Evaluation of the ethnobotanical importance of *Chromolana odorata* (L.) R.M.King & H.Rob. and *Mesosphaerum suaveolens* (L.) Kuntze, two invasive alien plant species in southern and central Benin

Gorgias Aikpon, Kourouma Koura, Antoine Affokpon, Adam Ahanchede, Jean Cossi Ganglo

Correspondence

Gorgias Aikpon[1*], Kourouma Koura[1], Antoine Affokpon[2], Adam Ahanchede[3], Jean Cossi Ganglo[1]

[1]Laboratory of Forest Sciences, Faculty of Agronomic Sciences, University of Abomey-Calavi, Benin.

[2]Nematology Unit (UNema), Laboratory of Study and Management of Plant Pathogens (LaGON), Faculty of Agronomic Sciences, University of Abomey-Calavi, 01 BP 526 Cotonou, Benin.

[3]Laboratory of Phytotechny, Physiology and Genetic Improvement of Plant Species, Department of Crop Production, Faculty of Agricultural Sciences, University of Abomey-Calavi, 01 BP 526, Cotonou, Benin

*Corresponding Author: gorgiaspremier@yahoo.fr

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Research

Abstract

Background: Traditional medicinal knowledge remains a major source of healthcare for rural communities in developing countries. *Chromolaena odorata* and *Mesosphaerum suaveolens*, native to tropical America and invasive in Africa and Asia, are widely used in traditional medicine despite their ecological impacts. This study documents and compares the ethnobotanical uses, preparation methods, and cultural importance of these two invasive species.

Methods: An ethnobotanical survey was conducted among 196 respondents selected using purposive sampling in rural communities of central and southern Benin. Data were collected from May to July 2025 using structured questionnaires to document uses, use categories, local names, plant parts, and preparation methods of both species. Relative Frequency of Citation (RFC) and Use Value (UV) indices were calculated to assess species importance. Associations between sociocultural groups and use categories were analysed using chi-square and Fisher's exact tests, and Correspondence Analysis.

Results: Twelve distinct vernacular names were identified for both species combined, five for *C. odorata* and seven for *M. suaveolens*, reflecting sociocultural variability in their designation. Three main categories of use were identified: medicinal, veterinary, and repellent. Among the different use categories, medicinal use was the most frequently cited for *C. odorata* (RFC = 55.6%) and *M. suaveolens* (RFC = 57.6%). Repellent use was markedly higher for *M. suaveolens* (RFC = 49.4%) than for *C. odorata* (RFC = 12.2%), while veterinary use remained limited for both species (RFC ≈ 11%). Leaves were the most used

plant part, and preparation methods mainly included decoction, infusion, trituration, and inhalation. Statistical analyses revealed significant associations between sociocultural groups and use categories ($p < 0.001$).

Conclusions: These findings highlight the widespread use of both species in traditional healthcare practices despite their invasive status. The reported uses of *C. odorata* and *M. suaveolens* highlight their potential relevance for the development of plant-based pest management strategies and emphasize the importance of documenting local ethnobotanical knowledge.

Keywords: Ethnobotany, *Chromolaena odorata*, *Mesosphaerum suaveolens*, traditional medicine, medicinal plants, indigenous knowledge.

Background

Invasive alien species have become a significant threat to the integrity of biodiversity worldwide (Peller & Altermatt 2024). These species have considerable ecological and socio-economic impacts (Ansori *et al.* 2020). However, some of these species, although initially perceived as harmful, are exploited for local uses and participate in various human activities, including traditional medicine, agriculture, crafts and even food (Ahumibe & Elochukwu 2019). Some of them are therefore gradually integrated into the traditional practices and knowledge of local communities. These facts highlight the complexity of the relationships that human societies have with their environment. This is particularly the case with *Chromolaena odorata* (L.) RM King & H. Rob. and *Mesosphaerum suaveolens* (L.) Kuntze, two species widely distributed in tropical and subtropical regions, and which are among the most worrying invasive alien species in several regions of the world (Ansori *et al.* 2021, Sawadogo *et al.* 2026).

Chromolaena odorata, commonly known as "Laos grass", originating from Central and South America, has spread across Africa, Asia and the Pacific, where it is often considered a threat to agriculture and natural ecosystems (Bhuyan *et al.* 2019). Similarly, *M. suaveolens* commonly known as “pignut” or “bush mint”, originating from tropical America, has naturalized in many regions of the world, altering local landscapes and ecological dynamics. However, despite their negative effects on biodiversity and their status as invasive species, these two plants have gradually found a place in the traditional pharmacopoeias of many communities (Aziz *et al.* 2020). This appropriation demonstrates the adaptability of human societies and their ability to transform environmental constraints into valuable resources (Dal-Fabbro *et al.* 2019). The local knowledge surrounding these species constitutes a valuable cultural and scientific heritage. Its study offers insights into socio-ecological adaptation processes and opens new perspectives for improving the long-term management of natural resources (Huynh 2020).

The first appearance of *C. odorata* in Africa was reported in Nigeria between 1936 and 1942 (Delabarre 1977), and its introduction in West Africa is generally dated to the late 1930s, followed by a rapid spread across the region (Aigbedion-Atalor *et al.* 2019). Its subsequent spread to Benin was reported in 1945 (Aboh *et al.* 2008). Its invasive status was corroborated by its inclusion in the Global Invasive Species Database (GISD) (Blackburn *et al.* 2011, Pyšek *et al.* 2004, Richardson *et al.* 2011). The species produces reproductive offspring at significant distances from parent populations and clearly outcompetes the native flora, thereby altering local community structures (Kriticos *et al.* 2005). *Mesosphaerum suaveolens* represents an older introduction, with records in West Africa dating back to the mid-19th century (Hutchinson & Dalziel 1963). Its establishment in Benin occurred in early 20th century through regional trade, leading to the formation of self-sustaining populations independent of any human intervention (Aboh *et al.* 2008, Pyšek *et al.* 2004). The species exhibits clearly invasive behavior in Benin, characterized by its widespread dominance in disturbed habitats and agricultural fallow lands across various agroecological zones (Akoègninou *et al.* 2006; Blackburn *et al.* 2011, IUCN 2000).

This study aims to explore the ethnobotanical knowledge associated with *C. odorata* and *M. suaveolens*, highlighting local uses, community perceptions and economic potential of these species. More specifically, it aims to analyze how these plants are integrated into local practices and how their valorization could contribute to a more efficient management of invaded ecosystems. The study addresses the following research questions: (i) What are the different uses of *C. odorata* and *M. suaveolens* among local communities? (ii) How do these uses vary across socio-cultural groups? (iii) How are these invasive species perceived and integrated into local knowledge systems?

