Indigenous knowledge and uses of *Ficus* species in the Sudanian zone of Burkina Faso: Prospects for sustainable management of their natural resources

Youssouf Sawadogo, Prospère Sabo, Aboubacar-Oumar Zon, Blaise Kabré, Mamounata Belem and Amadé Ouédraogo

Correspondence

Youssouf Sawadogo[1]*, Prospère Sabo[1,2], Aboubacar-Oumar Zon[1,3], Blaise Kabré[1,4], Mamounata Belem[5], Amadé Ouédraogo[1]

[1]Laboratoire de Biologie et Ecologie Végétales, Université Joseph KI-ZERBO, Ouagadougou 03 BP 7021, Burkina Faso
[2]Université Nazi BONI, 01 B.P. 1091, Bobo-Dioulasso 01, Burkina Faso
[3]Unité de formation et de recherche en Sciences et Technologies, Université Lédéa Bernard OUEDRAOGO, 01 BP 346 Ouahigouya, Burkina Faso
[4]Centre Universitaire de Tenkodogo, Université Thomas Sankara, 12 B.P. 417, Ouagadougou 12, Burkina Faso
[5]Département Environnement et Forêts, INERA/CNRST, 03 BP 7047, Ouagadougou 03, Burkina Faso

*Corresponding Author: youssouf_sd7@hotmail.com

Ethnobotany Research and Applications 30:11 (2025) - http://dx.doi.org/10.32859/era.30.11.1-22
Manuscript received: 29/10/2024 - Revised manuscript received: 01/20/2025 - Published: 01/22/2025

Research

Abstract

Background: In Burkina Faso*, Ficus* is one of the largest plant genera. However, its resource availability, populations status and uses which are crucial for the conservation of the species have not been sufficiently documented. This study aims to fill this gap of knowledge.

Methods: Semi-structured interviews were carried out purposively from August 2021 to April 2022 with 240 informants of different age categories, ethnic groups and sexes across 12 villages in the Sudanian zone of Burkina Faso. Collected information related to the resource availability, the population status and the uses of *Ficus* species. The data analysis consisted of calculation of frequencies and ethnobotanic indices such as relative frequency of citation (RFC) and use value. Chi-squared test and generalized linear model were used for statistical comparisons.

Results: *Ficus* species resources were perceived to be rare (69.06%) while populations status was perceived to be declining (41.39%). Both resource availability and populations status were only influenced by the ethnic group (p-value < 0.05). The most useful species were *F. sycomorus*, *F. platyphylla* and *F. sur*. Species were mostly used in medicine (RFC = 91.25%), fodder (90%), food (84.58%) and firewood (79.16%). Uses were strongly influenced by informants' ethnic group (p-value = 0.002), sex (p-value = 8.75e-06) and age category (p-value = 0.001).

Conclusions: The global decline trend of *Ficus* species in Burkina Faso combined with their high use by populations suggest the necessity of implementing conservation strategies involving the local population.

Keywords: Locals' perceptions, *Ficus* species diversity, Fig tree uses, Plant use value

Résumé

Contexte : Au Burkina Faso, les *Ficus* constituent l'un des genres les plus représentatifs de la flore. Cependant, la disponibilité des ressources, la dynamique des populations et les pratiques d'utilisations qui sont cruciaux pour la conservation du taxon n'ont pas été suffisamment documentés. Cette étude vise à combler ce manque de connaissances.

Méthodes : Des entretiens semi-structurés ont été menés aléatoirement du mois d'août 2021 au mois d'avril 2022 avec 240 informateurs de différentes classes d'âge, groupes ethniques et sexes dans 12 villages de la zone soudanienne du Burkina Faso. Les informations recueillies ont porté sur la disponibilité des ressources, la dynamique des populations et les usages des espèces. L'analyse des données a consisté au calcul de fréquences et d'indices ethnobotaniques tels que la fréquence relative de citation (FRC) et la valeur d'usage. Le test du Khi-deux et le modèle linéaire généralisé ont été utilisés pour les comparaisons statistiques.

Résultats : Les perceptions des enquêtés ont montré que les ressources des *Ficus* sont rares (69,06 %), tandis que la dynamique des populations est régressive (41,39 %). La disponibilité des ressources et la dynamique des populations sont influencées uniquement par le groupe ethnique (p-value < 0,05). Les espèces les plus importantes sont *F. sycomorus, F. platyphylla* et *F. sur*. Les espèces de *Ficus* sont principalement utilisées en médecine (FRC = 91,25%), comme fourrage (90%), en alimentation (84,58%) et comme bois de chauffe (79,16%). Les usages sont significativement influencés par le groupe ethnique (p-value = 0,002), le sexe (valeur p-value 0,001) et la classe d'âge (p-value = 0,001).

Conclusion : La dynamique régressive des espèces de *Ficus* au Burkina Faso, combinée à leur forte utilisation par les populations, suggère la nécessité de mettre en place des stratégies de conservation impliquant les populations locales.

Mots-clés : Perceptions des populations locales, diversité des espèces de *Ficus*, usages du figuier, valeur d'usage des plantes.

Background

The harvest of forest resources in Burkina Faso, like many other countries of West Africa provides various plant-based products such as firewood, food and medicinal materials to the population (Guigma *et al.* 2014, Tiétiambou *et al.* 2016). These products significantly contribute to the daily subsistence and household incomes of populations (Agence de Promotion des Produits Forestiers Non Ligneux 2011, Belem *et al.* 2017, Traore *et al.* 2011). For example, Non-Timber Forest Products contribute to the nutritional balance of more than 43% of the population, 23% of income and employment in Burkina Faso (Agence de Promotion des Produits Forestiers Non Ligneux 2011). However, nowadays, the harvest of these resources is intensified due to several factors, notably the escalating poverty (Oduro & Aryee 2003), rapid population growth and urbanization. Indeed, more than 50% of the population are living below the line of poverty, surviving on less than one dollar per day and struggling to meet their daily nutritional needs (Oduro & Aryee 2003). Rapid population growth and urbanization led to the depletion of land and vegetation cover (Yao *et al.* 2019). All these factors pushed populations to adopt unsustainable harvest practices of plant resources (Ministère de l'Environnement, de l'Economie verte et du Changement climatique 2019) that threaten biological diversity, already subject to the harmful effects of climate change. While the impacts of these unsustainable practices are widespread across multiple species, multipurpose and keystone species like *Ficus* spp. are likely to experience more severe effects. The potential consequences of disturbances are substantial and may ultimately result in local extinction of species.

Ficus is a pan-tropical genus of Moraceae family comprising over 800 species (Berg & Corner 2005) sharing the common characteristics of producing figs, a fruit-like inflorescence (Berg & Wiebes 1992). In Burkina Faso, *Ficus* is the fifth most diverse vascular plant genus in terms of the number of species, comprising twenty-seven known species to date (Thiombiano *et al.* 2012). It consists of both deciduous and evergreen free-stranding trees, shrubs creepers, climbers and stranglers (Rønsted *et al.* 2008). The genus is most renowned for its intricate and obligatory relationship with its pollinating wasps, which is typically species-specific (Lansky & Paavilainen 2010).

The genus is a crucial resource for animals, humans and other plants, exemplifying its keystone role (Arbonnier 2019, Shanahan *et al.* 2001). Despite the importance of the genus within the country's flora and its keystone role, there is limited information about the resource's availability, population status and uses of *Ficus* species. This information is however essential to assess the threats to the genus and implement conservation actions towards it. For example, assessing the resource availability and population status is crucial to understand the ecological pattern to design a well-informed

management plan (Zon *et al.* 2022). Identifying species' uses allows to identify the most utilized and underutilized ones (Houéhanou *et al.* 2016), species vulnerability (Traore *et al.* 2011) that can help with their prioritization.

Ethnobotany, an interdisciplinary field that examines the interactions between humans and plants, has gained increasing recognition as a crucial approach for acquiring comprehensive knowledge about plant species (Albuquerque & Hanazaki 2009, Prance 1991), making it particularly well-suited for such a study. It stands as a primary tool for acquiring information related to resource availability and uses of species (Kristensen & Balslev 2003, Tiétiambou *et al.* 2016, Traoré *et al.* 2021, Zon *et al.* 2022), providing invaluable knowledge about the traditional uses of plants by different cultures and insights into their ecological significance and conservation status (Albuquerque & Hanazaki 2009, Prance 1991). Indeed, understanding local perceptions and uses of plant species requires the involvement of indigenous and local communities, who often hold rich, location-specific knowledge passed down through generations (Kristensen & Balslev 2003, Traoré *et al.* 2021).

The objectives of this study are to: (i) apprehend the locals' perceptions of the resource availability and population status of *Ficus* species, (ii) assess the use value of the *Ficus* species, and (iii) assess the influence of socio-cultural characteristics of informants on their knowledge of the *Ficus* species.

Materials and Methods

Study area

The study was conducted between August 2021 to April 2022 in 12 villages located in five administrative regions namely Boucle du Mouhoun, Cascades, Centre-Ouest, Centre-Sud and Hauts-Bassins in the Sudanian climatic zone of Burkina Faso (Figure 1). The Sudanian climatic zone lies between the isohyets 900 mm and 1100 mm (Thiombiano & Kampmann 2010) and covers an area of approximately 71000 Km^2 (Institut Géographique du Burkina 2012). It is the rainiest climatic zone in Burkina Faso with five to six months of rainy season. The average annual temperature is 27°C, with a low temperature amplitude, between 20°C and 25°C (Thiombiano & Kampmann 2010). The vegetation is predominantly characterized by varied savannas, which are frequently subjected to bushfires during the dry season (Ouédraogo et al. 2006). More than 80% of people live in rural areas (Table 1) and mostly depend on plant resources for their daily needs. The main activities of people are agriculture and livestock farming (Ouédraogo et al. 2006). The most predominant ethnic groups in the study area are Bobo, Lobi, Turka, Gourounsi, Senoufo, Dagara (Savadogo et al. 2017).

Table 1. Number of inhabitants in the different regions (Institut national de la statistique et de la démographie 2019)

Region	Province	Status	Male	Female	Total
Haut-Bassins	Houet	Rural	137924	139351	277275
		Urban	10116	10077	20193
	Tuy	Rural	119146	122956	242102
		Urban	42900	44251	87151
Cascades	Comoé	Rural	233722	248577	482299
		Urban	73129	77615	150744
Centre-Sud	Nahouri	Rural	82095	85642	167737
		Urban	13749	14330	28079
Boucle du Mouhoun	Balé	Rural	137924	139351	277275
		Urban	10116	10077	20193
Centre-Ouest	Sissili	Rural	138474	146861	285335
		Urban	24978	26765	51743

The choice of the Sudanian zone for this study is based on two primary considerations. Firstly, *Ficus* species are megatherm species that thrive in humid environments (Berg & Corner 2005). Furthermore, data from the Global Biodiversity Information Facility (GBIF) indicate that the Sudanian zone has a high prevalence of *Ficus* species and hosts occurrence points for all *Ficus* species recorded in Burkina Faso.

