Endogenous knowledge and use value of *Mesosphaerum suaveolens* (L.) Kuntze, an invasive alien plant in Burkina Faso

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Research

Abstract

Background: *Mesosphaerum suaveolens* (L.) Kuntze is an alien invasive plant species in many countries in tropical Africa, including Burkina Faso. This study aimed to document the indigenous knowledge of local people regarding the invasion of *M. suaveolens*, its uses, and the impact of its proliferation.

Methods: Semi-structured interviews were conducted from January to March 2024 with 260 individuals from six ethnic groups in four sites across two climate zones of Burkina Faso. The use values and citation frequencies were calculated. A multinomial regression analysis was performed to identify the factors influencing indigenous knowledge.

Results: The proliferation of *M. suaveolens* has intensified over the past two decades. Livestock was identified as a primary source of the species' spread. The uses of *M. suaveolens* were classified into six categories; medicinal uses were by far the most common (69.61% of responses), followed by the use of the species as a mosquito repellent (4.61%). Values varied significantly according to climate zones and ethnic groups ($p < 0.001$). Most respondents (93.7%) reported that the species is fast spreading, and 75.4% of them considered the proliferation of *M. suaveolens* as a major threat to local plant resources. The impacts of the invasion include the extinction of local species, the reduction of biodiversity, and the depletion of pastures.

Conclusions: This study highlighted the huge endogenous knowledge from local communities that can serve for the implementation of strategies to mitigate the invasion impacts of *M. suaveolens*.

Keywords: Biodiversity, ethnobotany, invasive species, *Mesosphaerum suaveolens*, endogenous knowledge.

Background

In recent decades, biological invasions have been a growing concern worldwide (Lefeuvre 2006). A large number of livestock and plant species are progressively expanding their distribution and rapidly increasing in numbers, disrupting the stability of the ecosystems they invade (MEEVCC 2020). Biological invasion is a natural phenomenon that can be observed on a geological and temporal scale (Williamson 1996, Neindre 2002). This natural expansion process is favored by human activities through intentional or accidental introductions of exotic species (Vigne 1994). In addition to population growth and human

pressure, which contribute to the degradation of ecosystems (Nabaloum 2024), climate change can also negatively affect ecosystems by favoring biological invasions (Archibald *et al*. 2020). Invasion by alien species represents a major threat to biodiversity and is considered an alarming symptom of global ecosystem imbalance (Duncombe 2018). Invasive plants are responsible for the alteration of ecosystem services, causing the extinction of some local species and standing for one of the major issues for the long-term maintenance of ecosystem integrity and biodiversity (Aboh *et al*. 2017a, Ka *et al*. 2023). They are also sources of considerable costs for agriculture and livestock, as well as threats to forestry, fisheries, and human health (Wittenberg & Cock 2001).

In Burkina Faso, floristic richness comprises 531 woody species and 1,779 herbaceous species (MEEVCC 2020). Among them, at least twenty have been identified as invasive species, including *Mesosphaerum suaveolens* (L.) Kuntze, an alien herbaceous plant native to tropical America that is now widespread worldwide and commonly regarded as a competitive weed (Ahoton *et al*. 2010, SP/CONEDD 2010). This species poses a significant problem because it is unpalatable to livestock (Aboh *et al*. 2017b, Ka *et al*. 2023), grows faster than native species, and produces an exceptionally high number of seeds (Padalia *et al*. 2014, David *et al*. 2020). Beyond its negative impact on local biodiversity, the invasion of *M. suaveolens* negatively affects the production of agropastoral resources, thus exacerbating food insecurity and vulnerability of farming, including livestock farmers (Ka *et al*. 2023). Despite the wide expansion of its range, few studies have focused on the invasion of this species and its impact on ecosystem services in Burkina Faso. Furthermore, no study has documented the indigenous traditional knowledge on this species, more specifically, about the management of its invasiveness.

Based on that, this study aimed to: (i) document the indigenous knowledge of local communities regarding *M. suaveolens*; (ii) assess how the species is valued and utilized by local people; (iii) analyze local perceptions of the invasion and impacts of the species on ecosystems and agropastoral resources.

This study was designed based on the following hypotheses: (i) endogenous knowledge related to *M. suaveolens* differs significantly among sociocultural groups; (ii) the uses and valuation of the species vary across climatic zones; (iii) perceptions of the impacts associated with the proliferation of *M. suaveolens* differ with regards to the climatic zones.

Materials and Methods

Study area

This study was conducted in Burkina Faso across two climatic zones: the Sudano-Sahelian and the Sudanian zones (Figure 1), each comprising two study sites. These two climatic zones exhibit contrasting environmental conditions (Thiombiano & Kampmann 2010) (Table 1). The Sudanian zone, located in the southern part of the country, appeared to be the wet one. It is characterized by moderate variation of temperature. The Sudano-Sahelian zone, which covers most of the central part of Burkina Faso, has moderate rainfall, spread over a period of 4 to 5 months with high temperatures (Table 1).

In the Sudano-Sahelian zone, the selected sites were Gonsé, Kadiogo province, and Laba, Sanguié province. Concerning the Sudanian zone, the study sites were Sarba, in the Ioba province, and Diendéresso, in the Houet province.

