Ethnobotanical study of *Xylopia aethiopica* (Dunal) A. Rich. and its parasites of the genus *Tapinanthus* in Benin

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Research

Abstract

Background: In response to climate change and the degradation of ecosystems, the promotion of indigenous knowledge is a key strategy for the sustainable conservation of biodiversity in West Africa. This study examines the variety of local knowledge and traditional practices related to *X. aethiopica* and *Tapinanthus* species.

Methods: An ethnobotanical survey was conducted among 172 respondents familiar with these species in order to document their uses and the plant parts involved. Statistical analyses (Chi² test and Correspondence Analysis) revealed that ethnicity significantly influenced the distribution of knowledge and uses.

Results: For *X. aethiopica*, the fruit was identified as the most valuable part of the plant (UV = 10). The species is mainly used for medicinal (39.4%), medico-religious (32.75%) and culinary (13.73%) purposes. In contrast, medico-religious (55.88%) and medicinal (38.73%) uses predominated for *Tapinanthus s*pp., reflecting knowledge systems structured by the cultural heritage and ritual traditions of each ethnic group.

Conclusions: These findings emphasise the richness and specificity of indigenous knowledge, highlighting its central role in conserving and sustainably using local plant resources. It is essential to document and integrate this knowledge into participatory ecosystem management policies in order to promote culturally appropriate and sustainable conservation strategies.

Keywords: Ethnobotany, indigenous knowledge, *Xylopia aethiopica*, *Tapinanthus* spp., Benin, conservation.

Background

Climate change and the accelerated degradation of ecosystems are putting increasing pressure on plant resources in West Africa, affecting their availability, diversity, and how they are used (Tabet-Aoul 2008; IPCC 2023). These disturbances not only compromise the ecological stability of landscapes and threaten the transmission of local knowledge systems that directly depend on them. Indigenous knowledge is therefore a valuable resource for understanding and preserving biodiversity, particularly for species that are culturally, medicinally and economically important (Yevide *et al.* 2022; Boubacar *et al.* 2025). By focusing on the relationships between communities and the plant world, ethnobotanical research provides valuable insights into traditional knowledge, the multiple uses of plants, local perceptions of environmental changes, and associated management and conservation practices (Adéwalé *et al*. 2024). As such, It serves as a privileged framework for linking the social, cultural, and ecological dimensions of biodiversity (Wyndham *et al.* 2024; Trekpo *et al*. 2024), while offering perspectives for sustainable management adapted to local contexts (Agbodan *et al*. 2023).

Among the plant species of major interest is *Xylopia aethiopica* (Dunal) A. Rich. (Annonaceae), an aromatic multipurpose species that is widely distributed across tropical African forests and savannas (Erhirhie *et al*. 2014; Yin *et al*. 2019). This species is renowned for its cultural and socioeconomic importance and plays a key role in traditional healthcare systems and the diet of rural communities (Fetse *et al.* 2016; Evuen *et al*. 2022). However, increasing anthropogenic pressures particularly overexploitation, deforestation, and climate disturbances pose significant threats to the sustainability of its natural populations (Ganglo *et al*. 2017). At the same time, hemi-parasitic plants of the genus *Tapinanthus* (Loranthaceae), commonly known as African mistletoes, form close interactions with *X. aethiopica*, from which they obtain some of their nutrients (Isikhuemen *et al*. 2020). Although these species are often perceived as harmful, they also hold a significant place in traditional pharmacopoeia (Wang *et al*. 2022). Given this ecological interdependence and the diversity of local perceptions it entails, this study explores the ethnobotanical knowledge related to *X. aethiopica* and *Tapinanthus* species in Benin. The aim is to assess their socio-cultural importance and the local management practices that influence their conservation. Ultimately, this work aims to contribute to the valorisation of indigenous knowledge to inform the development of integrated, culturally relevant conservation strategies.

Materials and Methods

Study area

The study was conducted in Benin, a West African country located between latitudes 6°30′ and 12°30′ N and longitudes 1°00′ and 3°40′ E, covering an area of 114,763 km² (Neuenschwander & Toko 2011) (Fig. 1). Benin exhibits remarkable ecological diversity, structured into three main climatic zones: Guineo-Congolian Zone in the South, Sudano-Guinean Zone in the Central region, and Sudanian Zone in the North (FAO 2007). This climatic variability gives rise to a mosaic of vegetation types ranging from semi-deciduous dense forests to wooded and shrubby savannas, supporting a rich and varied flora (Adam & Boko 1993). From a socio-economic perspective, the Beninese population, estimated at 14.46 million inhabitants in 2024 (World Bank 2025), remains predominantly rural and deeply rooted in traditional practices. This strong cultural attachment underscores the crucial role of ethnobotanical knowledge in the sustainable management and conservation of biodiversity.

Data Collection

Endogenous knowledge related to the two species was collected from local populations in six municipalities of Benin, distributed across the country's three major climatic zones. In addition to areas where the species are abundant, the study also considered regions where they are not present but are widely known about and used by local communities. To ensure comprehensive national coverage, the municipalities of Kandi, Natitingou, Bantè, Ouèssè, Avrankou and Athiémé were selected (Fig. 1).

A preliminary exploratory survey was conducted among ten randomly selected individuals per site to determine the number of respondents to be interviewed in each municipality. This preliminary survey provided an estimate of the proportion of people with knowledge of the species. This estimate was then used in Dagnelie's formula (1998) to calculate the appropriate sample size.

$$n = \frac{U^2_{1-\frac{\alpha}{2}} \, x \, p(1-p)}{d^2}$$

Where:
n: the total number of people to be surveyed in the study;

$U^2_{1-\frac{\alpha}{2}}$: is the value of the normal random variable for a probability value of α = 0.05 and $U^2_{1-\frac{\alpha}{2}}$ = 1.96

p: the proportion of individuals familiar with the species;

d: the expected margin of error for any parameter to be calculated from the survey, set at 7%.