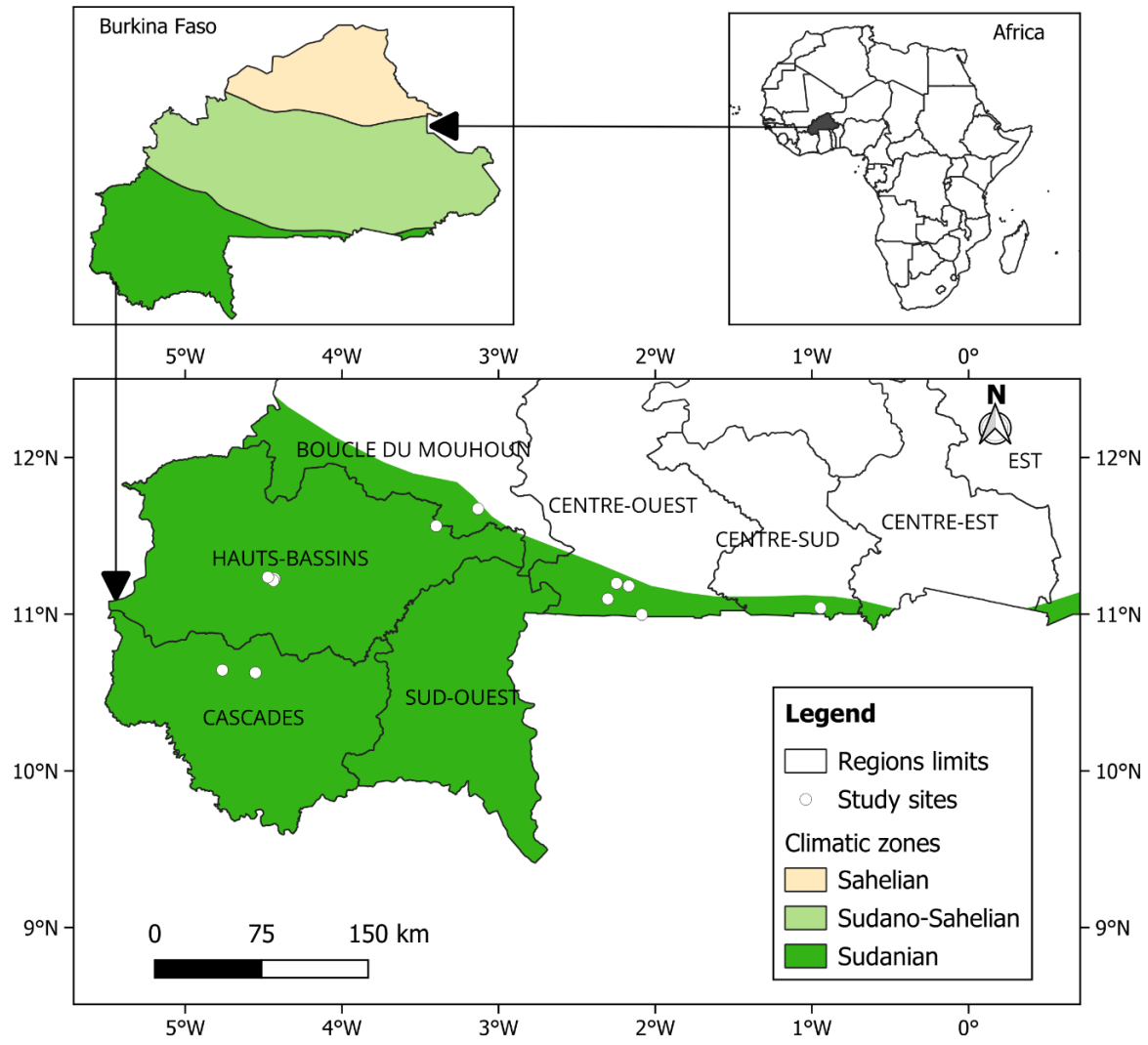

Figure 1. Map showing the study area, sites and regions names (Institut Géographique du Burkina 2012)

Sampling methods and data collection

We conducted semi-structured interviews using a purposive sampling method. Two hundred and forty (240) (Sanou *et al.* 2022, Zon *et al.* 2022) male and female informants of different age categories were interviewed with the assistance of local guides. The proportion of male informants was 63.75%, whereas that of female informants was 36.25%. The informants belonged to eleven ethnic groups, the most represented ones being Bobo (20.83%), Nuni (20.42%), Mossi (19.17%), Kassena (17.92%) and Sissalla (6.25%). With respect to the informants' age category, 60% of the informants were adults, 26% were young and 14% were old. The distribution of informants according to their socio-cultural characteristics is presented in Table 2.

Table 2. Informants number according to their socio-cultural characteristics

Ethnic group	**Sex**		**Age category**		
	Male	Female	Young	Adult	Old
Bobo	38	11	12	33	4
Kassena	24	19	11	33	1
Mossi	26	19	16	26	3
Nuni	33	16	10	30	9
Sissala	6	9	4	7	4

Informants were selected solely based on their knowledge of fig trees, with no additional criteria applied, to ensure a more general representation of the population (Zon *et al.* 2022). The age categories we used were those used by Zon *et al.* (2022): young persons (18 to 30 years), adults (31-59), and old persons (>59). The questions asked to informants concerned the local

names, resource availability, population status, uses, and organs/parts used of the twenty-seven *Ficus* species found in Burkina Faso. Species' resource availability recording consisted of a two-level scale (rare and abundant), while species population status consisted of a three-level scale (declining, stable and increasing). Eight use categories were considered, including construction, firewood, fodder, food, handcraft, medicine, medico-magic and trade. However, we were open to listing other uses if applicable. The identification of species by the informants was facilitated using local names and physical species organs. Additionally, printed photographs of species' organs were presented to informants. Such an approach is a recommended practice during ethnobotanical surveys (Thomas *et al.* 2007). We identified the species presented to informants using the identification keys of the flora guide "Arbres, arbustes et lianes des zones sèches d'Afrique de l'Ouest" (Arbonnier, 2019).

Data analysis

The analysis of data consisted of the calculation of ethnobotanical indices and statistical tests (Table 3). The *EthnobotanyR* package (Whitney 2022) served to calculate different ethnobotanical indices such as relative frequency of citation (RFCs) of species, relative frequency of citation of use categories (RFCu) and use values (UV).

Table 3. Ethnobotanical indices calculation

Indices	Calculation	Description
Relative frequency of citation of species	$RFC_s(\%) = \frac{n}{N} * 100$ *n*: Number of informants who mentioned the species *N*: Total number of informants	Measures how often a species is cited
Relative frequency of citation of use category	$RFC_u(\%) = \frac{n}{N} * 100$ *n*: Number of informants who mentioned the use *u* *N*: Total number of informants	Measures how often a use category is cited
Use value (Phillips & Gentry 1993)	$UV = \sum_{I=1}^{I_n} \frac{U_i}{n}$ U_i : Number of uses mentioned by informant *i*. *n*: Total number of informants	Measures the usefulness of species

To assess the resource availability and population status of species, the frequency of citation of the different levels of resource availability and population status of species was calculated using the following formula:

$$F\ (\%) = \frac{n}{N} * 100$$

n: Number of times the level is cited, *N*: Total count of level citations

All species with a relative frequency of citation less than 5% were considered infrequently cited species (Ouédraogo *et al.* 2013). While these species were included in the data analysis to ensure accuracy, only the frequently cited species (RFCs ≥ 5%) were presented in the graphical representations.

The chi-squared test was employed to assess the influence of ethnic group, age category and sex on the perception of the resource availability and population status of *Ficus* species. A generalized linear model (GLM) with a Poisson distribution was used to evaluate the influence of ethnic group, sex and age category on the knowledge of *Ficus* uses. Moreover, a Correspondence Analysis (CA) was performed to assess the link between population status and ethnic groups using *FactoMiner* package (Lê *et al.* 2008). The *FactoExtra* package was subsequently used to plot the factorial map (Kassambara & Mundt 2020). All statistical analyses were performed with R software version 4.2 (R Core Team 2023).

Results

Indigenous knowledge of *Ficus* diversity

A total of twenty-three species of *Ficus* were cited by informants, among which thirteen species were frequently cited ($RFC \geq 5\%$) (Figure 2): *Ficus demeusei* Warb., *F. benjamina* L., *F. dicranostyla* Mildbr., *F. glumosa* Delile, *F. ingens* (Miq.) Miq., *F. natalensis* Hochst., *F. platyphylla* Delile, *F. polita* Vahl, *F. sur* Forssk., *F. sycomorus* L., *F. thonningii* Blume, *F. trichopoda* Baker and *F. umbellata* Vahl. The most frequently cited species were respectively *F. sycomorus*, *F. platyphylla, F. sur, F. ingens* and *F. thonningii*. These five species represented 73.88% of total citations.

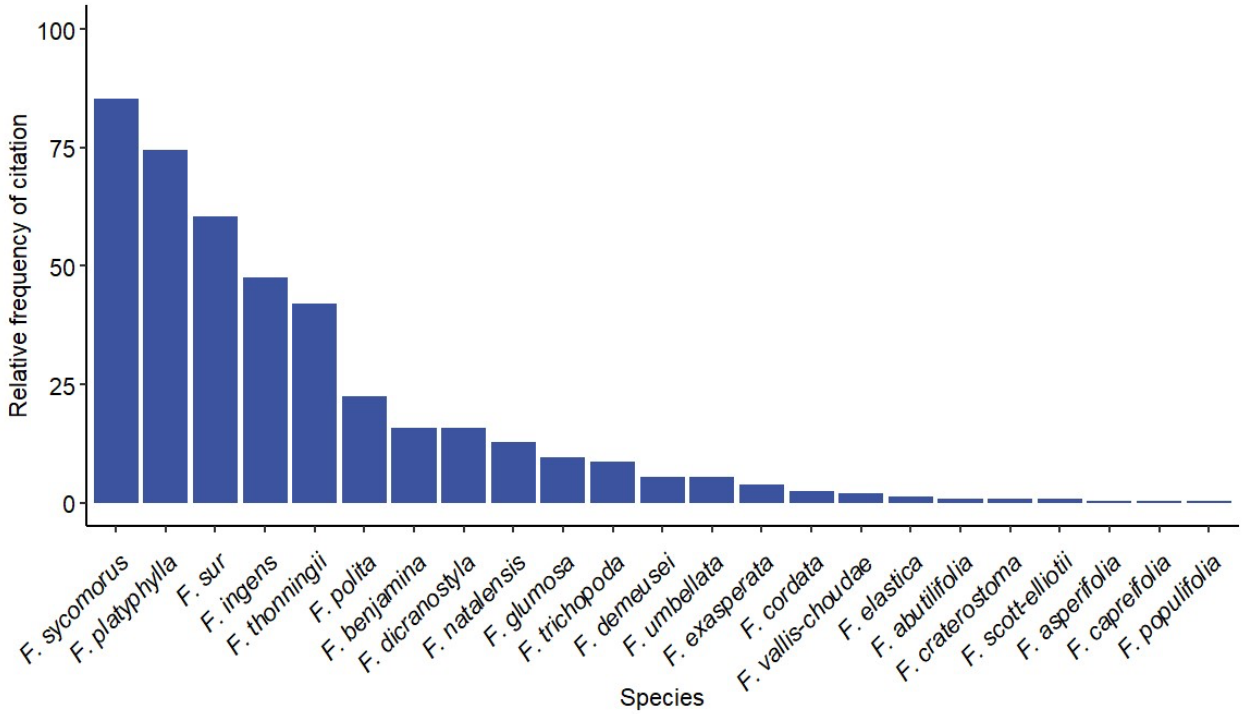

Figure 2. Relative frequency of citation of *Ficus* species

Informants' knowledge of *Ficus* species diversity varied significantly based on age category (p-value = 5.88e-3), ethnic group (p-value = 5.44e-06) and sex (p-value = 6.72e-8). Male informants demonstrated a greater knowledge of *Ficus* diversity compared to female informants. Regarding age categories, adults possessed more knowledge than both younger and older informants. Among ethnic groups, the Bobo and Sissala exhibited a higher level of knowledge compared to other groups (Table 4).