Materials and Methods

Study area

The research was conducted in six communes in central and southern Benin: Zè, Zogbodomè, Bohicon, Dassa-Zoumé, Savè and Glazoué (Fig. 1, Table 1). The selection of these communes was based on the documented occurrence of *C. odorata* and *M. suaveolens*, the presence of diverse sociocultural groups, and the representation of different land-use systems where the species are commonly found. These communes fall within the distribution area of *C. odorata* and *M. suaveolens* as documented in the Flora of Benin and GBIF website (https://doi.org/10.15468/dl.mev5v8 and https://doi.org/10.15468/dl.daffd6), thus guaranteeing the effective presence of the species. Scientific names and authorship of plant species were verified and standardized using the World Flora Online (WFO) database.

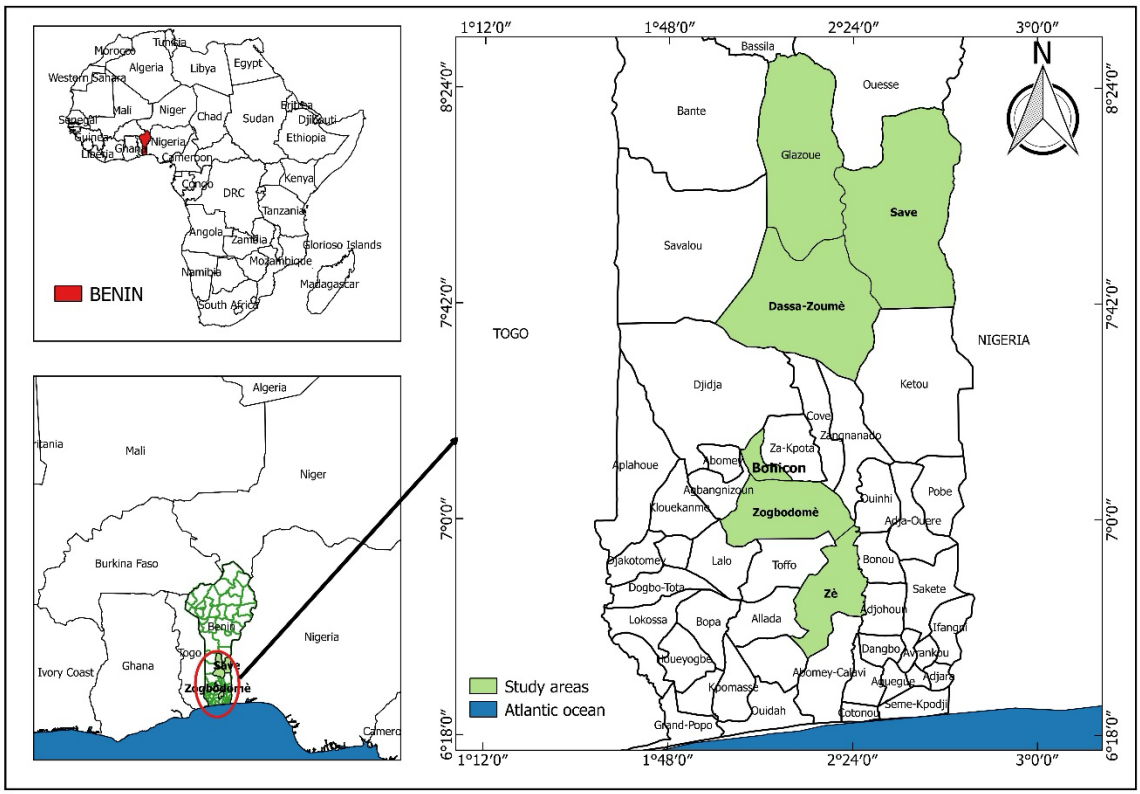

Figure 1. Study area map

The size n of the population to be surveyed was determined using the Dagnelie (1998) formula:

$$n = \frac{U^2 * ((1-p) * p)}{d^2}$$

with n: the number of respondents; U: the value of the confidence level of a normal law (1.96); p: the farming population in the target municipalities; d: margin of error set at 7% for this study (Makwana *et al.* 2023). The sample size per commune varied from 10 to 43, for a total of 196 people (Table I) from 06 socio-cultural groups.

Data Collection and Analysis

Ethnobotanical data were collected from May to July 2025 through structured interviews conducted individually with 196 respondents selected using a purposive sampling method. Respondents included traditional healers, farmers, livestock breeders, and forestry agents, who were identified in each of the six communes based on their knowledge and experience with the two species. Interviews were conducted in local languages with the assistance of interpreters. Data collected included local names of the species, plant parts used, diseases treated, preparation methods, and modes of administration. Within the diversity of uses cited, the choice of plant parts and preparation methods in traditional medicine were recorded and analysed. The Relative Frequency of Citation (RFC) and the Use Value (UV) indices were used to assess the relative importance of each species and their utilitarian importance within local communities (Lawin *et al.* 2019). Associations between sociocultural groups and use categories were analysed using chi-square and Fisher's exact tests, and Correspondence Analysis. Ethnobotanical data were organised using Microsoft Excel spreadsheets.

Table 1. Description of the sample size by socio-cultural and gender.

Socio-cultural groups	Men	Women	Total
Adja	12	09	21
Fon	60	19	79
Idatcha	16	12	28
Mahi	26	14	40
Nagot	01	10	11
Yoruba	15	02	17
Total	**130**	**66**	**196**

Table 2. Ethnobotanical indices

Indices	Formula	Interpretation	References
Relative Frequency of Citation (RFC)	$FRC = \frac{n}{N} * 100$ n: number of people who provided a response for a given use. N: total number of people surveyed	Relative importance of each use	Tardio & Pardo-De-Santayana (2008)
Use Value (UV)	UVi=$\frac{\sum_i^n si}{n}$ UVi: the use value of species "I" for a given category, si: the use score assigned by respondents, n: number of positive responses for a plant in a given use category	Utilitarian importance of a plant species per category of use within local communities.	Belem *et al.* (2008)
Use Value Total (UVT)	UVT= $\sum_i^e VUi$ UV: the use value of a given species "I" for a use category.	Utilitarian importance of a plant species within local communities.	Belem *et al.* (2008)

Analysis of correlations between usage practices and sociocultural groups

To examine the association between sociocultural groups and the different reported uses of *C. odorata* and *M. suaveolens*, a mixed approach combining classical and multivariate statistical methods was adopted. Data were first summarized into contingency tables crossing sociocultural groups with types of use, namely: medicinal, repellent, and veterinary. A chi-square test of independence was performed for each species to determine whether a statistically significant association existed between sociocultural groups and types of use. However, since some cells had fewer than five observations, Fisher's test was also performed to strengthen the reliability of the analysis. In parallel, a Correspondence Analysis was conducted to visually explore the affinities between sociocultural groups and usage types for each species. This multivariate method helps reveal overall trends as well as specific relationships between certain categories. Finally, bar plots were generated to illustrate the distribution of use types within each sociocultural group, providing a descriptive complement to the statistical analyses.

