Journal of Plant Biota

Original Research Article
ISSN: 3048-4863
Journal homepage: https://plant.researchfloor.org/

Medicinal Plant Diversity and Traditional Knowledge Among Ethnic Groups in Burkina Faso Central-West Region

Dramane Kabore*, Adama Rama, and Renan Ernest Traore

Université Joseph KI-ZERBO, Équipe Génétique et Amélioration des plantes, Laboratoire Biosciences, UFR/SVT, Ouagadougou, Burkina Faso

Abstract

This ethnobotanical study, conducted among the Mossi, Lyele, and Nuni populations in Burkina Faso, aims to document and analyze the therapeutic uses of fourteen medicinal plant species. A combined approach involving socio-demographic analysis, use value (UV) and relative frequency of citation (RFC) calculations, as well as evaluation of preparation methods, dosages, and times of administration was used. Data were statistically processed using RStudio (version 4.5.1). Results show a predominantly elderly population (67% ≥ 50 years) and a high illiteracy rate (72.1%), indicating that traditional knowledge is mostly transmitted orally. Euphorbia hirta emerges as the most used species, with the highest UV and RFC. Other frequently cited species include Spondias mombin, Annona senegalensis, and Acacia macrostachya. Decoction and infusion are the most common preparation techniques. Heatmaps highlight the variability of dosages and administration times depending on the species. A circular network diagram shows the density of interactions between plant species, ethnic groups, preparation methods, and treated ailments, reflecting a systemic organization of traditional therapeutic knowledge. These findings emphasize the need to preserve and promote this ethnobotanical heritage.

Keywords: *Ethnobotany, therapeutic uses, medicinal plants, use value, traditional pharmacopoeia, Burkina Faso.*

Introduction

Medicinal plants constitute a cornerstone of traditional healthcare systems globally, particularly in developing countries where access to modern medical services remains limited [1]. In sub-Saharan Africa, approximately 80% of rural populations continue to rely on plant-based resources for disease prevention and treatment [2] [3]. Beyond their therapeutic value, these plants represent a significant component of cultural heritage, transmitted orally across generations [4]. In Burkina Faso, traditional medicine is largely grounded in the use of a diverse array of medicinal plant species [5]. However, anthropogenic pressures, deforestation, declining plant biodiversity, and the globalization of lifestyles are accelerating the erosion of this ancestral knowledge [6] [7]. In this context, the documentation and valorization of local ethnobotanical knowledge are critical for both the conservation of medicinal plant species and the intergenerational transmission of traditional practices [8]. The Central-West region of Burkina Faso, characterized by rich floristic diversity and a long-standing tradition of medicinal plant use, remains insufficiently studied from an ethnobotanical perspective [9]. Recording the species employed and the associated knowledge is essential not only for biodiversity conservation but also for supporting the integration of traditional pharmacopoeia into local healthcare strategies [1] [3]. This study aims to inventory the medicinal plant species used in the Central-West region of Burkina Faso and to analyze the diversity and therapeutic applications of these taxa.

Materials and Methods

Study Area and Surveyed Population

The survey was conducted in 30 villages located within the Boulkiemdé and Sanguié provinces, in the Central-West region of Burkina Faso (Figure 1). These sites were selected based on criteria such as accessibility, ethnic diversity, and their recognized role in the transmission of traditional knowledge related to medicinal plant use. The participants included a wide range of individuals, primarily traditional healers, herbalists, folk medicine practitioners, and elderly persons acknowledged for their expertise in traditional pharmacopoeia.