Table 4. Socio-cultural characteristics associated with *Ficus* species diversity. Summary of the generalized linear model

		Estimate	Std. error	p-value
Ethic group	Intercept	1.64481	0.06214	< 2e-16
	Kassena	-0.66107	0.11206	3.65e-09
	Mossi	-0.32015	0.09819	0.00111
	Nuni	0.02020	0.08787	0.81817
	Sissala	-0.36387	0.14960	0.01500
Age category	Intercept	1.51567	0.03919	< 2e-16
	Old	-0.09219	0.09399	0.326682
	Young	-0.27430	0.07825	0.000456
Sex	Intercept	1.15449	0.06019	< 2e-16
	Male	0.41467	0.07066	4.39e-09

Reference levels: Bobo for ethnic group, Male for sex, Adult for age category. *p-value is regarded as significant

Resource availability and population status of *Ficus* species

Ficus species were broadly perceived as rare according to informants. Indeed, 69.06% of informants supported that species were rare, and only 30.94% supported that they were abundant. The perception of resource availability varied significantly

according to species (p-value < 0.05). Most frequently cited species were perceived as rare but for *F. polita* and *F. sycomorus*, the rare and abundant perceptions were relatively balanced (Figure 3).

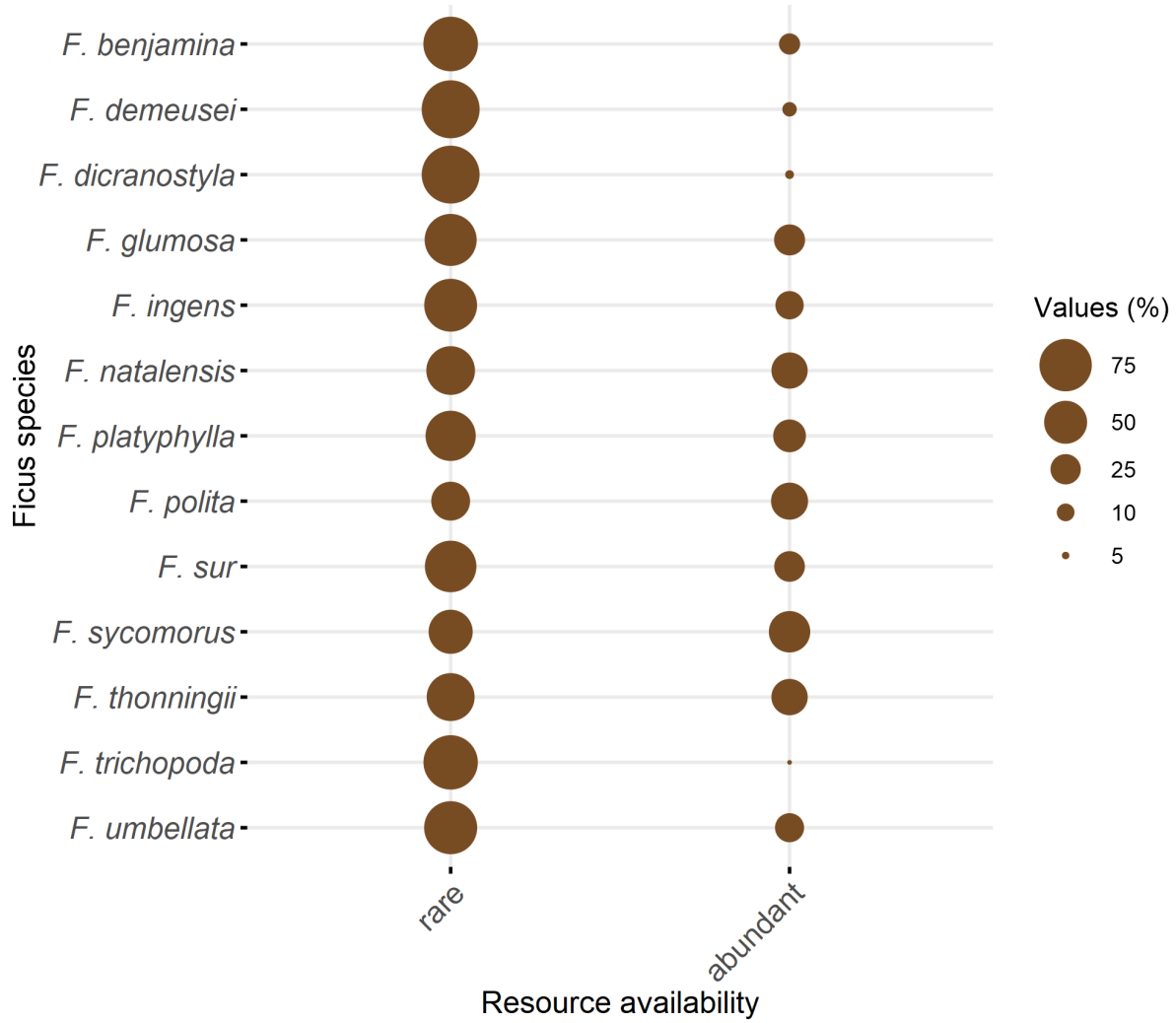

Figure 3. Informants' perceptions of the resource availability of *Ficus* species

The chi-squared tests (Table 5) revealed that only the ethnic group of informants significantly influenced the perceptions of the resource availability of species. Nuni, Bobo and Sissala mostly perceived species as rare whereas Mossi and Kassena ethnic groups perceived them as abundant.

Table 5. Influence of socio-cultural characteristics of informants on the perceptions of resource availability of *Ficus* species

		Perceptions of resource availability of *Ficus* species		
		Rare (%)	Abundant (%)	p-value
Ethnic group	Bobo	21.15	9.2	4.6e-12*
	Kassena	7.41	6.21	
	Mossi	11.83	8.12	
	Nuni	24.85	4.78	
	Sissala	5.97	0.48	
Sex	Male	51.07	21.7	0.26
	Female	18.01	9.21	
Age category	Young	14.04	6.97	0.21
	Adults	46.31	19.06	
	Old	8.71	4.92	

*p-value is regarded as significant

In line with informants' perceptions regarding species' resource availability, a notable disparity emerged in informants' perceptions regarding population status. Species were mostly perceived as declining, supported by 41.39% of perceptions. 31.58% and 27.02% of informants reported a stable and increasing status, respectively. This perception significantly varied according to species (p-value < 0.05). All frequently cited species were perceived as declining except for *F. thonningii* and *F. polita* which were perceived as increasing and stable, respectively (Figure 4).

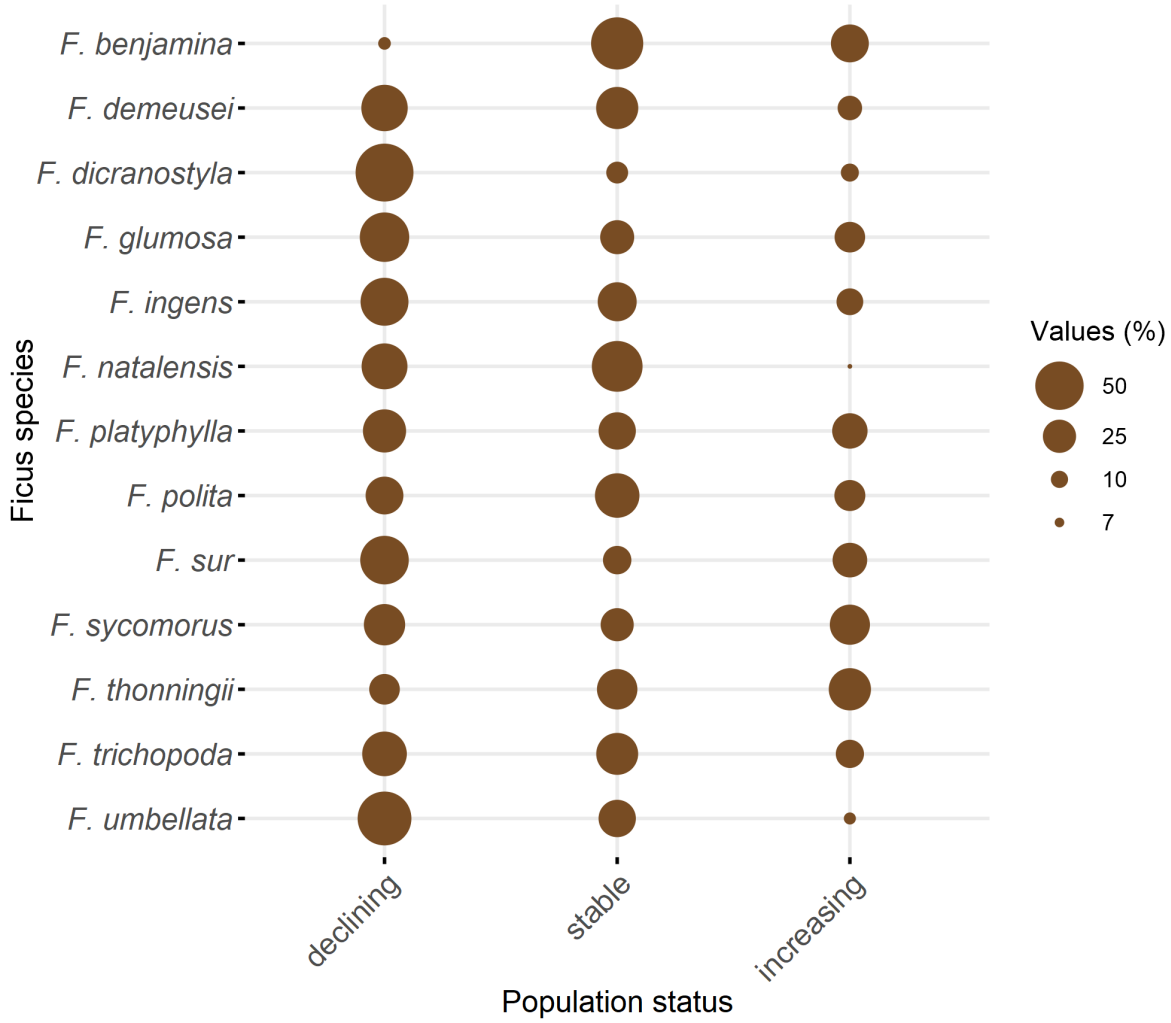

Figure 4. Informants' perceptions of the population status of *Ficus* species

The chi-squared test (Table 6) revealed that only the ethnic group of informants influenced the perceptions of *Ficus* species' population status (p-value = 1.07e-09).