Results

Common names and meanings

In total, five and seven distinct vernacular names were respectively recorded for *C. odorata* and *M. suaveolens* (Table 3). Both species were identified by a botanist from the National Herbarium of Benin. Specimens were collected in the field and deposited at the National Herbarium of Benin for reference. These names vary across sociocultural groups. The designation of these two species is mainly based on their distinctive morphological characteristics or on significant events in local history.

The vernacular names attributed to *C. odorata* and *M. suaveolens* provide valuable insights into local perceptions and knowledge systems. For *C. odorata*, "aloman" designates the plant recognized across multiple communities for its strong odor and invasive nature, "agatu/agatou/agato" indicates that seeds arrived via aerial transport of certain shipments, "sekoutoureman" refers to the period of Sékou Touré's visit to Benin, "hunsukon" designates a visible or aromatic characteristic of the plant and its invasive behavior, and "akintola" indicates the perception of the plant as introduced or foreign within Yoruba cultural contexts. For *M. suaveolens*, "gbofon" designates an aromatic or medicinal plant found in

fields and gardens, “klouekoue” indicates a strong smell and medicinal use, “zansoukpeman” designates a plant that repels mosquitoes, “xweflu” designates the texture and aromatic leaves used in remedies, “ikpadjako” indicates morphological or aromatic characteristics related to its ethnobotanical use, “efirin-igbo” designates an aromatic plant found in the forest, and “efirin-oko” designates an aromatic plant found in cultivated fields. These vernacular names illustrate the richness of local knowledge and demonstrate how communities recognize, categorize, and utilize these two species based on their ecological, aromatic, and medicinal properties.

Categories of use

C. odorata and *M. suaveolens* fall into three main categories of uses. For *C. odorata*, medicinal use was the most frequent (RFC=55.6%), followed by use as a repellent (RFC=12.24%) and veterinary use (RFC=11.2%). As for *M. suaveolens*, medicinal use was also the most frequent (RFC=57.6%), followed by use as a repellent (RFC=49.4%) and veterinary use (11.2%) (Table 4).

Medicinal uses

C. odorata and *M. suaveolens* contribute to the treatment of several diseases and symptoms (Table 5 and Table 6). These species are said to be effective in treating several conditions such as skin infections, gastric pain, cough, flu, diarrhoea, malaria, wounds and external bleeding, and other ailments.

Table 3. Common names of *C. odorata* and *M. suaveolens*

Socio-cultural groups	Local name of *C. odorata*	Local name of *M. suaveolens*
Adja	aloman, agatu	gbofon, klouekoue
Fon	agatou, sekoutoureman	zansoukpeman, xweflu
Idatcha	hunsukon, aloman	gbofon, klouekoue
Mahi	aloman, agato	gbofon
Nagot	agatou, akintola	ikpadjako
Yoruba	agatou, akintola	efirin-igbo, efirin-oko

Table 4. Categories of use for *C. odorata* and *M. suaveolens*

Species	Categories of use	RFC (%)	UV
C. odorata	Medicinal	55,61	1,59
	Veterinary	11,22	0,23
	Repellent	12,24	0,39
M. suaveolens	Medicinal	57,65	1,70
	Veterinary	11,22	0,23
	Repellent	49,48	1,51

Table 5. Medicinal uses of *C. odorata*

Category of use	Diseases or target Symptoms	Part used	Preparation or administration method
Wound healing or haemostatic	Cuts, wounds, burns, skin ulcers	Fresh leaves	Crushed leaves applied as a poultice to the affected area
Antiseptic or antibacterial	Skin infections, infected wounds	Fresh or dried leaves	Decoction or maceration for external use (washing, bathing)
Gastrointestinal	Diarrhoea, abdominal pain, gastric ulcers	Leaves	Infusion or decoction taken orally (1 to 2 cups/day)
Antipyretic or pain relief	Fever, headache, muscle pain	Leaves	Decoction taken orally or poultice applied to the painful area
Postpartum or uterine tonic	Post-delivery pain, infection prevention	Leaves	Decoction used for body bath
Antimalarial	Malaria (symptoms like fever, body aches)	Leaves	Infusion taken orally (as complement to medical treatment)
Anti-inflammatory	Joint pain, swelling	Leaves	Poultice applied to the inflamed area or decoction taken orally
Respiratory disorders	Coughs, colds	Leaves and stems	Syrup or decoction

Table 6. Medicinal uses of *M. suaveolens*

Category of use	Diseases or target symptoms	Part used	Preparation or administration method
Antimicrobial or antiseptic	Skin infections, wounds, abscesses	Leaves	Infusion or decoction applied externally
Respiratory	Cough, bronchitis, asthma	Leaves	Infusion taken orally or used for inhalation
Digestive	Stomach-aches, indigestion, intestinal worms	Leaves	Infusion or decoction taken orally
Antipyretic / Anti-inflammatory	Fever, inflammation	Leaves	Decoction or infusion taken orally
	Headaches	Leaves	Inhalation
Antimalarial	Malaria symptoms (fever, chills)	Leaves	Infusion taken orally as supportive treatment
Analgesic	Muscle pain, body aches	Leaves	Poultice or decoction applied externally
Gynecological	Menstrual pain, vaginal infections	Leaves	Infusion used as a vaginal rinse or taken orally

Plant parts used and preparation methods

For both *C. odorata* and *M. suaveolens*, the leaves were the most used plant part in traditional medicine, as reported by respondents who cited their ease of access and availability throughout the year. For *C. odorata*, the most common preparation methods were decoction, infusion, trituration, and fresh juice extraction. For *M. suaveolens*, decoction, infusion, trituration, and steam inhalation were the most frequently used methods. Its aromatic nature makes it particularly suited to preparations administered by inhalation or orally in traditional contexts (Fig.2).