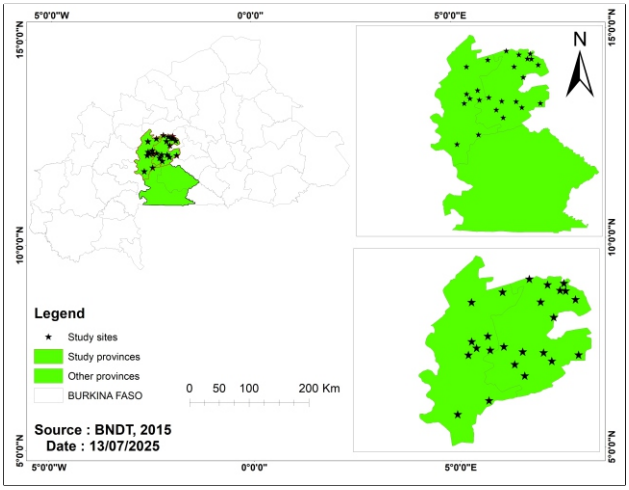

Figure 1: Surveyed areas in the Central-West region

19 April 2025: Received | 22 May 2025: Revised | 25 June 2025: Accepted | 18 July 2025: Available Online

Citation: Dramane Kabore, Adama Rama, and Renan Ernest Traore (2025). Medicinal Plant Diversity and Traditional Knowledge Among Ethnic Groups in Burkina Faso Central-West Region. *Journal of Plant Biota.* **19 to 23. DOI: https://doi.org/10.51470/JPB.2025.4.2.19**

Dramane Kabore | dramanekabore61@gmail.com

Data Collection

Data were collected using three complementary methods: semi-structured interviews, direct observations, and botanical specimen collection. Semi-structured interviews were conducted with traditional healers, herbalists, and other local knowledge holders. An interview guide was used to gather information on the medicinal plant species used, plant parts utilized, preparation methods, treated ailments, and conservation practices. Direct observations were carried out at collection sites, in local markets, and within households to document actual practices related to the use and management of medicinal plants. Specimen collection was conducted with the assistance of informants. Plant samples were harvested, pressed, and transported to the laboratory for identification. The identification process was based on regional floras and standard reference works[10][11].

Data Analysis

Statistical Analysis

All statistical and graphical analyses were performed using RStudio version 4.5.1, according to the requirements for processing, structuring, and visualizing the ethnobotanical survey data. Absolute and relative frequencies were calculated to describe the socio-demographic characteristics of the respondents. The Use Value (UV) of each plant species was computed following the formula proposed by[12]:

$$UV = \frac{\sum U_i}{N}$$

Ui represents the number of use reports mentioned by informant *i*, and *N* is the total number of informants. This index serves to assess the relative importance of a plant species within traditional medicinal practices.

In addition, the Relative Frequency of Citation (RFC) was calculated to measure the proportion of informants who cited each species, using the formula:

$$RFC = \frac{FC}{N}$$

FC is the number of citations for a given species, and *N* is the total number of participants. To explore the diversity of dosage types and administration times associated with the therapeutic uses of plants, heatmaps were generated based on binary or frequency-weighted occurrence matrices. Finally, the integrated structure of traditional therapeutic knowledge was visualized using a circular network diagram (chord diagram), linking plant species, ethnic groups, preparation methods, and types of treated ailments. This graphical representation illustrates the density of interconnections within the traditional medicinal system and highlights the central species in the network of ethnomedical knowledge.

Results

Socio-demographic Characteristics of Respondents

Data analysis highlights two key aspects of the respondents' profiles: age and educational level. Regarding age distribution, the majority of participants, representing 67%, were aged 50 years and above, while 33% were under 50 years. This demographic structure indicates a strong representation of elderly individuals within the sample. Concerning educational attainment, a large proportion of respondents (72.1%) had no formal schooling. Only 18.9% reached the primary education level, and 9% attained secondary education. This low level of education reflects a generally limited educational context among the majority of participants (Table 1).

Table 1: Socio-demographic Characteristics of the Respondents

Characteristic	Category	Frequency (%)
Age	Under 50 years	33 %
	50 years and over	67 %
Education level	No formal education	72,1 %
	Primary	18,9 %
	Secondary	9 %

Use Value of the Studied Plant Species

The most utilized species is *Euphorbia hirta*, which recorded the highest use value (UV = 0.737). This high score reflects both a significant frequency of use and a notable diversity of applications reported by informants. A group of species exhibited intermediate use values, with a UV of 0.368. These include *Ximenia americana*, *Vitex cuneata*, *Spondias mombin*, *Detarium microcarpum*, and *Acacia macrostachya*. These plants are also well established in the local pharmacopoeia, suggesting their recognized utility in traditional practices. Other species fall within a moderate use value category, with UVs ranging from 0.274 to 0.342. Among these are *Guiera senegalensis*, *Combretum paniculatum*, *Diospyros mespiliformis*, *Terminalia avicennioides*, and *Nauclea latifolia*. Finally, the least cited species are *Gardenia erubescens*, with a UV of 0.221, and *Piliostigma thonningii*, which has the lowest use value in the studied panel (UV = 0.132), indicating a lesser importance in the reported medicinal uses (Figure 2).