Based on this formula, the total sample size (n) was estimated to be 172 respondents.

The surveys mainly focused on: the socio-demographic characteristics of respondents, their knowledge of the different categories of species uses, the plant parts utilized, methods of preparation, diseases treated with these species, perceived threats, and local strategies for their conservation (Yevide *et al*. 2022). All data were collected in the field using the KoboCollect application.

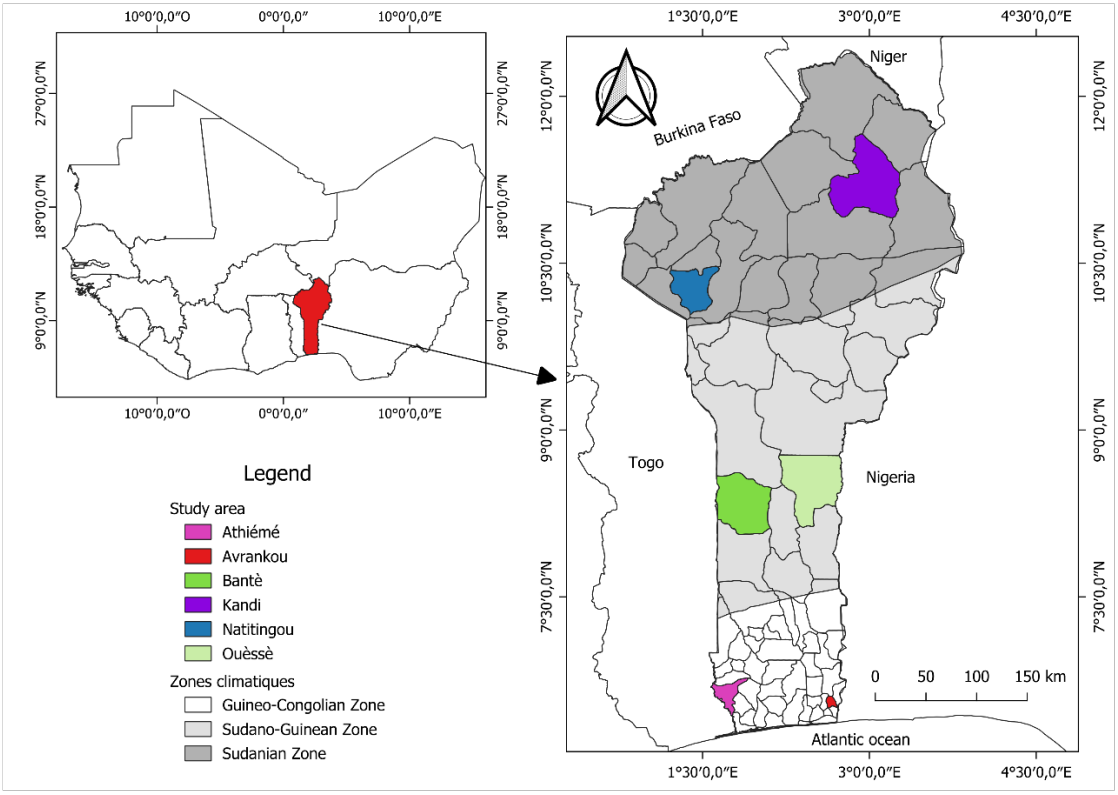

Figure 1. Distribution of climatic zones and surveyed municipalities

Data Analysis

To assess the uses and cultural significance of *Xylopia aethiopica* and *Tapinanthus* species among different ethnic groups, several ethnobotanical indices were calculated. These included the Relative Frequency of Citation (RFC), the Respondent Diversity Index (H), Pielou's Evenness Index (J), and the Ethnobotanical Use Value (UV), to quantify the importance of these species in local knowledge and practices.

Relative Frequency of Citation (RFC)

The RFC corresponds to the number of times a specific usehas been mentioned by respondents within a social group, divided by the total number of respondents in that same group. This index helps identify the most commonly cited uses among local populations (Dossou *et al*. 2012; Honfo *et al*. 2015).

$$\mathrm{FRC} = \frac{\mathrm{n}}{\mathrm{N}} \times 100$$

Where:

RFC is the Relative Frequency of Citation, expressed as a percentage; n is the number of respondents who mentioned a given use; and N is the total number of citations recorded.

Respondent diversity index (H)

The respondent diversity index (H) assesses the diversity of uses reported by informants within an ethnic group, taking into account both the number of different uses and their relative frequency. It is calculated according to the Shannon-Wiener formula (Shannon 1948; Silalahi *et al.* 2015):

$$\mathrm{H} = -\sum_{\mathrm{i}=1}^{\mathrm{S}} \mathrm{p_i} log_2 \,(\mathrm{pi})$$

Where:

H: diversity index of uses reported by the respondents,

S: total number of distinct uses cited for a given species,

p_i: proportion of citations for the *i*-th use relative to the total number of citations for all uses.

A higher value of *H* indicates a greater diversity of uses within the ethnic group. This index therefore quantifies both the richness and the distribution of ethnobotanical knowledge among informants.

Pielou's Evenness Index (J)

Pielou's evenness index measures the uniformity of the distribution of reported uses. It is calculated using the diversity index (H) and the total number of uses (S), according to Pielou (1966):

$$\mathrm{J} = \frac{\mathrm{H}}{log_2(\mathrm{s})}$$

Where:

J: evenness index,

H: diversity index of uses previously calculated,

S: total number of distinct uses cited.