Table 6. Influence of the socio-cultural characteristics of informants on the perception of the population status of *Ficus* species

		Perceptions on the population status of *Ficus* species			
		Increase (%)	Decline (%)	Stable (%)	p-value
Ethnic group	Bobo	4.92	14.87	10.91	
	Kassena	3.48	8.15	1.56	
	Mossi	7.67	5.52	6.95	1.06e-09*
	Nuni	7.19	13.07	9.35	
	Sissala	2.16	2.28	1.92	
Sex	Male	20.12	29.72	22.47	0.69
	Female	6.95	11.75	8.99	
Age category	Young	6.44	8.69	6.03	
	Adults	17.79	27.51	19.94	0.12
	Old	2.86	5.21	5.52	

*p-value is regarded as significant

The relationship between the perception of *Ficus* population status and ethnic groups is illustrated by the correspondence analysis in Figure 5. The cumulative percentage of variances revealed that the first two dimensions explained 63.6% and 36.4% of the total variations, respectively. It showed that the declining status was associated with Nuni while the increasing status was associated with Mossi and Sissala. The stable status was most associated with Bobo in the main dimension.

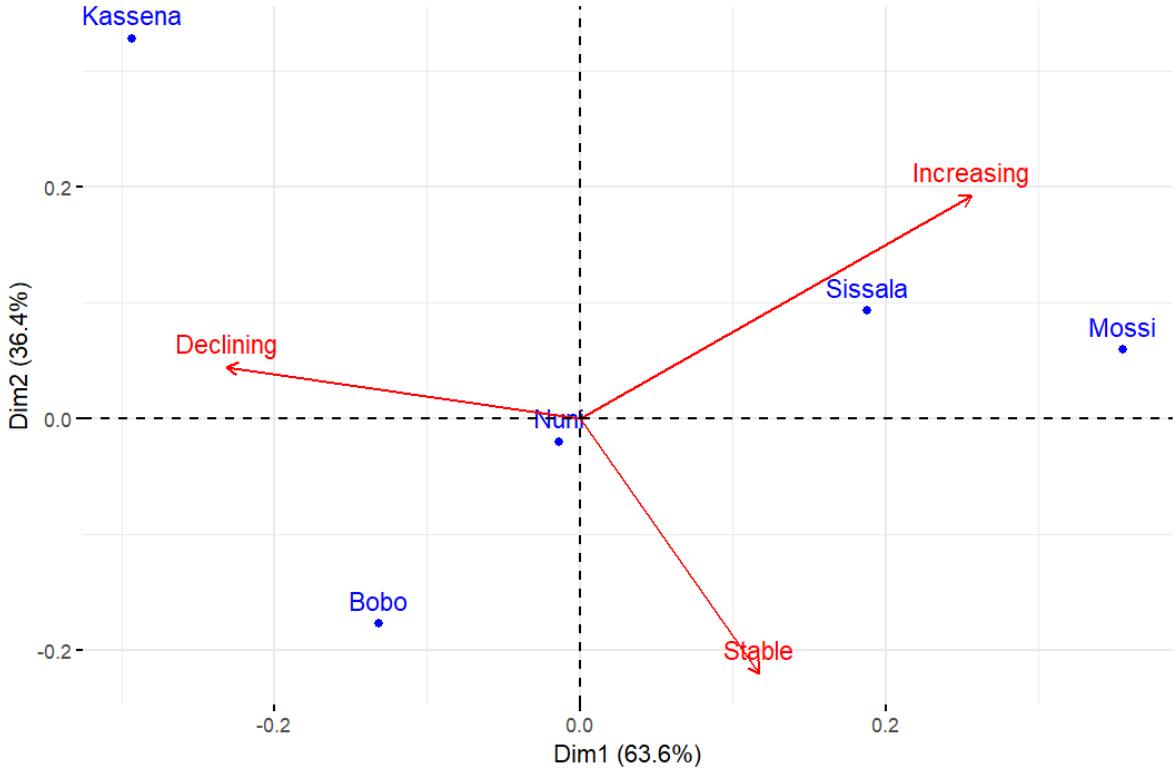

Figure 5. Relationship between perceived *Ficus* populations status and informants' ethnic groups

Diversity of *Ficus* species uses

Ficus species were used in several use categories. Medicine emerged as the use category where *Ficus* species were the most used, with a relative frequency of 91.25%. It was followed by fodder (90%), food (84.58%), firewood (79.16%), and medico-magic uses (22.08%). Handcraft, construction and trade were less represented with relative frequencies less than 8%. Besides the predefined use categories, *Ficus* species were also used for shade (77.08%) and ornamentation (19.16%). The calculated use values showed that *F. sycomorus* was the most useful species. It was followed by *F. sur* and *F. platyphylla* (Table 7).

The correlation between plant organs/parts and use categories (Figure 6) indicated that figs were primarily used for food (50%) and fodder (35.88%), with lesser use in medicine (11.34%). Leaves were predominantly used for fodder and medicine, with lesser use in food. Wood was mostly used for firewood. Aerial root, bark, latex and root were exclusively used for medicine.

Table 7. Uses and use value of *Ficus* species

Species	Medicine	Food	Fodder	Firewood	Trade	Construction	Medico-magic use	Handcraft	Shade	ornamentation	Use value
F. sycomorus	lea, la, fig, rt	fig, lea	lea	woo		woo	woo, tree,		tree		2.72
F. platyphylla	lea, la, bar, art, rt, fig	la, fig, lea	lea	woo		x	bar, lea, bra,	x	tree		1.54

F. sur	fig, lea, la, bar, rt	fig,	lea	woo	fig	fr, rt, lea	x	tree		1.42
F. ingens	lea, bar, la, art, rt	fig, lea	lea	woo		bar		tree		0.96
F. thonningii	fig, lea, bar, la, art, rt	fig,lea	lea			lea, bar, fig		tree	tree	0.85
F. benjamina	lea, rt		lea			x		tree	tree	0.03
F. capreifolia		fig								0.004
F. natalensis	fig, lea, bar, la,	fig	lea	woo		bar				0.29
F. glumosa	la, fig, lea, art, rt	fig,	lea	woo				tree		0.2
F. trichopoda	lea, bar, rt		lea	woo						0.11
F. exasperata	la, fig, lea, rt		lea	woo						0.1
F. umbellata	lea, rt, la	fig	lea	woo				tree		0.09
F. cordata	lea, la, bar, rt	fig	lea	woo						0.07
F. elastica	fig, bar			woo				tree		0.03
F. polita	lea, art, bar, rt	fig	lea	woo		rt, lea, art,		tree	tree	0.35
F. abutilifolia			lea	woo						0.01
F. scott-elliotii	rt, bar									0.02
F. asperifolia	la									0.004
F. craterostoma										0.01
F. dicranostyla	lea, la, fig	lea	lea	woo	lea			tree		0.41
F. populifolia	x		lea							0.01
F. vallis-choudae	fig		lea	woo						0.04

Abbreviations: art: aerial root, bar: bark, fig: fig, la: latex, lea: leaf, tree: tree, rt: root, woo: wood, x: unspecified

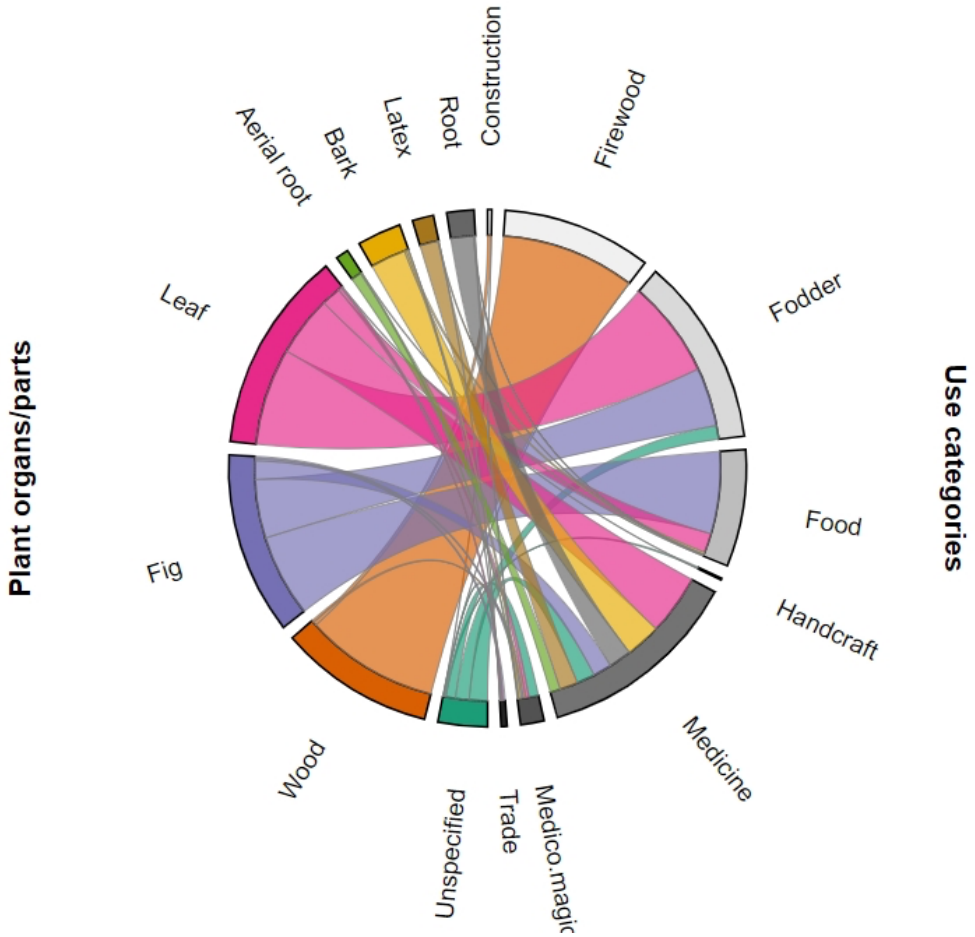

Figure 6. Relationship between use categories and plant organs/parts

Medicine uses

Informants reported 20 *Ficus* species used in medicine to treat various illnesses (Table 8). *Ficus sycomorus* was the most cited species with a relative frequency of citation of 64.84% for medicinal uses. It was followed by *F. platyphylla* (44.29%), *F. sur* (42.92%) and *F. ingens* (31.51%). The other species were less represented with relative frequencies of citations less than 30%. Leaves emerged as the most frequently used parts (32.86%), followed by bark (19.16%), root (12.43%), figs (10.15%), latex (9.90%) and aerial root (5.58%).