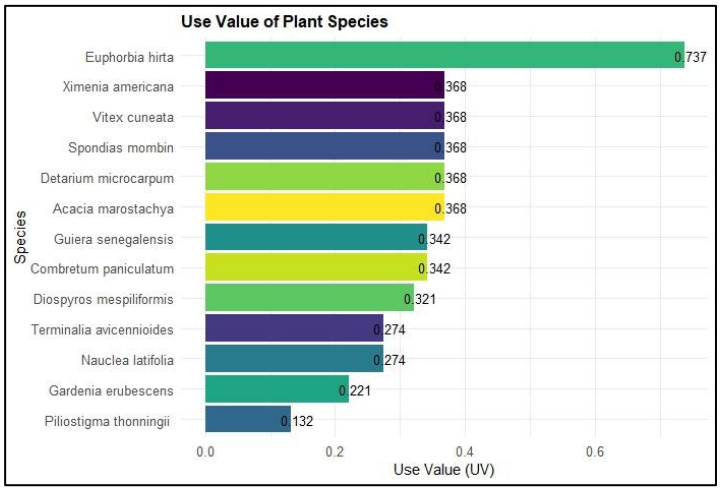

Figure 2: Use of the Studied Medicinal Plant Species

Relative Frequency of Citation (RFC) of the Studied Species

The graph presents the relative frequency of citation (RFC) of various medicinal plant species, an indicator measuring the importance and frequency of use of each plant within traditional medicine practices. *Euphorbia hirta* is the most cited species with an RFC of 0.15. This high value reflects its central importance in ethnobotanical knowledge and suggests widespread use in treating diverse ailments. *Diospyros mespiliformis* ranks second with an RFC of 0.10, also indicating significant recognition in local medicinal applications. A group of ten species shows intermediate RFC values, each around 0.07. These include *Ximenia americana*, *Vitex cuneata*, *Spondias mombin*, *Detarium microcarpum*, *Acacia macrostachya*, *Terminalia avicennioides*, *Nauclea latifolia*, *Guiera senegalensis*, *Gardenia erubescens*, and *Combretum paniculatum*. This uniformity in frequency suggests these plants play a significant but secondary role compared to the top two species. Finally, *Piliostigma thonningii* is distinguished by the lowest citation frequency, with an RFC of 0.04 (Figure 3).

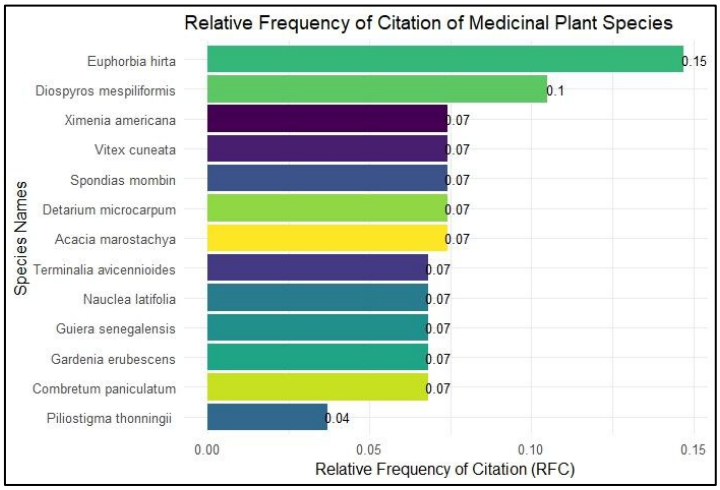

Figure 3: Occurrence Rate of Citation for the Studied Species

Diversity and Specificity of Dosage Methods in the Therapeutic Uses of the Studied Plants