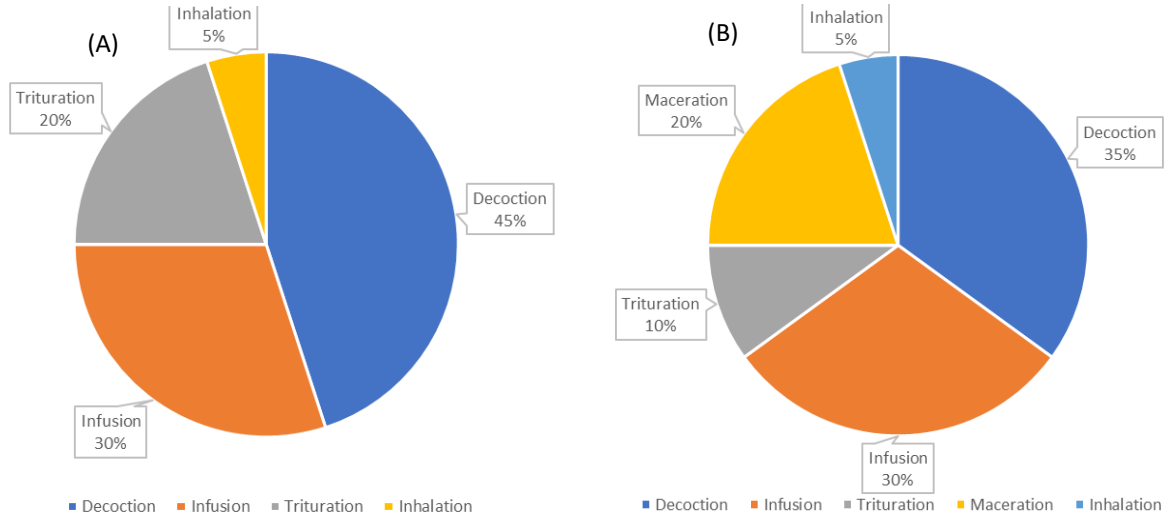

Figure 2. Method of preparation of *C. odorata* (A); Method of preparation of *M. suaveolens* (B)

Relationship between sociocultural groups and usage categories

Variability in *C. odorata* uses among sociocultural groups

The mosaic plot presents the distribution of different *C. odorata* use categories across the sociocultural groups surveyed (Fig. 3). Medicinal use was the most frequently reported category across all sociocultural groups, with particularly high representation among Mahi, Fon, and Adja groups. Repellent use was also notably reported among Adja, Fon, Idatcha, and Mahi groups, while veterinary use is primarily attributed to the Mahi group, who report this application significantly, followed by Fon and Nagot groups. Results from the Chi-square test show a significant association between sociocultural groups and the use categories of *C. odorata* y ($\chi^2 = 36.27$, df = 10, $p = 7.551\times10^{-5}$). This significance indicates that the observed differences in usage frequencies are not due to chance. Certain use categories, such as veterinary use among Mahi group, contribute strongly to this association. In addition to the Chi-square test, a Fisher's exact test (performed with a Monte Carlo simulation approximation using 10.000 iterations) was also applied to assess the association between sociocultural groups and *C. odorata* use types. The results confirmed a highly significant association (p-value = 4.0×10^{-6}). This test, known to be more

reliable in the presence of low frequencies in certain cells of the contingency table, particularly for veterinary use among several groups, reinforces the conclusions of the Chi-square test, confirming a marked cultural variability in the ethnobotanical uses of the species.

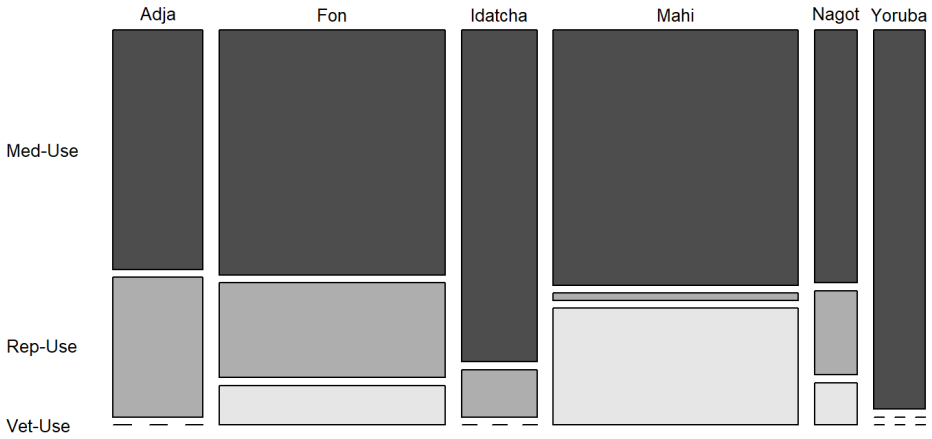

Figure 3. Sociocultural variability in the uses of *C. odorata*

The correspondence analysis (Fig. 4) highlights the specific relationships between sociocultural groups and usage types, with the first two dimensions explaining 76.8% for the first (Dim1) and 23.2% for the second (Dim2) of the total inertia, respectively, covering the entire observed variance. Mahi sociocultural group shows a strong association with veterinary use, which aligns with trends already observed in previous analyses. Fon and Adja groups are positioned closer to repellent use, while the Idatcha and Yoruba show weak correlation with veterinary and repellent uses, suggesting a lesser preference for these functions in their knowledge systems. Medicinal use, located at the center of the modality cloud, appears to be transversal across several groups, particularly Fon, Mahi, and Adja, and thus emerges as the most shared usage function. This structuring of usage preferences according to sociocultural origin highlights differentiated perceptions of *C. odorata*, reflecting ethnobotanical knowledge anchored in cultural dynamics specific to each group.

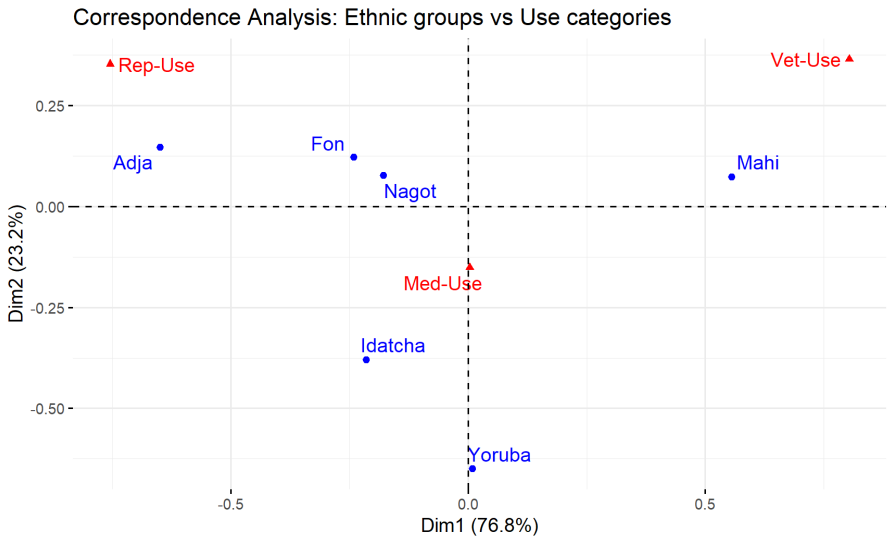

Figure 4. Factor analysis of the uses of *C. odorata* according to sociocultural groups