When J approaches 1, it indicates that all uses are cited with approximately equal frequency by respondents, reflecting a uniform distribution of knowledge. Conversely, values close to 0 suggest a strong dominance of certain uses over others, indicating uneven knowledge distribution among informants.

Consensus Value of categories of Uses (Cs)

The consensus value (*Cs*) assesses the degree of agreement among respondents regarding a specific use of a given species. It ranges from -1 to 1 and is calculated using the following formula:

$$\mathrm{Cs} = \frac{2\mathrm{ni}}{\mathrm{n}} - 1$$

Where *ni* is the number of respondents reporting the use of the species in a specific use category, and *n* is the total number of respondents.

Use value (UV) of an organ

The use value of each organ will be calculated by ethnic group using the following formula (Phillips & Gentry 1993):

$$\mathrm{UV}_k = \frac{1}{\mathrm{n}} \sum_{\mathrm{i}=1}^{\mathrm{n}} \mathrm{U}_k$$

and

$$\mathrm{UV}_T = \frac{1}{\mathrm{N}} \sum_{\mathrm{i}=1}^{\mathrm{n}} \mathrm{VU}_k$$

UV_k: Represents the ethnobotanical use value of organ *k* within an ethnic group.

U_k: Number of uses reported for organ *k* by respondent *i*.

n: Total number of citations in which respondent *i* mentioned the use of the organ.

UV_T: Total use value of an organ.

N: Total number of respondents who reported at least one use of the organ.

A chi-2 test was subsequently performed to determine whether the uses of the species depend on socio-cultural factors (gender, age group, and ethnicity). Finally, a contingency table was constructed to summarize the relationships among the

studied variables. This table was then subjected to a Correspondence Analysis (CA) to explore associations between the different ethnic groups and categories of use.

Results

Demographic characteristics of respondents

Both men and women use *Xylopia aethiopica* and *Tapinanthus* spp., but men make up the majority (67%) compared to 33% for women (Fig. 2a). The age group with the most knowledge of the species is adults (aged 30-59) at 69%, followed by older people (aged over 59) at 25%, while young people (aged 16-29) are under-represented at 6% (Fig. 2b). From a religious perspective, animists are the largest group (45%), followed by Christians (38%) and Muslims (17%) (Fig. 2c). Those with no education dominate (43%), followed by those with primary (23%) or secondary (21%) education. Literate people (11%) and those with higher education (2%) are in the minority (Fig. 2d). The Adja ethnic group is the most represented in the sample (19.19%), followed by the Mahi (17.44%), the Isha and the Bariba (14.53% each) and the Tori (13.95%). The Waamas (6.4%), Otammari (5.8%), and Peulh (4.7%) are less common, while Yorubas and Kotokolis are in the minority at 1.7% each (Fig. 3).

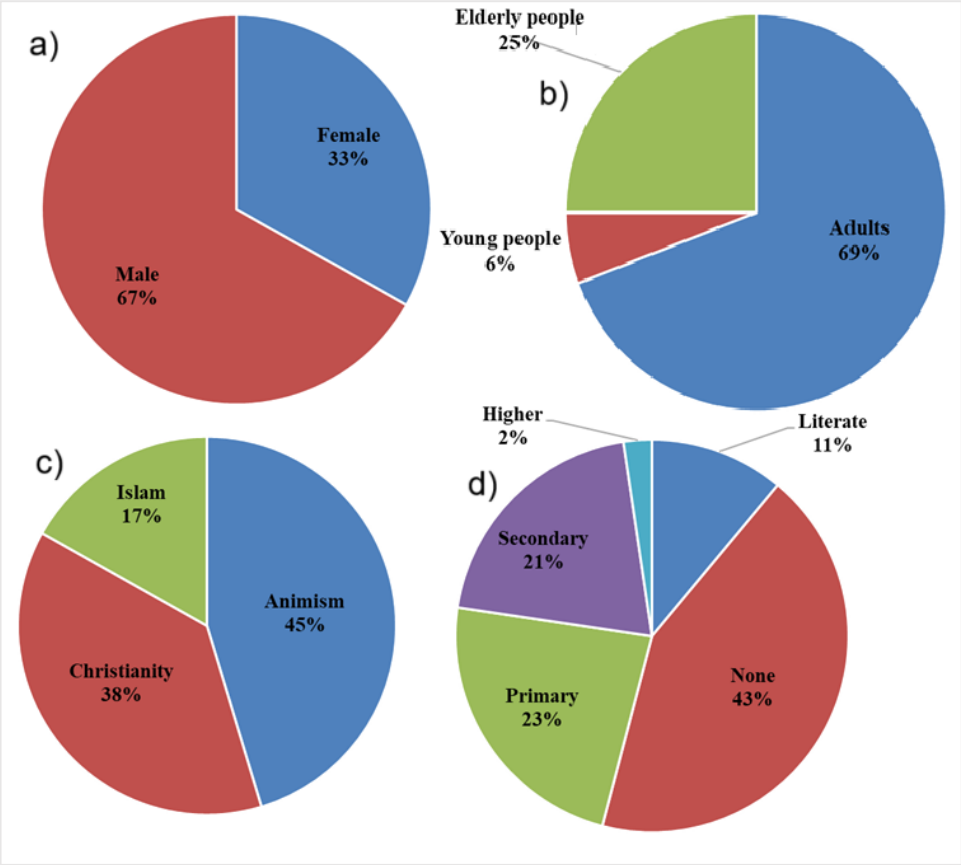

Figure 2. Distribution of respondents by gender (a), age (b), religion (c) and level of education (d)

Indigenous knowledge of *X. aethiopica*

Local names of Xylopia aethiopica by ethnic group

Table 1 reveals a wide diversity of local names attributed to *X. aethiopica* across ethnic groups in Benin, reflecting both the linguistic richness of the communities and the cultural importance of the species in their indigenous knowledge. Some names are shared among closely related groups, such as Kpédjélékoun among the Mahi and Tori and Anroun among the Isha and Yoruba, indicating cultural proximity. Other names, such as Osso among the Adja and Guera among the Bariba, reflect specific linguistic identities. This nomenclatural diversity highlights the deep integration of the species into local cultures and the variety of perceptions associated with it.