The heatmap highlights the studied plant species according to the types of dosages associated with their therapeutic uses. The analysis reveals a diversity of dosage methods employed. In total, seven usage types were identified: indefinite quantity (*Indefinite_quantity*), mouth rinse (*Mouth_rinse*), one tablespoon (*One_tablespoon*), tablespoon (*Table_spoon*), two eye drops (*Two_eye_drops*), and two tablespoons (*Two_tablespoons*). This variety in dosage reflects the diversity of pharmaceutical forms in traditional medicine. Some species exhibit versatility in their therapeutic applications by being associated with multiple dosage types. For example, *Acacia macrostachya* is used in three ways: indefinite quantity, mouth rinse, and one tablespoon. *Piliostigma thonningii* and *Diospyros mespiliformis* each appear in two dosage categories: eye drops and two tablespoons. *Terminalia avicennioides* is employed in two dosage types. Other species are associated with a single dosage type only. *Ximenia americana*, *Vitex cuneata*, *Detarium microcarpum*, *Gardenia erubescens*, and *Euphorbia hirta* each appear with a single dosage method. Certain administration modes, such as mouth rinse, eye drops, or indefinite quantity, apply to a limited number of species (Figure 4).

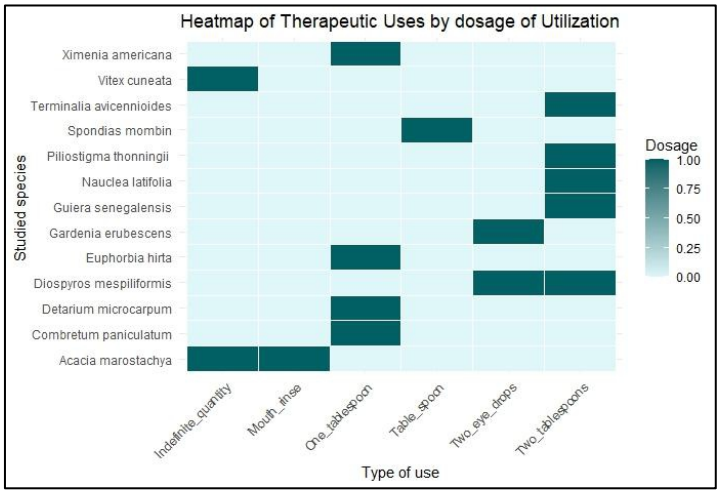

Figure 4: Dosage Methods in the Therapeutic Uses of the Studied Plants

Temporal Diversity of Therapeutic Uses of the Studied Plants

The heatmap illustrates the relationship between the studied plant species and the administration times associated with their therapeutic uses.

The analysis reveals a wide diversity of medicinal plant administration times. A total of eleven timing categories were identified, ranging from "All seasons" to specific periods such as "Morning-noon" or defined rhythms like "Thrice_daily" and "Two_days." This diversity highlights the richness and complexity of traditional practices. Some species are strictly associated with a single administration time. For example, *Guiera senegalensis* is used according to an "Age_schedule," *Vitex cuneata* throughout "All_seasons," and *Ximenia americana* primarily in the "Final_morning" period. This specificity may reflect precise local knowledge regarding the optimal timing to maximize therapeutic efficacy. Other species exhibit greater temporal versatility. *Euphorbia hirta* is associated with two different times: "Morning_evening" and "Thrice_daily," possibly indicating varied uses or more intensive treatment of certain ailments. Similarly, *Detarium microcarpum* is used at distinct times of the day. Finally, certain administration types, such as "Head_application" or "Every_hour," involve only a limited number of species, suggesting rarer or more targeted therapeutic practices, likely reserved for specific cases (Figure 5).