Variability in *M. suaveolens* uses among sociocultural groups

Fig. 5 illustrates the three main uses of *M. suaveolens* according to sociocultural groups. Medicinal use dominates, especially among the Fon, Idatcha, Mahi and Adja groups, reflecting a shared recognition of its therapeutic properties. Repellent use is also widespread, particularly among Fon, Adja and Yoruba groups, probably in response to domestic pests. Veterinary use, although less frequent, is present in all groups, with a slight predominance among Mahi and Yoruba groups. Finally, Nagot and Yoruba groups show a balanced usage profile, with a slight preference for medicinal and repellent uses. The statistical analysis performed using the Chi² test of independence allows us to assess the possible dependence between sociocultural

affiliation and the type of use of *M. suaveolens*. The test returns a statistic of $\chi^2 = 36.274$ with 10 degrees of freedom, for a p-value = 7.551×10^{-5}. This result is highly significant ($p < 0.005$), indicating a non-random association between the two variables. The distribution of ethnobotanical uses of *M. suaveolens* varies significantly across sociocultural groups. This heterogeneity can be interpreted as an expression of the diversity of traditional knowledge associated with the species in different ethnic contexts. In addition to the Chi² test, Fisher's exact test applied with a Monte Carlo simulation confirms the existence of a highly significant association between sociocultural groups and types of use of *M. suaveolens* ($p = 9.999 \times 10^{-5}$). This second test validates the findings from the Chi² test and reinforces the hypothesis of a cultural structuring of uses. Veterinary use is particularly associated with the Yoruba group, while medicinal use predominates among Mahi, Idatcha and Fon.

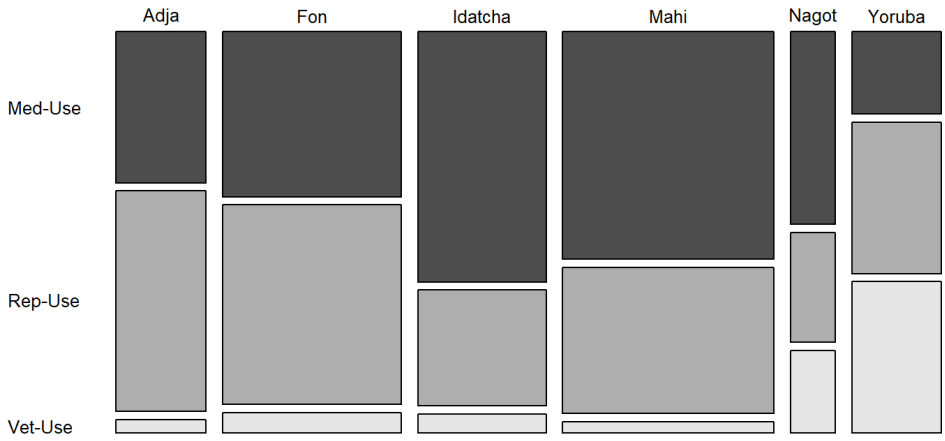

Figure 5. Sociocultural variability in the uses of *M. suaveolens*

Fig. 6 presents the factorial correspondence analysis. It highlights the differentiated relationships between sociocultural groups and the types of uses attributed to *M. suaveolens*. Indeed, the first two dimensions explain the entire total inertia, with 81.8% for the first dimension (Dim1) and 18.2% for the second (Dim2), reflecting a strong structuring of uses according to cultural affiliations. The Yoruba group stands out clearly for its pronounced association with the veterinary use of the species, suggesting a cultural specificity in the exploitation of its zootherapeutic properties. In contrast, Fon and Adja appear to have an affinity with repellent use, which could reflect a tradition of use focused on pest or insect control. The Idatcha and Mahi groups are positioned close to the 'medicinal use' modality, indicating a more medicinal and potentially multifunctional perception of the species. The Nagot, although somewhat isolated, also appears to be linked to medicinal use, albeit in a more marginal way. This spatial configuration of modalities confirms a marked cultural distribution of the ethnobotanical functions of *M. suaveolens*, with a tendency towards specialization among groups. The species is perceived differently depending on sociocultural contexts, revealing a diversity of local knowledge and functional uses integrated into traditional healthcare systems and everyday practices.

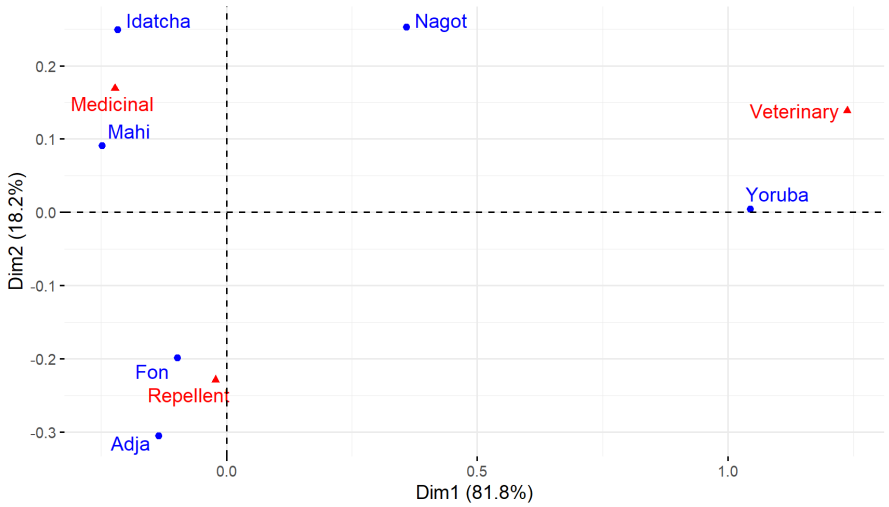

Figure 6. Factor analysis of the uses of *M. suaveolens* according to sociocultural groups

Discussion

This study highlighted the diversity of ethnobotanical uses of two invasive alien species, *C. odorata* and *M. suaveolens*, in different sociocultural communities in southern Benin. For both plants, medicinal use emerged as the most frequently cited function, although notable variations were observed between sociocultural groups. Various statistical tests such as Chi-square and Fisher's exact tests confirmed that these differences are significant, and correspondence factor analysis allowed for a more detailed exploration of the structure of these preferences within communities.

Vernacular nomenclature and cultural significance

The vernacular names of *C. odorata* and *M. suaveolens* vary across socio-cultural groups. This linguistic diversity reflects the cultural integration and historical significance within each community (Husen *et al.* 2020). In many cases, the local names directly indicate the most striking function of the plant. For example, for *C. odorata*, “aloman” designates the plant for its strong odor and invasive nature, “agatu/agatou/agato” indicates seeds introduced via aerial transport of certain shipments, “sekoutoureman” refers to the period of Sékou Touré’s visit to Benin, “hunsukon” designates a visible or aromatic characteristic and invasive behavior, and “akintola” indicates the perception of the plant as introduced or foreign within Yoruba cultural contexts (Bezerra *et al.* 2020, Costa *et al.* 2020). For *M. suaveolens*, “gbofon” designates an aromatic or medicinal plant found in fields and gardens, “klouekoue” indicates a strong odor and medicinal use, “zansoukpeman” designates a plant that repels mosquitoes, “xweflu” designates the texture and aromatic leaves used in remedies, “ikpadjako” indicates morphological or aromatic characteristics related to its ethnobotanical use, “efirin-igbo” designates an aromatic plant found in the forest, and “efirin-oko” designates an aromatic plant found in cultivated fields (Ho *et al.* 2024, Maulida *et al*. 2019). Some names highlight haemostatic or healing properties, others the invasive behavior, powerful scent, or traditional beliefs. This naming process reflects a long history of interaction between communities and these invasive species, demonstrating ecological knowledge passed down through generations. Vernacular nomenclature thus reveals the cultural significance of these species, which are not solely perceived as biological intruders and are often exploited according to the needs of each group.