Table 8. Medicinal uses of *Ficus* species. Languages between parentheses

Species	Local names	Illnesses/Virtues	Parts/organs
F. asperifolia		Unspecified	latex
F. benjamina		unspecified	Bark, leaf
F. cordata		Unspecified	Bark, root, leaf, latex
F. craterostoma		Unspecified	leaf
F. dicranostyla	**Kathiao** (G)	Teeth aches, whitlow, diarrhea	Leaf, fruit, la
F. elastica		Unspecified	Root, bark
F. exasperata		diabetes	Bark, leaf, root
F. glumosa	**Kunkui-miiga** (M), **karaga** (N), **dundeehi** (K), **m'bourou** (D)	Unknown diseases, diarrhea, scorpion bite, ringworm	Bark, leaf, aerial root, latex, latex
F. ingens	**Kunkuiiga** (M), **Kunkuii-peelga** (M), **Kamaro** (N), **Keekeehi** (F), **Kaprokakinga** (K)	Wounds, fracture, dislocation, hemorrhoid, teeth aches, entorse, dermatosis, malaria, ulcers, malaria,	Aerial roots, bark, leaf, root, latex
F. natalensis	**Yinyibalabolo** (D), **N duueren** (F), **Zerneblé** (Ba)	Wounds, postpartum hemorrhage, luxation, sprain, malaria, ulcers	Leaf, root, aerial root, latex

F. platyphylla	**Kamsâogo** (M), **Kaproto** (K), **Kaprokawogon** (K) **Kaprotaalé** (K), **Kapoo** (N), **Gall** (S), **n'duunen** (F), **Kobaahi** (F), **Wonho** (D)	Difficult childbirth, wounds, fatigue, goiter, tummy aches, fracture, dislocation, headaches, diarrhea, teeth aches, malaria, sinusitis, ringworm, cough, tongue aches, neck pains	Bark, root, leaves, latex, branches, aerial roots
F. polita	**Kosweer-n-yamb zanga** (M), **Kosweer-n-yamb zaka** (M), **Guintoa** (D), **Djatigifaga** (D)	Fracture, luxation, contagious diseases, malaria, dislocation	Bark, leaf, aerial root, root
F. populifolia		Unspecified	Unspecified
F. scott-elliotii		Unspecified	Root, bark
F. sur	**Womsèèga** (M), **Kaprokazenkatenga** (K), **Kaprobara** (N), **Toroborotou** (D), **boundrou** (D), **boulounsounou** (D), **rimattabekeehi** (F), **finfili Prusol** (S).	Wounds, buttons, fatigue, hemorrhoid, inflammation, fracture, throat sore, teeth aches, ringworm, dislocation, madness, uterus fatigue	Bark, leaf, root, latex, aerial root
F. sycomorus	**Kankanga** (M), **Finfili** (D), **Kapro** (K, N), **Pru** (S), **Ibbi** (F), **Toroyiri** (D), **Sôn** (Bi)	diarrhea, cheek swelling, wounds, fatigue, bronchitis, inflammation, sore throats, tummy aches, breast pain, malaria, cough, ringworm, fracture, dislocation.	Bark, root, leaves, latex, branches
F. thonningii	**Kusga** (M), **Kamanguya** (N), **jatiguifaga** (D), **Yirtenga** (D), **Zairainga** (Ba), **Yamkoom** (G), **Djatigifaga Yille** (Sa), **Tutoiga** (S).	Wounds, fracture, dislocation, fatigue, teeth aches, sore throats, malaria, arterial hypertension	Aerial roots, bark, leaf, root, latex
F. trichopoda	**Blatolo** (N), **toroboroyiri** (D), **toroborotou** (D), **Paan** (N)	Unspecified	Bark, leaf, root
F. umbellata	**Djatigi tinti** (D)	Fatigue, luxation	Leaf, latex, root
F. vallis-choudae		Malaria	Leaf, root, latex

Abbreviations: Ba: Bambara; Bi: Bissa; D: Dioula; F:Fulani; G:Gouin, K:Kassena; N:Nouni; M:Mossi; Sa:Sambala; S: Sissala

Food and fodder uses

Sixteen *Ficus* were mentioned to be used for food. *Ficus sycomorus*, *F. sur* and *F. platyphylla* emerged as the most frequently cited ones, with frequencies of citations exceeding 20%. Except for *F. dicranostyla* whose leaf was the only organ consumed, for all these species, the fig was the most consumed organ (90% - 100%), typically consumed ripe. Several *Ficus* species were reported to be consumed primarily during periods of food scarcity or exclusively by children. In contrast, *F. sycomorus* and *F. sur*, *F. vallis-choudae* were consumed regardless of food availability.

Leaves were mainly used as vegetables (98%). *Ficus dicranostyla* exhibited the highest frequency (93%) of leaf used for this purpose, mostly in the province of Sissili. The leaves of *F. sycomorus*, *F. platyphylla*, and *F. sur* were also reported as vegetable sources, albeit with lower utilization (10%-19.23%) compared to *F. dicranostyla*.

As far as fodder was concerned, all *Ficus* species were mentioned to be used. The leaf was the most consumed organ (57.34%) by ovine, caprine, and bovine species. Leafy branches of *F. sycomorus* were pruned for this purpose. Figs of *F. sycomorus* and *F. sur* were also consumed as fodder.

Medico-magic uses

Ten species were cited for the medico-magic uses. They were used for rituals (RFC = 15.25%), to bring wealth (18.64%), to promote good fortune (20.34%), and for curing ailments that could not be cured by modern medicine (8%). For example, the

aerial roots of *F. platyphylla* were cited by 3.75% of informants as a component in the production of lucky and protective soap. *Ficus sycomorus* (RFC = 8.75%) was cited for its perceived ability to enhance cognitive function. As for rituals, F. *sycomorus* played a role in Kassena funeral practices. Its wood was used as grave covering material. *Ficus sur* (5.83%) was considered a symbol of fertility and so, barren women and women having difficulties in producing mother's milk could make supplications to the plant during the night for their wishes to be granted.

Certain Ficus species were associated with specific cultural beliefs. For instance, within subgroups of the Bobo and Gouin ethnic groups growing epiphytic Ficus species in domestic settings was reported to be prohibited. This prohibition was attributed to a belief that growing them would result in the death of the family patriarch.

Other uses

According to the informants, all the species were used for firewood. However, for some ethnic groups, notably the Kassena and certain Nuni, the use of *F.* sycomorus as firewood was forbidden, as its wood was used to cover the grave during burial. The utilization of *Ficus* species in construction, handcraft, and trade was minimal, with relative frequencies of citations below 8%. The figs of *F. sur* and leaves of *F. dicranostyla* were cited as traded, in the provinces of Nahojuri and Sissili. Beyond these uses, *Ficus* species were planted for shade notably *F. sycomorus, F. platyphylla, F. ingens* and *F. polita*. In the ornamental use category, *F. benjamina* and *F. polita* were the most cited, with a relative frequency of citation of 7.08% and 2.91%, respectively.

Influence of socio-cultural characteristics on the knowledge of *Ficus* uses

The indigenous knowledge on the uses of *Ficus* species was significantly influenced by the socio-cultural characteristics of informants (Table 8) namely ethnic group (p-value = 0.002), age category (0.001) and sex (8.75e-06). Nuni and Bobo ethnic groups exhibited a more substantial knowledge compared to the other ethnic groups (p-value = 0.02). Regarding sex, male informants exhibited a higher degree of knowledge. Furthermore, adults had a superior understanding of *Ficus* species' uses compared to younger and older informants.

Table 8. Socio-cultural characteristics associated with uses of *Ficus* species. Summary of the generalized linear model

		Estimate	Std. Error	P-value
Ethnic group	Intercept	2.45	0.07	< 2e-16*
	Kassena	-0.37	0.12	0.00295*
	Mossi	-0.22	0.11	0.06
	Nuni	-0.04	0.11	0.67
	Sissala	-0.24	0.17	0.168
Sex	Intercept	2.38	0.04	< 2e-16*
	Female	-0.49	0.08	6.97e-06
Age category	intercept	2.37	0.05	< 2e-16*
	Elderly	-0.21	0.12	0.08
	Young	-0.35	0.10	4.89e-4*

Reference levels: Bobo for ethnic group, Male for sex, Adult for age category. *p-value is regarded as significant

Discussion

Indigenous knowledge of *Ficus* species diversity

Twenty-three *Ficus* species were cited by informants, representing 85% of the recorded *Ficus* species in Burkina Faso. Only 13 species had a high relative frequency of citation. That suggests that while people are aware of many *Ficus* species, they tend to remember those that are arguably the most utilitarian to them. This result is in line with Ouédraogo *et al.* (2013) and can be explained by the abundance and the cultural significance of certain species over others. The rank of *F. sycomorus, F. platyphylla* and *F. sur* at the top of most frequently cited species corroborates the report from Diop *et al.* (2012) in Senegal. This suggests that these three species are the most important and most abundant ones to informants. In Sawadogo *et al.* (2024)'s review of *Ficus* of Africa, these three species were already found among the topmost important ones in Africa.

The difference observed between the knowledge of species diversity and socio-cultural characteristics can be explained in several ways. For the sex and age category, this difference can be explained by the knowledge of the uses of species. As

pointed out by Ouattara *et al.* (2022), the knowledge of a species depends on the knowledge of its uses. As so, it may indicate that male informants have more knowledge of the uses of species than female informants do; similarly, adults have more knowledge than young and old informants. As for ethnic groups, in addition to the evident link with knowledge of uses, it can also derive from the availability of species in their areas (Zon *et al.* 2022).

Ficus species are broadly perceived as rare and declining according to informants. While the decline aligns with the worldwide trend of biodiversity and particularly in Burkina Faso, the rarity of *Ficus* species contrasts with the status of the study zone which is renowned for having high floristic diversity (Schmidt *et al.* 2005). Anthropogenic activities, particularly the expansion of agricultural lands, could play a significant role in this situation (Belem *et al.* 2019). According to Traoré (2013), farmers annually clear substantial areas of bushland to expand their fields during which useful species, including *Ficus* species, are not spared. Moreover, in agricultural lands that could conserve biodiversity through agroforestry systems, several *Ficus* species are less likely to be preserved. Indeed, Larwanou (2013) and Cisse *et al.* (2020) showed that besides *F. sycomorus*, none of *Ficus* species is considered a high-priority species. That could also explain why *F. sycomorus* is among the species less affected by resource rarity and decline. The second reason is related to the ecology of most *Ficus* species (Appendix 1) which grow in wetlands and forests (Arbonnier 2019, Berg & Corner 2005). Despite being the most watered climatic zone of the country, the Sudanian zone experienced over the years a decrease in precipitation (Karambiri & Gansaonre 2023). This decrease may have consequently shifted the suitable habitats of certain *Ficus* species. Finally, we have the exploitation of species resources that has always constituted a problem in Africa. Species are sometimes overharvested, particularly in medicine where most harvested organs are vital ones (Thiombiano & Kampmann 2010).

The significant difference in the ethnic groups' perceptions regarding the resource availability and population status of *Ficus* species is in line with those found by Zon *et al.* (2022) who also found varying population status depending on the ethnic group. The fact that Sissala and Mossi perceive species increasing may suggest that the decline of *Ficus* species in their area may not be as pronounced as that of other valuable species, or that the population of *Ficus* is abundant enough, making the decline less noticeable (Zon *et al.* 2022). It may also stem from effective conservation practices within the local population that promote species growth. For instance, Bationo et al. (2004) and Cissé et al. (2019) highlighted the successful conservation efforts of the Sissala ethnic group, particularly through reforestation and agroforestry. These practices are invaluable and could serve as a model for adoption by other ethnic groups.

Uses of *Ficus* species

Ficus platyphylla, F. sur and *F. sycomorus* are the most useful *Ficus* species according to their use values. This finding once again suggests that these species are the most widespread (Gonçalves *et al.* 2016) and deeply integrated into culture such that the traditional knowledge of their uses has been preserved over generations. This result corroborates the findings of Sawadogo *et al.* (2024) who also found that these three species are among the most important species in Africa.