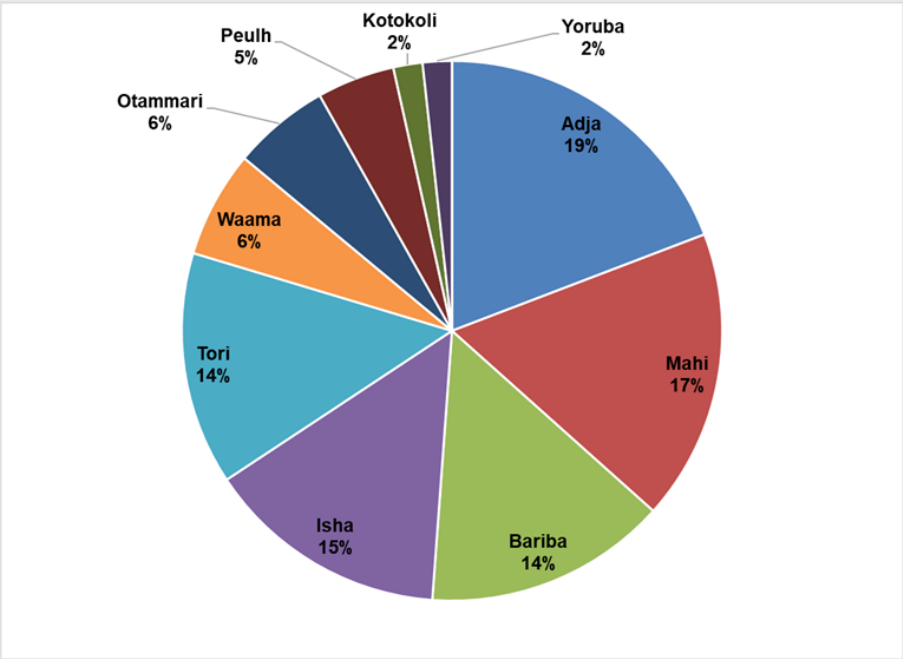

Figure 3. Breakdown of respondents by ethnicity

Table 1. The local names of *X. aethiopica* by ethnic group

Ethnic group	Name
Adja	Osso
Bariba	Guera
Isha	Anroun
Kotokoli	Souzi
Mahi	Kpedjelekoun
Otammari	Sikadoua
Peulh	Wakotor
Tori	Kpedjelekoun/Woudjelekoun
Waama	Nadofa
Yoruba	Anroun

Categories of uses of *Xylopia aethiopica*

The results indicate that *X. aethiopica* is utilized across six use categories within the communities (Fig. 4). It is primarily exploited for medicinal purposes, with a very high citation frequency (39.4%), highlighting its significant therapeutic value. This is followed by medico-religious use (32.75%), reflecting the cultural importance attributed to the species. Food uses (13.73%) are also notable, indicating its nutritional value. Uses as service wood and fuelwood, both at 5.66%, reflect substantial exploitation but are less frequent. Finally, cosmetic uses are marginal (2.7%), indicating limited application in this domain.

Analysis of the respondents' diversity indices corroborates this pattern: the Shannon diversity index (H = 2.06 bits) reveals moderate diversity of uses, and Pielou's evenness index (J = 0.80) indicates relatively balanced distribution across different use categories. These results suggest that *X. aethiopica* is recognised for its multiple cultural and utilitarian functions, emphasising its socio-cultural importance and potential value for conservation and sustainable utilisation strategies.

Consensus value of *Xylopia aethiopica* by category of use and socio-demographic group

Analysis of Table 2 shows that medicinal use dominates, with the highest consensus values in almost all groups. Although food use is present, it remains relatively uncommon. Cosmetic, timber and fuel wood uses remain limited, except among the Toris, who preserve them in a specific way. Medico-religious use is a practice shared by certain groups, particularly women, adults and certain ethnic groups such as the Ishas, the Otammari, the Kotokolis, Yorubas and the Waamas. This shows a diversity of ethnobotanical knowledge among social groups, centred on medicinal and food uses, with important implications for the promotion or conservation of ethnobotanical uses according to local cultures.

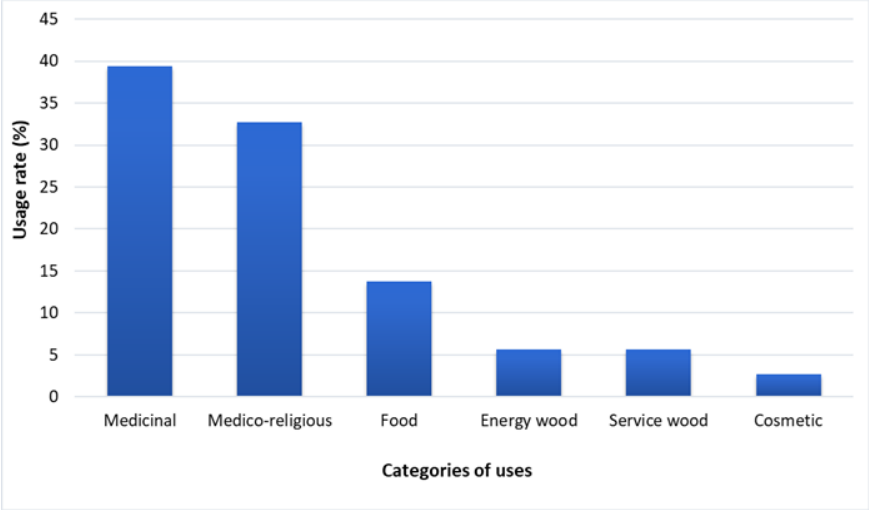

Figure 4. Categories of uses of *X. aethiopica* in Benin

Table 2. Consensus value of uses categories and by socio-demographic group of *X. aethiopica*

