. Forest Dynamics and Local Perceptions of Conservation: The Case of Bontioli Forest in South-Western Burkina Faso. Frontiers in Forests and Global Change 8:1658611. doi: 10.3389/ffgc.2025.1658611.

Troare IC, Tindano E, Ouedraogo O. 2023. Diversité Floristique et Caractéristiques Démographiques Des Juvéniles Des Parcs à Faidherbia Suivant Un Gradient Climatique Au Burkina Faso. Sciences Naturelles et Appliquées 39:163-181. https://revuesciences-techniquesburkina.org/index.php/sciences_naturelles_et_appliquee/article/view/1058

Trotter FD, Lehmann CER, Donaldson JE, Mangena HE, Parr CL, Archibald S. 2022. Drought and Fire Determine Juvenile and Adult Woody Diversity and Dominance in a Semi-arid African Savanna. Biotropica 54:1015-1029. doi: 10.1111/btp.13126.

Wickham H. 2016. Ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York. https://ggplot2.tidyverse.org

Xiaoling L., Ning L, Jin Y, Fuzhou Y, Faju C, Fangqing C. 2011. Morphological and Photosynthetic Responses of Riparian Plant *Distylium chinense* Seedlings to Simulated Autumn and Winter Flooding in Three Gorges Reservoir Region of the Yangtze River, China. Acta Ecologica Sinica 31:31-39. doi: 10.1016/j.chnaes.2010.11.005.

Zizka A, Thiombiano A, Dressler S, Nacoulma BM, Ouédraogo A, Ouédraogo I, Ouédraogo O, Zizka G, Hahn K, and Schmidt M. 2015. Traditional Plant Use in Burkina Faso (West Africa): A National-Scale Analysis with Focus on Traditional Medicine. Journal of Ethnobiology and Ethnomedicine 11:9. doi: 10.1186/1746-4269-11-9.