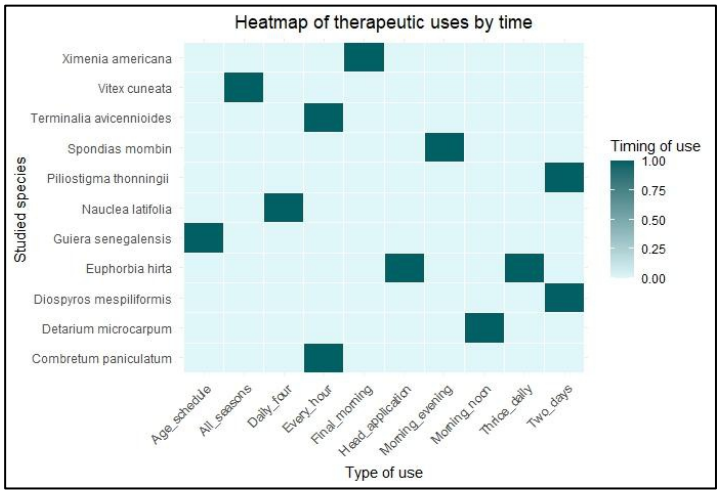

Figure 5: Therapeutic Uses of the Studied Plants Relative to Time

Integrated Approach to the Therapeutic Uses of the Studied Plants

The figure illustrates the complex interactions among ethnic groups, plant species, preparation methods, and treated ailments. Three main sociocultural groups are represented: Mossi, Lyele, and Nuni, each possessing medicinal knowledge transmitted orally. Some species are used commonly across groups, reflecting a shared knowledge base, while others are specific to a particular group. Among the 14 recorded species, *Euphorbia hirta* (digestive disorders), *Spondias mombin* (infusion or decoction), *Annona senegalensis*, and *Acacia macrostachya* are the most represented. Other plants such as *Piliostigma thonningii*, *Diospyros microcarpum*, and *Terminalia avicennioides* complete the inventory. Certain species stand out due to their high connectivity, being linked to multiple ailments and preparation methods. Nine traditional preparation techniques were identified, primarily decoctions and infusions, using leaves, stems, bark, or roots. Other forms include powders, medicinal charcoal, and direct consumption. The choice of preparation appears to depend on the plant part used and the targeted ailment. Thirteen disease categories are treated with the studied plants, ranging from digestive disorders (diarrhea, colic) to chronic conditions (diabetes, night blindness), infectious diseases (conjunctivitis, schistosomiasis), as well

as muscular, dental, and pediatric ailments. The circular network diagram highlights the density of interconnections between plants, ailments, preparation methods, and ethnic groups (Figure 6).

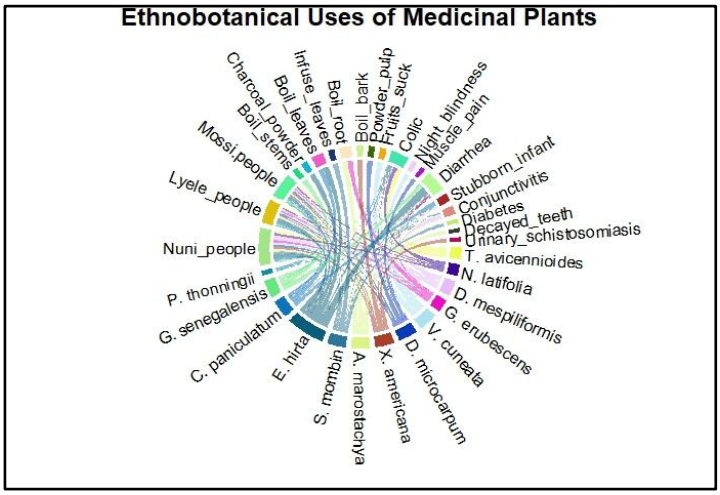

Figure 6: Interactions Between Ethnic Groups, Studied Species, and Modes of Use

Discussion

The analysis of Relative Frequency of Citation (RFC) reveals a clear hierarchy of ethnomedicinal knowledge within the Mossi, Lyele, and Nuni communities. Certain species, notably *Euphorbia hirta* and *Diospyros mespiliformis*, stand out due to their high recurrence, reflecting a central role in the traditional pharmacopoeia. This dominance may be explained by a combination of factors such as perceived efficacy, accessibility in the natural environment, diversity of therapeutic indications, and more active intergenerational transmission [13] [14]. Conversely, species like *Piliostigma thonningii*, which are less frequently cited, may correspond to more restricted uses, either due to ecological rarity or confidential uses linked to specialized knowledge held by certain traditional practitioners. Between these extremes, about ten species exhibit medium frequency, indicating more contextual uses, sometimes related to geographic zones, lineages, or specific pathologies [15]. The diversity of dosage forms observed, with at least seven modalities recorded, attests to a wealth of pharmacotechnical knowledge. Some species, such as *Acacia macrostachya* and *Diospyros mespiliformis*, are used in various forms, including decoction, infusion, and poultice, suggesting flexible adaptation to the nature of the ailment treated as well as to resource availability. Conversely, some plants appear in only one mode of use, which may signal either therapeutic specialization or restricted knowledge within a subgroup of the population. Less common methods, such as mouth rinses or eye drops, deserve particular attention as they may pertain to secret uses or intra-family transmissions often absent from shared knowledge corpora [16]. Moreover, the variation in administration times observed in practices reflects a rigorous empirical codification, possibly resulting from prolonged observation of biological rhythms and plant effects according to the time of day. This temporality, which appears specific to certain species such as *Guiera senegalensis* or *Ximenia americana*, illustrates the systemic dimension of local therapeutic knowledge, rooted in both pragmatic and symbolic logics '[17] [18]. Finally, the socio-cultural characteristics of the respondents, 67% elderly and over 70% illiterate, confirm the fundamental role of elders in safeguarding ethnobotanical knowledge.