Socio-demographic groups	Food	Medicinal	Cosmetic	Medico-religious	Service wood	Energy wood
Gender						
Female	-0.439	0.754	-0.93	0.649	-0.825	-0.789
Male	-0.304	0.913	-0.843	0.496	-0.687	-0.704
Age group						
Adult	-0.445	0.815	-0.849	0.613	-0.731	-0.714
Young people	-0.2	1	-1	0.2	-0.6	-0.8
Elderly people	-0.11	0.953	-0.907	0.442	-0.767	-0.767
Ethnic group						
Adja	-0.81	0.939	-1	0.576	-1	-1
Bariba	0.2	0.92	-1	-0.04	-1	-1
Kotokoli	-0.33	1	-1	1	-1	-1
Isha	-0.52	0.76	-1	1	-1	-1
Mahi	-0.8	0.667	-0.933	0.267	-1	-1
Otammari	0.6	0.8	-0.8	1	-1	-1
Peulh	0.25	1	-1	0.25	-1	-1
Tori	-0.5	1	-0.25	0.667	0.833	0.917
Waama	0.273	1	-1	0.818	-1	-1
Yoruba	0.333	0.333	-1	1	-0.333	-1.001

Dependence between the frequency of citation of categories of use and socio-demographic characteristics

The results of the Chi²test (Table 3) show that knowledge of the categories of use of *X. aethiopica* varies mainly according to the ethnic groups of the communities concerned. The frequency of citation of usage categories does not depend on gender or age, as the probability associated with these statistics is 0.6452 and 0.8676, respectively. However, it does depend on variables related to ethnic groups (p-value = 0.0004).

Table 3. Results of the Chi² test between the categories of use of *X. aethiopica* and sociodemographic characteristics

Socio-demographic characteristic	p-values obtained after Chi² test
Gender	0.6452
Age group	0.8676
Ethnic group	0.0004

The Correspondence Analysis (CA) (Fig. 5) shows that the first two dimensions jointly explain 96.5% of the total inertia, with Dim1 accounting for 82.6% and Dim2 for 13.9%, demonstrating the robustness of the projection for interpreting associations.

The analysis reveals a strong cultural structuring of the uses of *X. aethiopica*. Axe 1 clearly opposes energy wood, service wood, and cosmetic uses strongly associated with the Tori people to medicinal and medico-religious uses, which are more frequently practiced by the Kotokoli, Mahi, Adja, and Isha groups. Axe 2 distinguishes the Bariba, Peulh, Waama, Otammari, and Yoruba ethnic groups, who primarily value the species for food-related uses. These results indicate that ethnobotanical practices are deeply embedded in sociocultural identities and that the diversity of uses reflects the linguistic and cultural diversity of Benin.

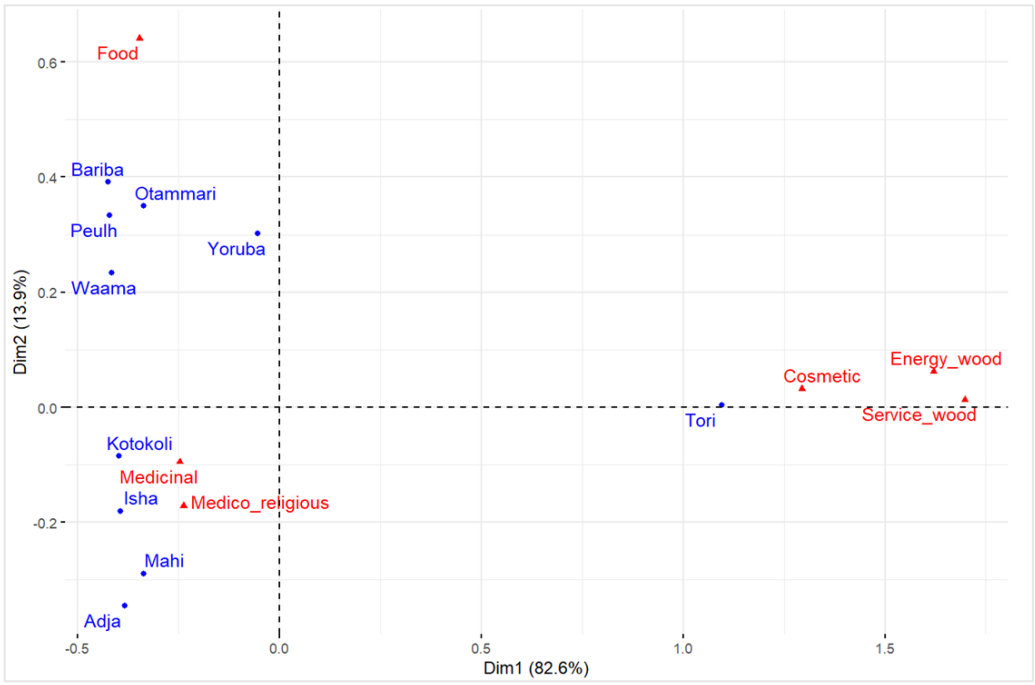

Figure 5. Analysis of the relationship between the uses of *X. aethiopica* and ethnic groups

Use Value of organs

Xylopia aethiopica has a high Total Use Value (UV_T) for its fruit (UV_T =10), revealing their value to all communities (Table 4). On the other hand, the use of wood (UV_T = 0.61), bark (UV_T = 0.58), leaves (UV_T = 0.4524) and roots (UV_T = 0.25) remains specific to the Tori ethnic group, highlighting the cultural diversity of uses. The fruits of *X. aethiopica* are distinguished by their versatility of use, whether for food, medicine, rituals or cosmetics. Dried and then ground into powder, they are used as a traditional spice to flavor various dishes, giving them a distinctive taste. In cosmetics, the fruit powder is mixed with shea butter and applied to soften and revitalize the skin, particularly in elderly people. Medicinally, the fruits are frequently used in the preparation of herbal teas and traditional remedies, often in combination with other plants. They are recommended for the treatment of stomach aches, infectious diseases, etc. In most communities, the fruits of *X. aethiopica* are essential to rituals for caring for newborns and women after childbirth.