Firewood, fodder, food and medicine are the most cited use categories with the higher relative frequencies of citations. Similar results were reported by Ouédraogo *et al.* (2017) about the uses of woody species in northern Burkina Faso. Zizka *et al.* (2015) also reported that species in Burkina Faso are mostly used for fodder, food and medicine.

The predominance of medicine confirms the medicinal potential of *Ficus* species as reported by Olaoluwa *et al.* (2022). *Ficus* species are particularly important not only for rural populations (Ouoba *et al.* 2022) but also for practitioners of conventional medicine (Ouoba *et al.* 2023). The majority of ailments reported by the informants are corroborated by scientific studies, be it malaria (Ibrahim *et al.* 2020), diabetes (Deepa *et al.* 2018), asthma, or tuberculosis. *Ficus* species provide efficient health solutions for rural people who do not have easy access to health facilities against deadly diseases such as malaria. It is one of the main causes of consultations accounting for 43% of all consultations in Burkina Faso (World Health Organization 2024). Given the disparity among the repartition of health infrastructures in the country (Zon *et al.* 2020), *Ficus* species could constitute an alternative given their multiple pharmacological properties (Chindo *et al.* 2016, Hassan *et al.* 2022, Manisha *et al.* 2021).

The high use of *Ficus* for fodder is likely due to the high nutritive content and the biology of the species. Indeed, several species including *F. thonningii* (Berhe 2013, Mengistu *et al.* 2017), *F. sycomorus* (Kassa *et al.* 2015) are recognized as a good source of nutrients, ensuring ruminant livestock growth and development. Moreover, the evergreen nature of most *Ficus* species such as *F. sycomorus* (Berg & Corner 2005), and their ability of producing figs year-round (Huang *et al.* 2019) constitute a notable asset, ensuring a year-round availability of fodder, a crucial factor for sustaining livestock even during seasonal fluctuations.

In the field of firewood, which is the main source of energy for approximately 80% of people in Burkina Faso (Arevalo 2016), there is a notable prevalence of uses of *Ficus* species. A similar result was reported by Ipulet (2007) in Uganda where all species were mentioned as being used for firewood. However, previous studies sustaining an intense use of *Ficus* species in Burkina Faso are difficult to find. Koffi *et al.* (2018) for example, reported that useful species are rarely used for firewood. This result may indicate a scarcity of preferred species for firewood to such an extent that people ceased sorting species.

Ficus species are used for food, confirming their keystone role for humans (Shanahan *et al.* 2001). They have good nutritive elements, vitamins, and suitable mineral elements necessary to maintain good health (Achi *et al.* 2017). Mineral elements such as calcium, magnesium, and phosphorus (Nkafamiya *et al.* 2010) provide several benefits. For children, they strengthen bones and help them to grow (Bronner 2003). That could explain why figs are widely consumed by children. For men, fig consumption has been associated with a reduced risk of teeth loss (Adegboye *et al.* 2010). The fact that *Ficus* species can produce figs year-round (Huang *et al.* 2019) makes them suitable for ensuring food security in the current food shortage in the country due to ongoing violence (Kafando & Sakurai 2024). Informants' preference for *F: sycomorus, F. sur* and *F. platyphylla* for food corroborates the findings of Belem *et al.* (2007) in Burkina Faso and Hankiso *et al.* (2023) in Ethiopia. Arbonnier (Arbonnier 2019) also highlighted the importance of these species in food along with other species such as *F. vallis-choudae.* One reason behind this preference is likely the size of the fig. Unlike these species, several *Ficus* species in Burkina Faso including *F. thonningii, F. trichopoda, F. ingens, F. cordata* have small figs (Wilson & Downs 2012), and given the hollow nature of figs' receptacle (Halevy 2019), the resulting pulp is exceptionally thin and may have contributed to a certain reluctance of people to consume it. Additionally, besides *F. carica* which can be parthenocarpic (Rosianski *et al.* 2016), most figs contain dead wasps upon ripening which may contribute to a reluctance of some people to preferentially consume them.

The limited use of *Ficus* species for construction and handcraft suggests that most species lack the essential traits required for such uses such as the hardness of the wood, straightness and resistance to fungi (Pushpakumara *et al.* 2023). Their utilization in construction or handcrafting endeavors would likely be impractical owing to heightened susceptibility to fungal infections or structural weakness. This assumption is supported by Mansour *et al.* (2023) who found that the wood of *F. sycomorus* was not durable and strong enough for construction and handcrafting purposes. Furthermore, several species such as *F. abutilifolia, F. asperifolia, F. benjamina, F. cordata, F. polita, F.* sur and *F. vallis-choudae,* are small trees (Arbonnier 2019) rendering them unsuitable for construction.

Effect of socio-cultural characteristics on *Ficus* species uses

The knowledge of informants about *Ficus* species' uses significantly differed according to sex, age category, and ethnic group. This result aligns with the findings of previous ethnobotany studies that showed that socio-cultural deeply influence the knowledge of plant species' uses (Tiétiambou *et al.* 2016, Goudégnon *et al.* 2018, Salako *et al.* 2018, Traoré *et al.* 2021, Zon *et al.* 2023). According to ethnic groups, Bobo and Nuni exhibit more substantial knowledge about the uses of species than Mossi, Sissala, and Kassena. For Bobo, this superiority of knowledge can be attributed to their presence across a wider geographical area within the study area, compared to other ethnic groups. Indeed, Bobo are found in the provinces of Comoe and Houet where they are native. This ancestral presence has enabled them to develop an increased familiarity with local species and their uses. This can also be derived from the availability of *Ficus* species in their area. As pointed out by previous studies, the knowledge and uses of species are a function of species' availability (Gonçalves *et al.* 2016). Furthermore, cultural prohibitions regarding the use of certain species can negatively impact knowledge about their uses. This is the case for *F. sycomorus* in Kassena and certain Nuni areas which is forbidden for firewood or handcraft. This was already highlighted by Kristensen and Balslev (Kristensen & Balslev 2003).

As far as sex is concerned, male informants have more knowledge than females despite the wide belief that women have more contact with biodiversity than men (Salako *et al.* 2018). This result probably finds its origin in the roles of men and women in society, which leads to a specialization regarding plant uses between the two genders (Fulton 2004, Salako *et al.* 2018). According to Elias and Carney (2007), women are the main holders of knowledge about plants' domestic uses. That is why for example, Tiétiambou *et al.* (2016) and Saussey *et al.* (2008) found that female informants had more knowledge than male informants about oilseed species. Indeed, women may have greater knowledge about the use for food since they are responsible for kitchen and selling products in markets. As far as use categories such as medicine, construction, handcraft, and medico-magic are concerned, men have a superiority as they are generally responsible for related tasks in society (Salako *et al.* 2018).

According to the age category, adults had more knowledge than young and old informants. This result contrasts with many studies that showed that old people generally have more knowledge about the uses of species than young people and adults, mostly because they have accumulated knowledge about the uses of species over the years (Etongo *et al.* 2017). While this statement may be true for a single species, it is not forcefully true for multiple species. Indeed, age-related health problems such as memory loss and eyesight problems (Maharani *et al.* 2018) could negatively affect the ability of older people to even recognize species, consequently leading to an overall lesser knowledge.

Lessons and perspectives for *Ficus* species conservation

The rarity and decline of *Ficus* species in the Sudanian zone, even if field studies are needed to confirm this statement, pose a great concern as this zone is the most suitable for *Ficus* species in Burkina Faso (Berg & Corner 2005). This suggests that the situation would be worse in the two other climatic zones which are drier. There exists a significant threat to the *Ficus* species in Burkina Faso whose importance is no longer to be proven. In addition to their great socio-cultural importance for rural populations, *Ficus* species play key ecological roles in ecosystems (Cottee-Jones *et al.* 2016, Shanahan *et al.* 2001). Therefore, the local extinction of *Ficus* species will have serious consequences on many co-occurred species, including their pollinators and some ecosystem services. Therefore, conservation measures must be undertaken, prioritizing the most threatened species such as *F. dicranostyla, F. vallis-choudae, F. scott-elliotii* to ensure their sustainable availability. It is important to look for ways to promote the inclusion of *Ficus* species in agricultural lands through the sensibilization of farmers.

Despite appearing less useful to informants, *Ficus* species with low use values should not be left aside from the conservation efforts. They must be conserved for the protection of the local biological diversity. This is particularly important given that the one-to-one relationships of *Ficus* species and their pollinators depend on a minimum population size threshold for long-term viability (Bronstein *et al.* 1990).

Conclusion

This study revealed the declining trend of the *Ficus* genus species according to locals' perception in Burkina Faso. This alarming situation highlights the urgent need to implement targeted conservation strategies for this plant group. However, due to the large number of species within the *Ficus* genus and the challenges associated with conserving such biodiversity, it will be crucial to prioritize certain species. The resource availability, population status, use categories and use values of the different species revealed in this study can play a key role in determining these priorities.

Nevertheless, the vulnerability of local communities, combined with their heavy dependence on natural resources for basic needs, presents a significant challenge to conservation efforts. Balancing resource conservation with sustainable use in this context is difficult. Thus, it is critical to involve local populations in conservation initiatives through awareness campaigns, emphasizing the importance of preserving these species. Conservation efforts should not only focus on species with high use values but also consider underutilized species to ensure the preservation of biodiversity as a whole.

Declarations

List of abbreviations: RFC: Relative frequency of citation; RFCs: Relative frequency of citation of species; RFCu: Relative frequency of citation of use category; UV: Use value; GLM: Generalized linear model; CA: Correspondence analysis; GBIF: Global Biodiversity Information Facility

Ethics approval and consent to participate: Individual consent to participate in the study was obtained prior to the study by the administration of the questionnaire. Only people who consented to participate in the study were considered.

Consent for publication: Not applicable.

Availability of data and materials: The datasets used and/or analyzed in the current study are available from the corresponding author on request.

Competing interests: The authors declare that they have no competing interests.

Funding: The Ministry of High Education, Research and Innovation of Burkina Faso financially supported the study through a doctoral grant.

Authors' contributions: YS and PS designed the study and collected the data under the supervision of AO and MB. YS performed the statistical analyses and wrote the first manuscript. PS, AZ, and BK contributed to the statistical analyses. All authors have contributed to the revision of the manuscript and have read and approved the final manuscript.

Acknowledgements

We thank the Ministry of High Education, Research and Innovation of Burkina Faso for the financial support and all the informants from the different villages for sharing their knowledge with us.

Literature cited

Achi NK, Onyeabo C, Ekeleme-Egedigwe CA, Onyeanula JC. 2017. Phytochemical, proximate analysis, vitamin and mineral composition of aqueous extract of *Ficus capensis* leaves in South Eastern Nigeria. Journal of Applied Pharmaceutical Science 7(3):117-122. doi:10.7324/JAPS.2017.70319.

Adegboye ARA, Fiehn N-E, Twetman S, Christensen LB, Heitmann BL. 2010. Low Calcium Intake Is Related to Increased Risk of Tooth Loss in Men. Journal of Nutrition 140(10):1864-1868. doi:10.3945/jn.109.117770.

Albuquerque UP, Hanazaki N. 2009. Five Problems in Current Ethnobotanical Research—and Some Suggestions for Strengthening Them. Human Ecology 37(5):653-661. doi:10.1007/s10745-009-9259-9.