This strong reliance on oral transmission renders this heritage particularly vulnerable to modernization dynamics and cultural erosion [19] [20]. The distribution of use values shows an organized pharmacopoeia: high-value species like *Euphorbia hirta* dominate, while those with intermediate values (*Vitex cuneata*, *Ximenia americana*) enrich diversity, and low-use species may hold still unexplored therapeutic potential [21]. The structuring of uses according to ethnic groups, as revealed by the chord diagram, reflects a coherent system where remedies, cultural identities, shared, and differentiated knowledge interconnect [22]. This holistic vision of health confers upon plants a dual function: therapeutic agents and cultural markers.

Conclusion

This study highlights the richness of traditional therapeutic knowledge surrounding fourteen medicinal plants used by the Mossi, Lyele, and Nuni communities. The results reveal a well-structured pattern of use, characterized by the diversity of species, preparation methods, dosages, and administration times. Certain plants, such as *Euphorbia hirta*, occupy a central position both in terms of citation frequency and the variety of their applications. These empirically based knowledge systems constitute a valuable heritage that is essential to document, preserve, and promote for public health purposes and scientific research.

References

1. FAO, Éd., *The second report on the state of the world's plant genetic resources for food and agriculture*. Rome: Commission on Genetic Resources for Food and Agriculture, Food and Agriculture Organization of the United Nations, 2010.

2. K. Hostettmann, A. Marston, K. Ndjoko, et J.-L. Wolfender, « The Potential of African Plants as a Source of Drugs », *COC*, vol. 4, no 10, p. 973-1010, oct. 2000, doi: 10.2174/1385272003375923.

3. D. Pilling et J. Bélanger, « The state of the world's biodiversity for food and agriculture », FAO Commission on Genetic Resources for Food and Agriculture, Rome, 2019.

4. W. M. Koné et K. Kamanzi, « Ethnobotanical inventory of medicinal plants used in traditional veterinary medicine in Northern Côte d'Ivoire (West Africa) », *South African Journal of Botany*, vol. 74, no 1, p. 76-84, janv. 2008, doi: 10.1016/j.sajb.2007.08.015.

5. K. M. Guissou, E. Sanon, P. H. Sankara, et S. Guinko, « La mycothérapie au Burkina Faso : État des lieux et perspectives », *J. App. Bioscience.*, vol. 79, no 0, p. 6896, sept. 2014, doi: 10.4314/jab.v79i0.14.

6. S. Savio *et al.*, « Etude Ethnobotanique Et Screening Phytochimique De Plantes Ornementales a Usage Therapeutique Du District De Bamako, Mali », *IJAR*, vol. 8, no 8, p. 251-262, août 2020, doi: 10.21474/ijar01/11487.

7. R. Maman, M. M. Inoussa, B. Morou, A.-L. Hamani Noma, M. H. Illo Souley, et Y. Bakasso, « Diversité Floristique de la Végétation de la Zone Centrale de l'Habitat des Girafes du Niger, Afrique de l'Ouest », *ESJ*, vol. 20, no 12, p. 96, avr. 2024, doi: 10.19044/esj.2024.v20n12p96.

8. P. Zerbo, J. Millogo Rasolodimby, O. Nacoulma Ouedraogo, et P. Van Damme, « Plantes médicinales et pratiques médicales au Burkina Faso : cas des Sanan », *Bois for. trop.*, vol. 307, p. 41-53, mars 2011, doi: 10.19182/bft2011.307.a20481.