Table 4. Use Value of *Xylopia aethiopica* Organs by gender and group

Ethnic group	Wood	Bark	Leaves	Fruit	Roots
Adja	0	0	0.0294	1	0
Bariba	0	0	0	1	0
Kotokoli	0	0	0	1	0
Isha	0	0	0	1	0
Mahi	0	0	0	1	0
Otammari	0	0	0	1	0
Peulh	0	0	0	1	0
Tori	0.61	0.58	0.423	1	0.25
Waama	0	0	0	1	0
Yoruba	0	0	0	1	0
Total (VU_T)	**0.61**	**0.58**	**0.4524**	**10**	**0.25**

We can therefore conclude from these analyses that *X. aethiopica* occupies a central place in traditional knowledge, with a marked predominance of its medicinal and medico-religious uses. The diversity of these uses varies significantly according to group ethnic, reflecting a cultural richness that should be valued in conservation and local development strategies.

Indigenous knowledge of *Tapinanthus* spp.

Categories of use of Tapinanthus spp.

Tapinanthus spp. are used in four main categories by local communities. Medico-religious use is by far the most prevalent, with a high frequency of citation (55.88%), reflecting the cultural importance attributed to these plants. Medicinal use comes in second place (38.73%), highlighting their significant role in traditional pharmacopoeia. In contrast, cosmetic (3.43%) and fodder (1.96%) uses are very rare (Fig. 6).

The results of the Chi² test (Table 5) show that ethnicity has a highly significant influence on knowledge and frequency of use of *Tapinanthus* (p-value= 0.0000). However, the results do not indicate any significant effect of gender (p-value = 0.6592) or age group (p-value = 0.4202) on knowledge of uses. These results suggest that endogenous knowledge about these species is mainly shaped by the cultural heritage specific to each ethnic group.

Furthermore, unlike many woody or herbaceous species, *Tapinanthus* spp. have only a limited number of usable parts. Due to their particular morphology, only the leaves are available and exploited by local communities for the various uses reported.

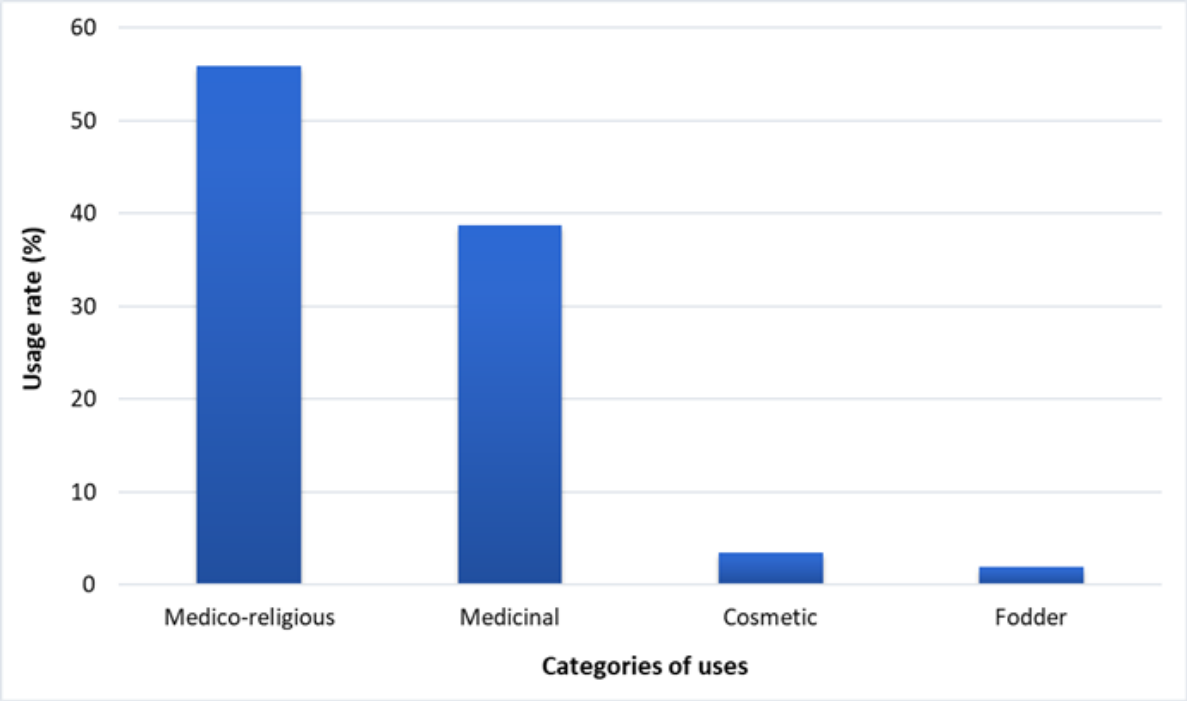

Figure 6. Categories of *Tapinanthus* spp. uses in Benin

Table 5. Results of the Chi² test between categories of *Tapinanthus* use and socio-demographic characteristics

Socio-demographic characteristic	**p-value obtained after Chi² test**
Gender	0.6592
Age group	0.4202
Ethnic group	0.0000

Consensus values for the uses of *Tapinanthus* spp. according to socio-demographic groups

Analysis of Table 6 reveals significant differences in knowledge and perceptions of the uses of *Tapinanthus* species according to socio-demographic characteristics. Consensus values are highest overall for medical and religious uses, while values for fodder and cosmetic uses are very low or even negative, reflecting a lack of knowledge within communities.