Agence de Promotion des Produits Forestiers Non Ligneux. 2011. Stratégie nationale de valorisation et de promotion des produits forestiers non ligneux, Agence de Promotion des Produits Forestiers Non Ligneux, Ouagadougou, Burkina Faso.

Arbonnier M. 2019. Arbres, arbustes et lianes des zones sèches d'Afrique de l'Ouest. CIRAD-MNHN, Montpellier, France.

Arevalo J. 2016. Improving woodfuel governance in Burkina Faso: The experts' assessment. Renewable and Sustainable Energy Reviews 57:1398-1408. doi:10.1016/j.rser.2015.12.178.

Bationo BA, Yelemou B, Ouedraogo SJ. 2004. Le neem (*Azadirachta indica* A. Juss.), une espèce exotique adoptée par les paysans du centre-ouest du Burkina Faso. Bois & Forets des Tropiques 282:5-10. doi:10.19182/bft2004.282.a20219.

Belem B, Marie B, Nacoulma I, Gbangou , Roland, Kambou S, Hanne , Hansen H, Gausset Q, Lund S, Raebild A, Lompo D, Ouedraogo M, Theilade I, Boussim IJ. 2007. Use of Non Wood Forest Products by local people bordering the "Parc National Kaboré Tambi", Burkina Faso. Journal of Transdisciplinary Environmental Studies 6(1).

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(5):2186. doi:10.4314/ijbcs.v12i5.20.

Belem MO, Yameogo J, Ouedraogo S, Nabaloum M. 2017. Étude ethnobotanique de *Boscia senegalensis* (Pers.) Lam (Capparaceae) dans le Département de Banh, Province du Loroum, au Nord du Burkina Faso. Journal of Animal and Plant Sciences 34:5390-5403.

Berg C, Corner E. 2005. Moraceae: Ficeae. Spermatophyta, 17(2), 1-702.

Berg CC, Wiebes JT. 1992. African fig trees and fig wasps. Amsterdam, New York: North-Holland

Berhe H. 2013. Evaluation of the effect of *Ficus thonningii* (blume) on soil physicochemical properties in Ahferom district of Tigray, Ethiopia. Journal of Soil Science and Environmental Management 4(2):35-45. doi:10.5897/JSSEM13.0369.

Bronner F. 2003. Calcium nutrition and metabolism. Dental Clinics of North America 47(2):209-224. doi:10.1016/S0011-8532(02)00097-6.

Bronstein JL, Gouyon P, Gliddon C, Kjellberg F, Michaloud G. 1990. The Ecological Consequences of Flowering Asynchrony in Monoecious Figs: A Simulation Study. Ecology. 71(6):2145-2156. doi:10.2307/1938628.

Chindo BA, Schröder H, Koeberle A, Werz O, Becker A. 2016. Analgesic potential of standardized methanol stem bark extract of *Ficus platyphylla* in mice: Mechanisms of action. Journal of Ethnopharmacology 184:101-106. doi:10.1016/j.jep.2016.03.003.

Cisse A, Ouattara M, N'guessan EA, Abrou JEN. 2020. Diversité végétale et usages des plantes dans une zone de savane soudanienne : Cas de la localité de Ferkessédougou (Nord, Côte d'Ivoire). International Journal of Biological and Chemical Sciences 14(8):2807-2825. doi:10.4314/ijbcs.v14i8.13.

Cissé M, Bationo BA, Traoré S, Boussim IJ. 2019. Perception d'espèces agroforestières et de leurs services écosystémiques par trois groupes ethniques du bassin versant de Boura, zone soudanienne du Burkina Faso. Bois & Forets des Tropiques 338:29. doi:10.19182/bft2018.338.a31680.

Cottee-Jones HEW, Bajpai O, Chaudhary LB, Whittaker RJ. 2016. The Importance of *Ficus* (Moraceae) Trees for Tropical Forest Restoration. Biotropica 48(3):413-419. doi:10.1111/btp.12304.

Deepa P, Sowndhararajan K, Kim S, Park SJ. 2018. A role of *Ficus* species in the management of diabetes mellitus: A review. Journal of Ethnopharmacology 215:210-232. doi:10.1016/j.jep.2017.12.045.

Diop D, Mbaye MS, Kane A, Sambou B, Noba K. 2012. Chorologie, écologie et ethnobotanique de certains *Ficus sp.* L. (Moraceae) au Sénégal. Biotechnology, Agronomy, Society and Environment 16(1):13-24.

Elias M, Carney J. 2007. African Shea Butter: A Feminized Subsidy from Nature. Africa 77(1):37-62. doi:10.3366/afr.2007.77.1.37.

Etongo D, Djenontin INS, Kanninen M, Glover EK. 2017. Assessing use-values and relative importance of trees for livelihood values and their potentials for environmental protection in Southern Burkina Faso. Environment, Development and Sustainability 19(4):1141-1166. doi:10.1007/s10668-016-9787-6.

Fulton S. 2004. Women & Plants. Gender Relations in Biodiversity Management & Conservation. Economic Botany 58(3):486-486. doi:10.1663/0013-0001(2004)058[0486:DFABRE]2.0.CO;2.

Gonçalves PHS, Albuquerque UP, Medeiros PMD. 2016. The most commonly available woody plant species are the most useful for human populations: a meta-analysis. Ecological Applications 26(7):2238-2253. doi:10.1002/eap.1364.

Goudégnon EOA, Vodouhê FG, Gouwakinnou GN, Salako VK, Oumorou M. 2018. Ethnic and generational differences in traditional knowledge and cultural importance of *Lannea microcarpa* Engl. & K. Krause in Benin's Sudanian savannah. Bois & Forets des Tropiques 334:49. doi:10.19182/bft2017.334.a31491.

Guigma Y, Ouédraogo A, Zerbo P, Millogo-Rasolodimby J. 2014. The Use of Wild Plants as Food in Three Adjoining Villages in Southern Burkina Faso. Journal of Nutritional Ecology and Food Research 2(2):105-115. doi:10.1166/jnef.2014.1076.

Halevy AH. 2019. Handbook of flowering. Volume VI. 1st ed. Boca Raton: CRC Press,, Boca Raton, U.S.A.

Hankiso M, Warkineh B, Asfaw Z, Debella A. 2023. Ethnobotany of wild edible plants in Soro District of Hadiya Zone, southern Ethiopia. Journal of Ethnobiology and Ethnomedicine 19(1):21. doi:10.1186/s13002-023-00588-2.

Hassan M, Bala S, Gadanya A. 2022. Anticonvulsant effect of flavonoid-rich fraction of *Ficus platyphylla* stem bark on pentylenetetrazole induced seizure in mice. Nigerian Journal of Basic and Clinical Sciences 19(1):20. doi:10.4103/njbcs.njbcs_33_21.

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.

Huang Y-T, Lee Y-F, Kuo Y-M, Chang S-Y, Wu C-L. 2019. Fruiting phenology and nutrient content variation among sympatric figs and the ecological correlates. Botanical Studies 60(1):27. doi:10.1186/s40529-019-0275-9.

Ibrahim MK, Garga MA, Mohammad A, Abdullahi HA, Yusuf MB, Ibrahim N, Garba IL, Bako I, Salisu B. 2020. In vitro antimalarial activity of leave petroleum ether extract of *Ficus sycomorus* plant. International Journal of Research 8(12):279-283. doi:10.29121/granthaalayah.v8.i12.2020.2677.

Institut national de la statistique et de la démographie. 2019. Cinquiéme Recensement Général de la Population et de l'Habitation du Burkina Faso.

Ipulet P. 2007. Uses of genus *Ficus* (Moraceae) in Buganda region, central Uganda. African Journal of Ecology 45(3):44-47. doi:10.1111/j.1365-2028.2007.00856.x.

IUCN. 2024. The IUCN Red List of Threatened Species. Version 2024-2. https://www.iucnredlist.org

Kafando WA, Sakurai T. 2024. Armed conflicts and household food insecurity: Effects and mechanisms. Agricultural Economics 12814. doi:10.1111/agec.12814.

Karambiri BLCN, Gansaonre RN. 2023. Variabilité Spatio-temporelle de la Pluviométrie dans les Zones Climatiques du Burkina Faso: Cas de Bobo -dioulasso, Ouagadougou et Dori. European Scientific Journal 19(9):262. doi:10.19044/esj.2023.v19n9p262.

Kassa A, Tadele Y, Mekasha Y. 2015. *Ficus sycomorus* (Sycamore Fig or Shola) Leaf, A Potential Source of Protein for Ruminants: A Review. Journal of Fisheries & Livestock Production 03(04). doi:10.4172/2332-2608.1000152.

Kassambara A, Mundt F. 2020. factoextra: Extract and Visualize the Results of Multivariate Data Analyses. https://CRAN.R-project.org/package=factoextra.

Koffi CK, Gazull L, Gautier D. 2018. Variability of household fuelwood consumption in a rural Sudano-Sahelian context in Burkina Faso. Energy for Sustainable Development 47:75-83. doi:10.1016/j.esd.2018.09.001.

Kristensen M, Balslev H. 2003. Perceptions, use and availability of woody plants among the Gourounsi in Burkina Faso. Biodiversity and Conservation 12(8):1715-1739. doi:10.1023/A:1023614816878.

Lansky EP, Paavilainen HM. 2010. Figs: The Genus *Ficus*. CRC Press, Boca Raton, U.S.A.

Larwanou M. 2013. Espèces prioritaires et options agroforestières pour la mise en valeur de la Grande Muraille Verte. IRD Éditions. (Le projet majeur africain de La Grande Muraille Verte). p. 31-51.

Traoré L. 2013. Influence du climat et de la protection sur la végétation ligneuse de la partie occidentale du Burkina Faso. Université de Ouagadougou, Ouagadougou, Burkina Faso.

Lê S, Josse J, Husson F. 2008. FactoMineR : An R Package for Multivariate Analysis. Journal of Statistical Software 25(1). doi:10.18637/jss.v025.i01. [accessed 2024 Mar 23]. http://www.jstatsoft.org/v25/i01/.

Maharani A, Dawes P, Nazroo J, Tampubolon G, Pendleton N. 2018. Visual and hearing impairments are associated with cognitive decline in older people. Age and Ageing 47(4):575-581. doi:10.1093/ageing/afy061.

Manisha, Singh Ajeet Pal, Singh Amar Pal. 2021. Pharmacological profile of *Ficus thonningii*: a review. World Journal of Current Medical and Pharmaceutical Research 3(6):160-162. doi:10.37022/wjcmpr.v3i6.206.

Mansour MMA, Mohamed WA, El-Settawy AAA, Böhm M, Salem MZM, Farahat MGS. 2023. Long-term fungal inoculation of *Ficus sycomorus* and Tectona grandis woods with Aspergillus flavus and Penicillium chrysogenum. Scientific Reports 13(1):10453. doi:10.1038/s41598-023-37479-1.

Mengistu A, Kebede G, Assefa G, Feyissa F, Adane T, Mekuria S. 2017. Production, management and utilization of the indigenous multipurpose fodder tree chibha (*Ficus thonningii*) in Ethiopia. Academia Journal of Agricultural Research 5(5):380-390. doi: https://10.14662/ARJASR2017.045.