The vernacular nomenclature of plants plays a central role in structuring local ecological knowledge and in community responses to environmental change. Several ethnobotanical studies have shown that the vernacular names given to plants often reflect morphological characteristics, ecological behaviors, medicinal uses or symbolic associations specific to each culture (Andrianjafinandrasana *et al.* 2020, Yolidje *et al.* 2020). For *C. odorata* and *M. suaveolens*, the diversity of names recorded according to sociolinguistic groups reflects a significant traditional knowledge of these species within communities (Dossou *et al.* 2025). Previous studies conducted in West Africa have highlighted that the names given to *C. odorata* often emphasize its ability to rapidly colonize fallow or disturbed land, interpreted by some communities as a sign of soil degradation, while others see it as a natural process of ecological restoration (Atto *et al.* 2022, Bekoin-Abhé *et al.* 2020). In Benin and Nigeria, for example, this species is sometimes referred to by names meaning ‘land occupier’ or ‘plant of wounds,’ revealing both its ecological dominance and its traditional medicinal uses (Adomou *et al.* 2010). As for *M. suaveolens*, it is generally associated with names evoking its pleasant fragrance or soft texture, characteristics that justify its presence in certain rituals, cosmetic or domestic practices (Dembélé *et al.* 2023, Sawadogo *et al.* 2026). These names are not simply descriptive but are part of broader cultural systems. Local plant classification is a tool for analyzing community values and local uses (Dossou *& Fandohan* 2021). Thus, in many traditional African societies, plants that regenerate quickly or cover abandoned fields are perceived as beneficial and medicinal in certain contexts, but invasive and harmful when they compete with food crops (Ekele 2023). This ambivalent perception between usefulness and harmfulness has also been documented in other contexts. In southern Africa, certain exotic invasive plants such as Prosopis and Opuntia species were integrated into local rural economies, despite their invasive nature (Kankara *et al.* 2023). This type of observation reveals that the cultural value of invasive species is never fixed, but varies according to local needs, knowledge systems and the historical experience of populations with these species. Thus, analyzing the vernacular nomenclature of *C. odorata* and *M. suaveolens* provides a better understanding of how local communities perceive, categorize and interact with these plants. These names reflect adaptive strategies, social representations, and compromises between ecosystem preservation and daily needs. Studying this nomenclature therefore provides a detailed insight into traditional knowledge and cultural dynamics in relation to invasive species.

Association between sociocultural groups and categories of use

The results suggest that, despite their invasive nature, *C. odorata* and *M. suaveolens* are functionally integrated into local knowledge and practice systems. The fact that medicinal use predominates in most groups can be interpreted as a cultural adaptation strategy, in which communities value available resources to meet their health needs. For example, the strong association between the Mahi group and the veterinary use of *C. odorata* seems to reveal a specific tradition of domestic

animal care, possibly inherited or adapted from ancestral practices. Similarly, for *M. suaveolens*, the strong correlation between the Yoruba group and the veterinary use, identified by the AFC, supports this interpretation. Meanwhile, groups such as the Adja and Fon exhibit a preference for the repellent uses of these species, suggesting distinct local expertise in biological control or insect management. These differentiated preferences illustrate how invasive alien species, rather than being perceived merely as nuisances, can also be integrated into opportunistic or utilitarian practices. The results obtained confirm previous conclusions made in other studies. Several studies conducted in West Africa and Asia have shown that *C. odorata* is commonly used to treat wounds, digestive disorders and skin infections (Seyed *et al.* 2024). Similarly, *M. suaveolens* is recognized for its insect repellent and antiparasitic properties (Harley *et al.* 2019).

Ethnic group membership is often an important determinant of the diversity and richness of plant uses (Nguta *et al.* 2019). In many African contexts, the way a plant is perceived, named and used varies significantly from one group to another, even when communities share the same geographical territory (Konrath *et al.* 2020). Several studies have shown that this variability in uses is influenced by factors such as livelihood, the traditional role of plants in local pharmacopoeia, and the level of historical contact with the species concerned (Okoro 2020). For certain invasive species, some groups consider them harmful and invasive, while others incorporate them into medicinal, artisanal or pastoral practices, depending on their specific needs (Rai & Singh 2020).

The use of invasive plant species is not restricted to Africa. Similar patterns have been reported in their native range in tropical America. For instance, in Argentina, introduced plant species are widely used for medicinal purposes and are integrated into local pharmacopoeia (Manzano-García 2021). In their native range, both *C. odorata* and *M. suaveolens* are also used in traditional medicine, particularly for wound healing, antimicrobial treatments, and other therapeutic applications. In the present study, these species are similarly used in Benin for medicinal purposes, including wound care, treatment of infections, and insect repellent applications (Martínez 2013). This indicates that their core uses are conserved across regions. However, additional uses have developed in the introduced range, reflecting adaptation to local needs and environmental conditions, such as the prominent use of *M. suaveolens* as a mosquito repellent. This demonstrates the capacity of local knowledge systems to integrate both native and introduced species and to expand their uses beyond those observed in their original range.

Implications and significance of the study

This study recommends controlled and supervised exploitation of *C. odorata* and *M. suaveolens*, particularly in heavily infested areas such as protected areas. Such an approach would both limit their spread and take advantage of their uses. It is essential to actively involve local communities in this process, recognizing their ethnobotanical knowledge and involving them in the development of sustainable exploitation strategies. The development of simplified technical guides specifying good harvesting practices such as appropriate plant parts, optimal harvesting periods, and precautions to prevent species spread could provide a practical tool for regulating use without exacerbating the invasion (Ngueguim *et al.* 2023). In addition, further research combining ethnobotany, ecology, pharmacology and rural economics is important to assess the properties, limitations and risks associated with these uses. The development of local processing chains, particularly in the medicinal, agroecological and artisanal sectors, could also represent a source of income for populations, especially women and young people in rural areas. Finally, all these approaches should be integrated into existing public policies, particularly protected area management plans, national strategies for combating invasive species, and local development programs, to promote management that is adapted to the realities on the ground.