Table 6. Consensus value of *Tapinanthus* spp. by category of use and socio-demographic group

Socio-demographic groups	Fodder	Medicinal	Cosmetic	Medico-religious
Gender				
Female	-0.895	0.211	-0.947	0.789
Male	-0.956	0.244	-0.867	0.778
Age group				
Adult	-0.952	0.143	-0.881	0.762
Young people	-0.5	1	-1	0.5
Elderly people	-0.95	0.35	-0.9	0.85
Ethnic group				
Adja	-1	-0.484	-1	1
Bariba	-0.5	-0.167	-1	0.667
Isha	-1	0.913	-1	0.652
Mahi	-1	-0.0588	-0.882	0.412
Otammari	-1	0.273	-1	1
Peulh	-0.5	0.5	-1	1
Tori	-1	1	-0.478	0.739
Waama	-1	-0.143	-1	1

The Correspondence Analysis (CA) (Fig. 7) reveals a strong differentiation among ethnic groups according to the types of uses of *Tapinanthus* species. The Bariba and Peulh ethnic groups are primarily associated with fodder use, whereas the Tori stand out for their association with cosmetic use. In contrast, medicinal and medico-religious uses are more widely distributed, shared across several ethnic groups, indicating a more generalized knowledge of these practices.

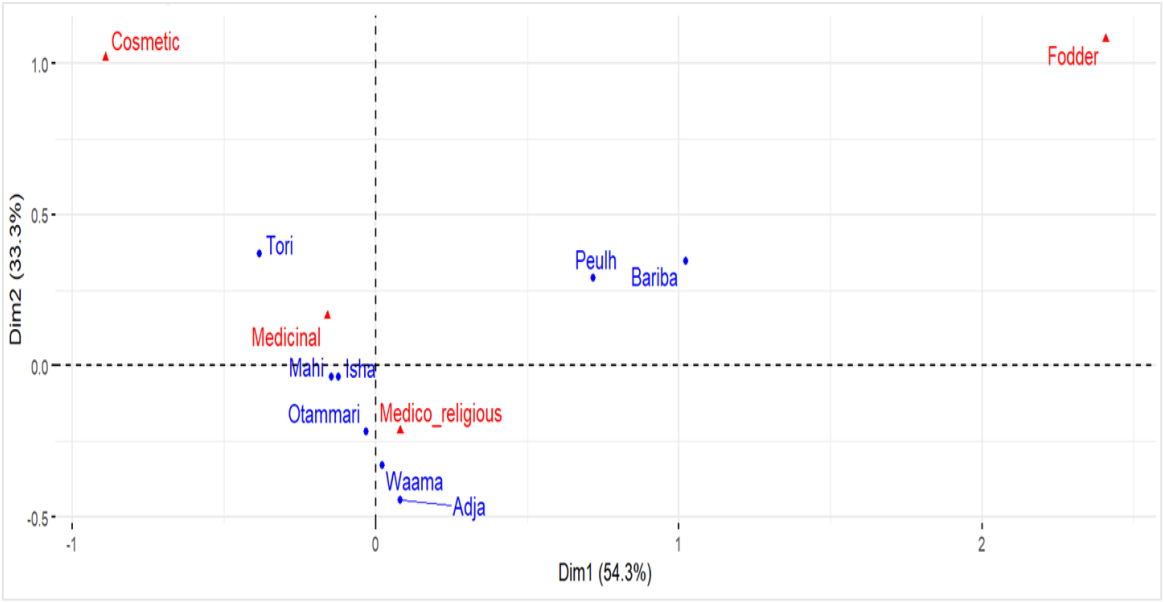

Figure 7. Analysis of the relationships between categories of uses of *Tapinanthus* spp. and ethnic groups

Discussion

The uses of *X. aethiopica* fall into six main categories, dominated by medicine, medico-religious practices, and food, which also show the highest levels of consensus among respondents. This strong convergence reflects the major cultural and therapeutic importance of the species within local communities, consistent with the observations of Dossou *et al*. (2012) on other woody species of high ethnobotanical value. According to the surveys, the fruit is the most exploited part of *X. aethiopica*. This result is consistent with those reported for *Chrysophyllum albidum* and *Beilschmiedia mannii* (Lougbegnon 2015; Yévité *et al.* 2022), suggesting that, for several forest species, fruits represent a valuable resource due to their food, medicinal, or cultural uses. Furthermore, knowledge regarding the uses of *X. aethiopica* varies significantly only according to ethnic group. This result corroborates that of Assogbadjo *et al*. (2011), who also highlighted significant differences between ethnic groups, but no variation related to sex or age in the case of the baobab in Benin. However, this contrasts with the

results obtained for other species, where ethnobotanical knowledge varied according to sex, age, and ethnic group (Lougbegnon *et al.* 2015; Wédjangnon *et al.* 2016). The nutritional and medicinal-magical importance attributed to *X. aethiopica* could be explained by its richness in bioactive compounds with proven therapeutic properties. Several studies have indeed highlighted the presence of secondary metabolites such as alkaloids, flavonoids, tannins, and essential oils, known for their antimicrobial, anti-inflammatory, and antioxidant effects (Anyamele *et al.* 2023; Ndoye *et al.* 2024; Nguedia *et al.* 2025). This phytochemical richness justifies its widespread traditional use, both as a food spice and as a remedy for various ailments within local communities (Airaodion *et al.* 2019; Ogbuagu *et al*. 2019). Given the relatively limited distribution of *X. aethiopica* in Benin and the high demand for it, this ethnobotanical importance could lead to increased pressure on its natural populations (Camou-Guerrero *et al.* 2008; Dossou *et al.* 2012). It can therefore be deduced that, due to its high ethnobotanical value and the exploitation pressure exerted mainly on its fruits, *X. aethiopica* could be exposed to an accumulated risk of overexploitation, particularly in areas where its distribution is limited.