Ministère de l'Environnement, de l'Economie verte et du Changement climatique. 2019. Tableau de bord de l'environnement 2019. Ministère de l'Environnement, de l'Economie verte et du Changement climatique, Ouagadougou, Burkina Faso.

Nkafamiya II, Osemeahon SA, Modibbo UU, Aminu A. 2010. Nutritional status of non-conventional leafy vegetables, *Ficus asperifolia* and *Ficus sycomorus*. African Journal of Food Science 4(3):104-108.

Institut Géographique du Burkina. 2012. Base nationale de données topographiques. Institut Géographique du Burkina, Ouagadougou, Burkina Faso.

Oduro AD, Aryee IK. 2003. Investigating chronic poverty in West Africa. Chronic Poverty Research Centre, Manchester.

Olaoluwa O, Taiwo O, Nahar L, Sarker SD. 2022. Ethnopharmacology, phytochemistry and biological activities of selected African species of the genus *Ficus*. Trends in Phytochemical Research 6(1):46-69. doi:10.30495/tpr.2022.1939285.1219.

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 & Forets des Tropiques 352:43-60. doi:10.19182/bft2022.352.a36935.

Ouédraogo A, Lankoandé B, Lykke AM. 2013. Potentials for Promoting Oil Products Identified from Traditional Knowledge of Native Trees in Burkina Faso. Ethnobotany Research and Applications 11:071-083

Ouédraogo A, Thiombiano A, Hahn-Hadjali K, Guinko S. 2006. Diagnostic de l'état de dégradation des peuplements de quatre espèces ligneuses en zone soudanienne du Burkina Faso. Secheresse 17(4), 485-491.

Ouédraogo P, Bationo BA, Sanou J, Traoré S, Barry S, Dayamba SD, Bayala J, Ouédraogo M, Soeters S, Thiombiano A. 2017. Uses and vulnerability of ligneous species exploited by local population of northern Burkina Faso in their adaptation strategies to changing environments. Agriculture & Food Security 6(1):15. doi:10.1186/s40066-017-0090-z.

Ouoba K, Lehmann H, Zongo A, Pabst J-Y, Semdé R. 2022. Prevalence of traditional medicines use and adverse events: A population-based cross-sectional survey in Burkina Faso. European Journal of Integrative Medicine 51:102129. doi:10.1016/j.eujim.2022.102129.

Ouoba K, Zongo A, Lehmann H, Pabst J-Y, Semdé R. 2023. Use of traditional medicines among conventional medicine practitioners in Burkina Faso. Sante Publique 35(1):75-86. doi:10.3917/spub.231.0075.

Phillips O, Gentry AH. 1993. The useful plants of Tambopata, Peru: II. Additional hypothesis testing in quantitative ethnobotany. Economic Botany 47(1):33-43. doi:10.1007/BF02862204.

Prance GT. 1991. What is ethnobotany today? Journal of Ethnopharmacology 32(1-3):209-216. doi:10.1016/0378-8741(91)90120-3.

Pushpakumara B, Gunasekara M, Abhayathunge U. 2023. Investigation on mechanical and of Sri Lankan timber species for construction applications. Case Studies in Construction Materials 19:e02269. doi:10.1016/j.cscm.2023.e02269.

R Core Team. 2023. R: A Language and Environment for Statistical Computing. https://www.R-project.org/.

Rønsted N, Weiblen GD, Clement WL, Zerega NJC, Savolamen V. 2008. Reconstructing the phylogeny of figs (*Ficus*, Moraceae) to reveal the history of the fig pollination mutualism. Symbiosis 45:45-55.

Rosianski Y, Doron-Faigenboim A, Freiman ZE, Lama K, Milo-Cochavi S, Dahan Y, Kerem Z, Flaishman MA. 2016. Tissue-Specific Transcriptome and Hormonal Regulation of Pollinated and Parthenocarpic Fig (*Ficus carica* L.) Fruit Suggest that Fruit Ripening Is Coordinated by the Reproductive Part of the Syconium. Frontiers in Plant Science 7:1696. doi:10.3389/fpls.2016.01696.

Salako KV, Moreira F, Gbedomon RC, Tovissodé F, Assogbadjo AE, Glèlè Kakaï RL. 2018. Traditional knowledge and cultural importance of Borassus aethiopum Mart. in Benin: interacting effects of socio-demographic attributes and multi-scale abundance. Journal of Ethnobiology and Ethnomedicine 14(1):36. doi:10.1186/s13002-018-0233-8.

Sanou L, Koala J, Ouédraogo S, Ouattara B. 2022. Perceptions, services écosystémiques et vulnérabilité des espèces ligneuses à multiples usages du 20 ème site Ramsar au Burkina Faso, Afrique de l'Ouest. Afrique Science 20(3):25-40.

Saussey M, Moity-Maizi P, Muchnik J. 2008. Nouvelles formes de reconnaissance des femmes burkinabè dans la production collective de beurre de karité. Cahiers Agricultures 17(6):582-586. doi:10.1684/agr.2008.0252.

Savadogo S, Kabore A, Thiombiano A. 2017. Caractéristiques végétales, typologie et fonctions des bois sacrés au Burkina Faso. International Journal of Biological and Chemical Sciences 11(4):1497. doi:10.4314/ijbcs.v11i4.8.

Sawadogo Y, Belem M, Sabo P, Kabré B, Tiétiambou FRS, Ouédraogo A. 2024. A critical review on the *Ficus* genus in Africa: current knowledge and perspectives for its sustainable management. Biodivers Conserv. doi:10.1007/s10531-024-02881-2.

Schmidt M, Kreft H, Thiombiano A, Zizka G. 2005. Herbarium collections and field data-based plant diversity maps for Burkina Faso. Diversity and Distributions 11(6):509-516. doi:10.1111/j.1366-9516.2005.00185.x.

Shanahan M, So S, Gompton SG, Gorlett R. 2001. Fig-eating by vertebrate frugivores: a global review. Biological Reviews 76(4):529-572. doi:10.1017/S1464793101005760.

Thiombiano A, Kampmann D. 2010. Atlas de la biodiversité de l'Afrique de l'Ouest, Tome II: Burkina Faso. Goethe-Universität, Ouagadougou & Frankfurt/Main, Burkina Faso.

Thiombiano A, Schmidt M, Dressler S, Ouédraogo A, Hahn K, Zizka G. 2012. Catalogue des plantes vasculaires du Burkina Faso. Boissiera: mémoires des Conservatoire et Jardin botaniques de la Ville de Genève, France

Thomas E, Vandebroek I, Van Damme P. 2007. What works in the field? A comparison of different interviewing methods in ethnobotany with special reference to the use of photographs. Economic Botany 61(4):376-384. doi:https://doi.org/10.1663/0013-0001(2007)61[376:WWITFA]2.0.CO;2.

Tiétiambou FRST, Lykke AM, Korbéogo G, Adjima Thiombiano, Ouédraogo A. 2016. Perceptions et savoirs locaux sur les espèces oléagineuses locales dans le kénédougou, Burkina Faso. Bois & Forets des Tropiques 327(327):39. doi:10.19182/bft2016.327.a31295.

Traoré L, Hien M, Ouédraogo I. 2021. Uses, availability and endogenous conservation strategies of Canarium schweinfurthii (Engl.) (Burseraceae) in the Cascades region (Burkina Faso) . Ethnobot Res Appl. 21:01. doi:10.32859/era.21.01.1-17.

Traore L, Ouedraogo I, Ouedraogo A, Thiombiano A. 2011. Perceptions, usages et vulnérabilité des ressources végétales ligneuses dans le Sud-Ouest du Burkina Faso. International Journal of Biological and Chemical Sciences 5(1). doi:10.4314/ijbcs.v5i1.68103.

Whitney C. 2022. ethnobotanyR: Calculate Quantitative Ethnobotany Indices. https://CRAN.R-project.org/package=ethnobotanyR.

Wilson AL, Downs CT. 2012. Fruit nutritional composition and non-nutritive traits of indigenous South African tree species. South African Journal of Botany 78:30-36. doi:10.1016/J.SAJB.2011.04.008.

World Health Organization. Le Burkina Faso entame la vaccination des enfants contre le paludisme. 2024. https://www.afro.who.int/fr/countries/burkina-faso/news/le-burkina-faso-entame-la-vaccination-des-enfants-contre-le-paludisme (Accessed 11/03/2024).

Yao R, Cao J, Wang L, Zhang W, Wu X. 2019. Urbanization effects on vegetation cover in major African cities during 2001-2017. International Journal of Applied Earth Observation and Geoinformation 75:44-53. doi:10.1016/j.jag.2018.10.011.

Zizka A, Thiombiano A, Dressler S, Nacoulma BM, Ouédraogo A, Ouédraogo I, Ouédraogo O, Zizka G, Hahn K, 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(1):9. doi:10.1186/1746-4269-11-9.

Zon A-O, Kouassi EK, Tiétiambou FRS, Ouédraogo A. 2023. Usage Patterns and Conservation Practices of Wild Palm Species (Arecaceae) in Western Burkina Faso. Economic Botany. doi:10.1007/s12231-023-09595-6.

Zon AO, Tiétiambou FRS, Kabré B, Kouassi KE, Ouédraogo A. 2022. Assessment of the conservation status *of Borassus akeassii* Bayt., Ouédr. & Guinko in Western Burkina Faso through local communities perceptions and the species stands structure. Global Ecology and Conservation 39:e02284. doi:10.1016/j.gecco.2022.e02284.

Zon H, Pavlova M, Groot W. 2020. Regional health disparities in Burkina Faso during the period of health care decentralization. Results of a macro-level analysis. International Journal of Health Planning and Management 35(4):939-959. doi:10.1002/hpm.2979.

Appendix 1. Ecological habitats, conservation status and population trend of *Ficus* species (IUCN 2024)

Scientific name	Status	Population trend	Habitat
F. abutilifolia (Miq.) Miq.	Least Concern	Stable	
F. asperifolia Miq.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. benjamina L.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. capreifolia Delile	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. cordata Thunb.	Least Concern	Stable	Savanna - Dry| Shrubland - Subtropical/Tropical Dry| Rocky areas (eg. inland cliffs, mountain peaks)
F. craterostoma Warb. ex Mildbr. & Burret	Not Evaluated		
F. demeusei Warb.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. dicranostyla Mildbr.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. elastica Roxb. ex Hornem.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland| Forest - Subtropical/Tropical Moist Montane
F. exasperata Vahl	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. glumosa Delile	Least Concern	Stable	Savanna - Dry| Rocky areas (eg. inland cliffs, mountain peaks)
F. ingens (Miq.) Miq.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. natalensis Hochst.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. platyphylla Delile	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. polita Vahl	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland|Forest - Subtropical/Tropical Moist Montane|Savanna - Dry
F. populifolia Vahl	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. scott-elliottii Mildbr. & Burret	Least Concern	Stable	Savanna - Dry
F. sur Forssk.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland|Savanna - Dry|Grassland - Subtropical/Tropical Seasonally Wet/Flooded
F. sycomorus L.	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. thonningii Blume	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. trichopoda Baker	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. umbellata Vahl	Least Concern	Stable	Forest - Subtropical/Tropical Moist Lowland
F. vallis-choudae Delile	Not Evaluated		