Conclusion

This study revealed that *C. odorata* and *M. suaveolens*, although invasive alien species, occupy an important place in the knowledge systems and practices of local communities. Their various uses, particularly medicinal and utilitarian uses as mosquito repellents, demonstrate a certain cultural appropriation and appreciation of these species. These results highlight the importance of moving beyond purely ecological or eradication approaches by integrating social and cultural dimensions into invasive species management strategies. Recognition of popular uses invites us to consider *C. odorata* and *M. suaveolens* not only as ecological threats, but also as resources with potential. Controlled exploitation, particularly in protected areas where they proliferate, could contribute to both their regulation and strengthen the livelihoods of local populations. The active involvement of communities, the promotion of endogenous knowledge, and the integration of these actions into action plans appear to be promising avenues for a more inclusive, sustainable and contextually appropriate management of these species.

Declarations

List of abbreviations: RFC- Relative Frequency of Citation; UV- Use value; UVT- Use Value Total

Ethics approval and consent to participate: This ethnobotanical study was conducted in accordance with ethical and legal guidelines governing research on traditional knowledge. Prior to data collection, verbal informed consent was obtained from all participants after explaining the objectives of the study.

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 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 conception and design of the study. G. A. designed the study, conducted field data collection, performed data analysis, and wrote the first draft of the manuscript. K. K., A. A., A. A., and J. C. G. provided academic supervision and contributed to the conceptual framework, critical review, and editing of the manuscript. All authors read and approved the final version of the manuscript.

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Literature cited

Aboh BA, Houinato M, Oumorou M, Sinsin B. 2008. Invasiveness of two exotic species, *Chromolaena odorata* (Asteraceae) and *Hyptis suaveolens* (Lamiaceae), in relation with land use around Bétécoucou (Benin). Belgian Journal of Botany 141(2):125-140.

Adomou AC, Yedomonhan H, Sinsin B, Van der Maesen LJG. 2010. Distribution des aires protégées et conservation de la flore en République du Bénin. Acta Botanica Gallica 157(4):687-701.

Ahumibe DJM, Elochukwu IC. 2019. Phytochemical and antifungal properties of *Chromolaena odorata* (Siam weed) leaves. European Journal of Biomedical and Pharmaceutical Sciences 6(10):18-23.

Aigbedion-Atalor PO, Adom M, Day MD, Uyi O, Egbon IN, Idemudia I. 2019. Eight decades of invasion by *Chromolaena odorata* (Asteraceae) and its biological control in West Africa: the story so far. Biocontrol Science and Technology 29:1215-1233.

Akoègninou A, Van der Burg WJ, Van der Maesen LJG. 2006. Flore Analytique du Bénin. Wageningen Agricultural University Papers 06.2. Backhuys Publishers, Leiden. 1034 p.

Andrianjafinandrasana SN, Chillet M, Ramonta IR, Tsy JMLP, Minier J, Danthu P. 2020. Biological activity of *Syzygium aromaticum* and *Ravensara aromatica* essential oils from Madagascar and their possible use against postharvest mango anthracnose. American Journal of Plant Sciences 11:1682-1697.

Ansori ANM, Fadholly A, Hayaza S, Susilo RJK, Inayatillah B, Winarni D, Husen SA. 2020. A review on medicinal properties of mangosteen (*Garcinia mangostana* L.). Research Journal of Pharmacy and Technology 13(2):974-982.

Ansori ANM, Kharisma VD, Fadholly A, Tacharina MR, Antonius Y, Parikesit AA. 2021. Severe acute respiratory syndrome coronavirus-2 emergence and its treatment with alternative medicines: A review. Research Journal of Pharmacy and Technology 14(10):5551-5557.

Atto V, Zahui SO, Kpahie FZ, Nene Bi AS. 2022. Évaluation de l'activité cicatrisante de l'extrait aqueux de l'écorce de tronc de *Terminalia superba* (Combretaceae). International Journal of Biological and Chemical Sciences 16(6):2494-2505.

Aziz NA, Mohamad M, Mohsin HF, Mohamad NA, Hamid KA. 2020. The pharmacological properties and medicinal potential of *Chromolaena odorata*: A review. International Journal of Pharmaceutical, Nutritional and Cosmetic Science 2:30-41.

Bekoin-Abhé CM, Ouattara A, Coulibaly KT, Mobio MP, Tetchi YD. 2020. Profil épidémioclinique et évolutif des patients admis pour une morsure de serpent dans le service de réanimation du CHU de Cocody (Abidjan, Côte d'Ivoire). Revue Internationale des Sciences Médicales 21(1):67-71.

Belem B, Smith OC, Theilade I, Bellefontaine R, Guinko S, Lykke AM. 2008. Identification des arbres hors forêt préférés des populations du Sanmatenga (Burkina Faso). Bois et Forêts des Tropiques 298(4):53-64.

Bezerra JWA, Rodrigues FC, Gonçalo MABF, Santos MAF, Macedo GF, Souza J, Fernandes PAS, Fernando EMP, Oliveira CHS, Silva VB, Torquato IHS, Monte NS, Santos LT, Coutinho HDM. 2020. Chemical composition and antibacterial activity of the essential oil of *Mesosphaerum suaveolens* (Lamiaceae). IntechOpen. https://doi.org/10.5772/intechopen.92704.

Bhuyan M, Deb P, Dasgupta D. 2019. *Chromolaena odorata*: As nature's wound healer. International Journal of Current Pharmaceutical Research 11(4):63-65.

Blackburn TM, Pyšek P, Bacher S, Carlton JT, Duncan RP, Jarošík V, Wilson JRU, Richardson DM. 2011. A proposed unified framework for biological invasions. Trends in Ecology and Evolution 26(7):333-339.

Costa AR, Bezerra JWA, Cruz RP, Freitas MA, Silva VB, Neto JC. 2020. In vitro antibiotic and modulatory activity of *Mesosphaerum suaveolens* (L.) Kuntze against Candida strains. Antibiotics 9:46.

Dagnelie P. 1998. Statistique Théorique et Appliquée. Tome 2. De Boeck et Larcier, Bruxelles. 659 p.

Dal-Fabbro R, Marques-de-Almeida M, Cosme-Silva L, Ervolino E, Cintra LTA, Gomes-Filho JE. 2019. Chronic alcohol consumption increases inflammation and osteoclastogenesis in apical periodontitis. International Endodontic Journal 52(3):329-336.

Delabarre M. 1977. Incidence Agronomique du Développement de *Eupatorium odoratum* (Composée) en Côte d'Ivoire. Thèse, Université Nationale de Côte d'Ivoire, Abidjan. 108 p.

Dembélé DL, Somboro AA, Doumbia S, Diarra ML, Haïdara M, Sanogo R. 2023. Étude pharmacognosique des feuilles, écorces de racines, écorces de tronc et de la racine entière de Securidaca longipedunculata Fresen. (Polygalaceae), récoltées au Mali. International Journal of Biological and Chemical Sciences 17(4):1701-1716.