The results of this study show that species of the genus *Tapinanthus* are primarily used in four main categories, among which magico-religious practices and medicinal uses occupy a predominant place, with the highest levels of consensus among respondents. This predominance reflects the cultural, symbolic, and therapeutic importance of the genus *Tapinanthus* within local communities. These results are consistent with several studies conducted on Loranthaceae in Africa, notably those by Soumaila *et al.* (2017), Mana *et al.* (2021), and Ahamidé *et al.* (2024), which have highlighted the intensive use of Loranthaceae parasites in the traditional pharmacopoeia as well as in the ritual practices of many local populations. In general, local communities use Loranthaceae to treat various ailments, including mental, digestive, and reproductive disorders, as well as certain chronic diseases, often within a context combining therapeutic care and magico-religious practices (Azo'o *et al.* 2013; Ahamidé *et al.* 2017). The strong emphasis placed on the medicinal, magico-religious uses of *Tapinanthus* spp. could be explained primarily by the particular morphology and ecology of this genus. As hemiparasitic plants, *Tapinanthus* do not develop in the soil but on other host plants, which gives them a unique ecological status. This intermediate position between autonomy and parasitism contributes to their perception as atypical plants, often considered mysterious or endowed with supernatural powers, thus facilitating their integration into traditional rituals and beliefs (Arbonnier 2009; Buhari *et al.* 2022; Tarfa *et al.* 2022).Furthermore, the widely reported medicinal and magico-religious uses of *Tapinanthus* could also be linked to the partial acquisition of pharmacodynamic properties from their host plants, as suggested by several authors (Arbonnier 2009; Mana *et al.* 2021). This ability to concentrate or integrate certain bioactive compounds from the host would enhance the perceived therapeutic efficacy of these species, which would explain their high value in local traditional healthcare systems. The study's results also reveal that surveyed knowledge regarding the uses of *Tapinanthus* varies significantly according to ethnic origin. This finding corroborates the work of Ahamidé *et al.* (2024), who also showed that ethnobotanical knowledge of *Loranthaceae* differs among ethnic groups. Similarly, Ahoyo *et al*. (2023) emphasized that knowledge of specific traditional medicinal uses varies according to ethnic origin, but also according to other sociocultural factors. This interethnic variation in knowledge can be explained by the predominantly oral transmission of traditional knowledge, generally within cultural groups. This knowledge is strongly influenced by local beliefs, therapeutic practices, the socio-ecological environment, and the lifestyles specific to each ethnic group, which contributes to the differentiation of uses and perceptions of plant species from one group to another. These results underscore the need to implement sustainable management and conservation strategies for *X. aethipica* and species of the genus *Tapinanthus* that integrate local uses and sociocultural knowledge, in order to ensure the long-term survival of natural populations of the species while maintaining its food, medicinal, and cultural functions. They also highlight the importance of valuing traditional knowledge specific to each ethnic group, both for the preservation of ethnobotanical heritage and for the development of therapeutic and conservation approaches adapted to local contexts.

Conclusion

The findings of this study on *X. aethiopica* and *Tapinanthus* spp. in Benin highlight the richness and diversity of local knowledge associated with these species. These plants occupy a central role in the medicinal and spiritual practices of local communities, reflecting their high socio-cultural value. The recorded uses, dominated by medicinal and magico-religious applications, demonstrate the strong integration of these species into cultural, therapeutic, and spiritual practices. Variations according to ethnic affiliation underscore the richness and cultural specificity of traditional knowledge, whereas the lack of significant influence of sex and age indicates cross-generational knowledge transmission within communities. For *X. aethiopica*, the fruits stand out as the key organ, combining food, medicinal, and medico-religious uses. For *Tapinanthus* spp., the leaves represent the main exploited resource, primarily for medicinal and medico-religious purposes. These results underscore the importance of promoting endogenous knowledge within participatory conservation strategies and sustainable plant resource management. Integrating this knowledge into local conservation policies is essential to enhance the cultural and ecological resilience of communities in the face of environmental change.

Declarations

List of abbreviations: RFC: Relative Frequency of Citation, CA: Correspondence Analysis, UV: Use value

Ethics approval and consent to participate: The development of this ethnobotanical study followed ethical and legal guidelines for research involving traditional knowledge. Before beginning the interviews, verbal consent was obtained from all participants after explaining the study objectives.

Consent for publication: This article has not been published previously, and all authors agreed to its submission for publication

Availability of data and materials: The data used and analyzed during the current study are available from the corresponding author upon reasonable request The data featured in this manuscript can be obtained from the corresponding author

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

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Author contributions: All authors contributed to the study conception and design. Francis Hounkpe designed the study, conducted field data collection, performed data analysis, and wrote the first draft of the manuscript. Rodrigue Idohou and Adi Mama supervised the research and approved the final version of the manuscript. Romaric Vihotogbe and Thierry Houehanou contributed to the conceptual framework and provided critical revisions. Kourouma Koura and Jean Cosso Ganglo contributed to the review and editing of the manuscript, visualization of results, and validation of the final content. All authors read and approved the final manuscript.

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