9. A. Zizka *et al.*, « Traditional plant use in Burkina Faso (West Africa): a national-scale analysis with focus on traditional medicine », *J Ethnobiology Ethnomedicine*, vol. 11, no 1, déc. 2015, doi: 10.1186/1746-4269-11-9.

10. M. Arbonnier, *Arbres, arbustes et lianes des zones sèches d'Afrique de l'Ouest*. Montpellier] [Paris] [s.l.: CIRAD, Centre de coopération internationale en recherche agronomique pour le développement MNHN, Muséum national d'histoire naturelle UICN, Union mondiale pour la nature, 2000.

11. G. J. Martin, *Ethnobotany*, 0 éd. Routledge, 2010. doi: 10.4324/9781849775854.

12. O. Phillips et A. H. Gentry, « The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique », *Econ Bot*, vol. 47, no 1, p. 15-32, janv. 1993, doi: 10.1007/bf02862203.

13. L. Ouédraogo, J. Endl, P. A. E. Djifaby Sombié, H. Schaefer, et M. Kiendrebeogo, « Ethnobotanical use and conservation assessment of medicinal plants sold in markets of Burkina Faso », *Ethnobot. Res. App.*, vol. 20, nov. 2020, doi: 10.32859/era.20.39.1-25.

14. G. Alebie, B. Urga, et A. Worku, « Systematic review on traditional medicinal plants used for the treatment of malaria in Ethiopia: trends and perspectives », *Malar J*, vol. 16, no 1, déc. 2017, doi: 10.1186/s12936-017-1953-2.

15. F. Xing *et al.*, « Effects of Chinese herbal cataplasm Xiaozhang Tie on cirrhotic ascites », *Journal of Ethnopharmacology*, vol. 139, no 2, p. 343-349, janv. 2012, doi: 10.1016/j.jep.2011.10.040.

16. N. Percino-Daniel, D. Buckley, et M. García-París, « Pharmacological properties of blister beetles promoted their integration into the cultural heritage of native rural Spain as inferred by vernacular names diversity, traditions, and mitochondrial DNA », *Journal of Ethnopharmacology*, vol. 147, no 3, p. 570-583, juin 2013, doi: 10.1016/j.jep.2013.03.037.

17. Y. Karanga, T. H. Ganamé, W.-K. H. C. Nikiema, et I. Tapsoba, « Anti-Diabetic Activities of the Extracts from Euphorbia hirta L. (Euphorbiaceae) Specie found in Burkina Faso Using α-Glucosidase Inhibitor », *Int. Res. J. Pure Appl. Chem.*, vol. 25, no 4, p. 44-50, juill. 2024, doi: 10.9734/irjpac/2024/v25i4865.

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

19. M. O. Foláyan, M. T. Olagunju, O. R. Abodunrin, et O. T. Alade, « A scoping review on the use of traditional medicine and oral health in Africa », *PLoS ONE*, vol. 19, no 5, p. e0297570, mai 2024, doi: 10.1371/journal.pone.0297570.

20. Muwenge, Tolérant LUBALEGA KIMBAMBA, John TEMBENI MAKIADI TAMBU NYAMI, et Eustache KIDIKWADI TANGO, « Utilisation des plantes médicinales dans le traitement traditionnel des morsures de serpents par les habitants des villages environnants de la station de l'INERA Kiyaka (Province du Kwilu) », sept. 2024, doi: 10.5281/ZENODO.13832463.

21. H. Abdourhamane, B. Morou, H. Rabiou, et A. Amhamane, « Caractéristiques floristiques, diversité et structure de la végétation ligneuse dans le Centre-Sud du Niger : cas du complexe des forêts classées de Dan kada Dodo-Dan Gado », *Int. J. Bio. Chem. Sci*, vol. 7, no 3, p. 1048, oct. 2013, doi: 10.4314/ijbcs.v7i3.13.

22. M. Karambiri, M. Elias, B. Vinceti, et A. Grosse, « Exploring local knowledge and preferences for shea (*Vitellaria paradoxa*) ethnovarieties in Southwest Burkina Faso through a gender and ethnic lens », *Forests, Trees and Livelihoods*, vol. 26, no 1, p. 13-28, janv. 2017, doi: 10.1080/14728028.2016.1236708.