Dossou JA, Fandohan BA. 2021. Utilisation des plantes médicinales pour prévenir et guérir les morsures de serpents : état des lieux et perspectives. Biotechnology, Agronomy, Society and Environment 25(2):57-70.

Dossou M, Aïkpon R, Todo E, Salomon A, Lokossou BA, Obossou E, Dassou H. 2025. Étude ethnopharmacologique des plantes utilisées contre les moustiques dans les trois zones bioclimatiques du Bénin. International Journal of Biological and Chemical Sciences 19(1):180-195.

Ekele JU. 2023. Phytochemical analysis of six antivenom medicinal plants. Journal of Medicinal Plants Studies 11(3):71-79.

Harley RM, Pastore JFB, Soares AS, Fernando EMP, Mota M. 2019. *Mesosphaerum caatingense* (Lamiaceae), a new species from the semi-arid Caatinga region of Northeast Brazil. Kew Bulletin 74:55.

Ho JSS, Ping TL, Paudel KR, El Sherkawi T, De Rubis G, Yeung S, Hansbro PM, Oliver BGG, Chellappan DK, Sin KPS, Dua K. 2024. Exploring bioactive phytomedicines for advancing pulmonary infection management: Insights and future prospects. Phytotherapy Research 38(12):5840-5872.

Husen SA, Setyawan MF, Syadzha MF, Susilo RJK, Hayaza S, Ansori ANM, Alamsjah MA, Ilmi ZN, Wulandari PAC, Pudjiastuti P, Awang P, Winarni D. 2020. A novel therapeutic effect of *Sargassum ilicifolium* alginate and okra (*Abelmoschus esculentus*) pod extracts on open wound healing process in diabetic mice. Research Journal of Pharmacy and Technology 13(6):2764-2770.

Hutchinson J, Dalziel JM. 1963. Flora of West Tropical Africa. 2nd edition. Crown Agents for Oversea Governments and Administrations, London.

Nguyen VDH, Nguyen ATV, Truong TQ, Trinh LTP, Huynh BV. 2019. Optimization of total phenolic extraction of *Chromolaena odorata* leaf for antifungal activity against plant pathogens. Journal of Agriculture and Development 18(6): 38-48. https://doi.org/10.52997/jad.6.06.2019.

IUCN. 2000. IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species. IUCN, Gland, Switzerland.

Kankara IA, Maru AA, Paulina GA, Kurfi BG. 2023. In vivo antivenom effect of *Annona senegalensis* (Pers.) against biological activities of Naja nigricollis envenomation. International Journal of Science for Global Sustainability 9(3):70-78.

Konrath EL, Strauch I, Boeff DD, Arbo MD. 2020. The potential of Brazilian native plant species used in the therapy for snakebites: A literature review. Toxicon 217:17-40.

Kriticos DJ, Yonow T, McFadyen RE. 2005. The potential distribution of *Chromolaena odorata* (Siam weed) in relation to climate. Weed Research 45:246-254.

Lawin IF, Houètchégnon T, Fandohan AB, Salako VK, Assogbadjo AE, Ouinsavi CA. 2019. Connaissances et usages de *Cola millenii* K. Schum. (Malvaceae) en zones guinéenne et soudano-guinéenne au Bénin. Bois et Forêts des Tropiques 339:61-74.

Makwana D, Engineer P, Dabhi A, Chudasama H. 2023. Sampling methods in research: A review. International Journal of Trend in Scientific Research and Development 7(3):762-768.

Manzano-García J. 2021. Estudio etnobotánico de flora introducida con usos medicinales en el Chaco Seco de Córdoba, Argentina. Medicinal Plant Communications 4:23-29.

Martínez GJ. 2013. Use of fauna in the traditional medicine of native Toba (qom) from the Argentina Gran Chaco region: an ethnozoological and conservationist approach. Ethnobiology and Conservation 2:1-43.

Maulida PA, Putri DA, Fatmawati S. 2019. Free radical scavenging activity of *Chromolaena odorata* L. leaves. IPTEK Journal of Technology and Science 30(3).

Ngueguim FT, Gounoue RK, Donfack JH, Simo SM, Jouonzo J, Fifen RN, Dzeufet PDD, Dimo T. 2023. *Chromolaena odorata* (L.) R.M. King and H. Robinson leaves aqueous extract improves the femoral head in ethanol-induced osteonecrosis in rats. BioMed Research International 2023:5436771.

Nguta JM. 2019. *In vivo* antimalarial activity, toxicity, and phytochemical composition of total extracts from *Securidaca longipedunculata* Fresen. (Polygalaceae). Biomedical and Biotechnology Research Journal 3:196-201.

Okoro IO. 2020. Effects of extraction solvents on the antioxidant and phytochemical activities of *Manihot esculenta* leaves. Iranian Journal of Toxicology 14(1):51-58.

Peller T, Altermatt F. 2024. Invasive species drive cross-ecosystem effects worldwide. Nature Ecology and Evolution 8:1087-1097.

Pyšek P, Richardson DM, Rejmánek M, Webster GL, Williamson M, Kirschner J. 2004. Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. Taxon 53(1):131-143.

Rai PK, Singh JS. 2020. Invasive alien plant species: Their impact on environment, ecosystem services and human health. Ecological Indicators 111:106020.

Richardson DM, Pyšek P, Carlton JT. 2011. A compendium of essential concepts and terminology in invasion ecology. In: Richardson DM (Ed.), Fifty Years of Invasion Ecology: The Legacy of Charles Elton. Wiley-Blackwell, Oxford. pp. 409-420.

Sawadogo O, Kagambega W, Sabo P, Ouédraogo A, Sawadogo O. 2026. Endogenous knowledge and use value of *Mesosphaerum suaveolens* (L.) Kuntze, an invasive alien plant in Burkina Faso. Ethnobotany Research and Applications 33:1-15.

Seyed MA, Elodemi M, Alalawy AI. 2024. A comprehensive review on the therapeutic potential of *Chromolaena odorata* for the management of foot ulceration and chronic wounds. Pakistan Journal of Medical and Health Sciences 18(7):3.

Tardio J, Pardo-De-Santayana M. 2008. Cultural importance indices: A comparative analysis based on the useful wild plants of southern Cantabria (northern Spain). Economic Botany 62(1):24-39.

Yolidje I, Keita DA, Moussa I, Toumane A, Bakasso S, Saley K, Much T, Pirat JL, Ouamba JM. 2020. Enquête ethnobotanique sur les plantes utilisées traditionnellement au Niger dans la lutte contre les moustiques vecteurs des maladies parasitaires. International Journal of Biological and Chemical Sciences 14(2):570-579.