Study species

Mesosphaerum suaveolens, previously named *Hyptis suaveolens*, belongs to the Lamiaceae family, which comprises more than 250 genera and nearly 7,000 species distributed throughout the world (Thiombiano *et al*. 2009). It grows in the wooded savannas, roadsides, around villages, crops, fallow land, and reproduces by seed (Thiombiano *et al*. 2012). It is an erect annual species, highly aromatic, that can reach a height of up to 2 meters, and this plant spreads by seed. The stem is woody, polygonal, moderately branched, leafy, greyish, pubescent, and marked with glandular dots (Aboh 2008). This species is native to tropical America but is now found almost everywhere in the world (Duncombe 2018). The leaves are simple, opposite, and decussate. The petiole is well-marked and measures 2 to 4 cm long (Ahoton *et al*. 2010). The leaves are oval at its base, while those at the top are elliptical. The leaf blade measures 2 to 10 cm long and 4 to 6 cm wide (Figure 2). It has a rounded to slightly cordate base, an acute or obtuse apex, and an irregularly serrated margin. Both sides are pubescent and contain small glands. The inflorescence is a loose, few-flowered cymose cluster located in the upper leaf axils. The flowers are blue, about 8 mm long, and underpinned by calyxes (about 5 mm long when flowering and 10 mm long when fruiting), which are strongly striated and covered with long, soft hairs that grow longer when the fruits appear (Berhaut 1975). The fruit is a compressed nutlet, black in color, and truncated at the apex. It typically measures about 2.5 mm long and 2 mm wide. The seed is about 2 mm long with a distinctive polymorphic feature at the end (Masís *et al*. 1998).

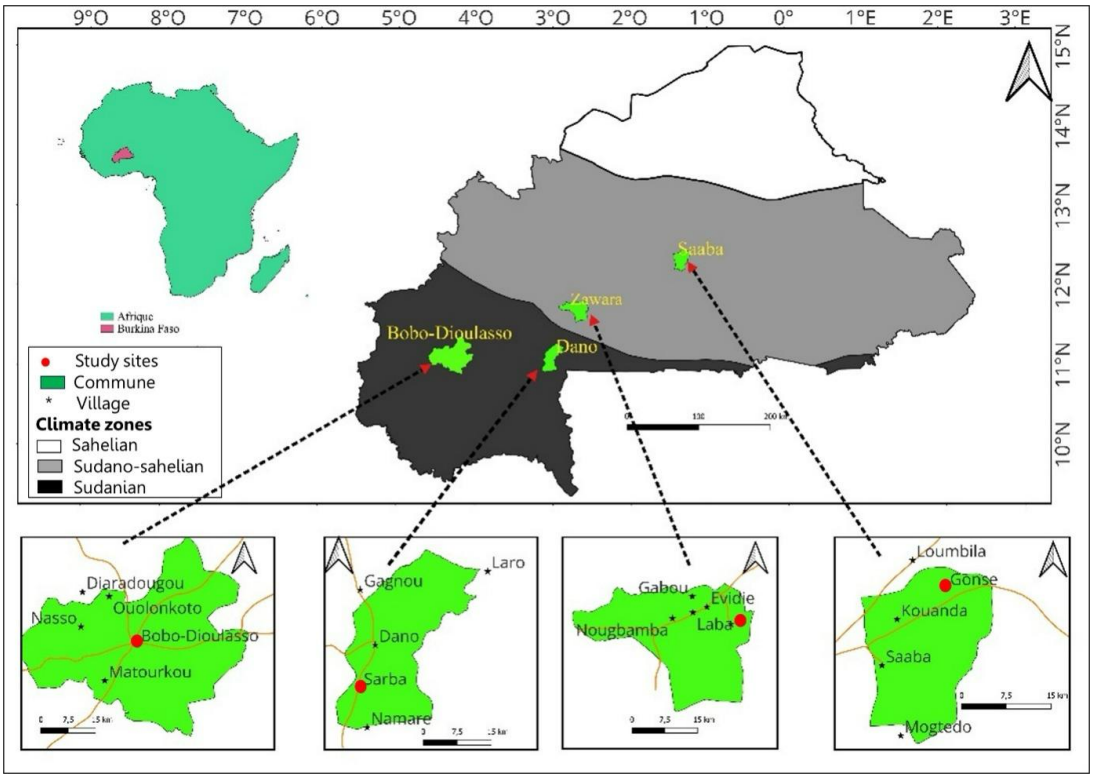

Figure 1. Location of study sites across the climatic zones

Table 1. Environmental parameters of the study area

Parameters	Climatic zones	
	Sudano-sahelian	Sudanian
Raining saison	June-October	May-October
Rainfall	600-900 mm	> 1000 mm
Number of rainy days	56 - 88 days	83-104 days
Temperature	20-30°C	20-25°C
River	Mouhoun and tributaries	Comoé and Léraba
Soil	Vertisols, ferruginous and hydromorphic	Hydromorphic and feralitic
Vegetation	Savannas, gallery forests	Savannas, dry forests, gallery forests

Source: (Thiombiano & Kampmann 2010)

Figure 2. A: Entire plant of *Mesosphaerum suaveolens* B: Inflorescence C: Seeds (source: Sawadogo Ousmane, September 2024)

Data collection

A preliminary study was first conducted in four sites in order to identify stakeholders who could be used for the survey. This concerned a sample of 30 people per site, selected at random to determine the proportion of respondents who know and use *M. suaveolens*. This showed that in all sites, local communities were familiar with the species and use it for many purposes. Thus, data collection for this study was carried out from January to March 2024. For that, a stratified sampling method was performed using a questionnaire. This includes four levels of factors, including climatic zone (two zones), ethnicity (six sociocultural groups), age (three age categories), and gender (male and female). The questionnaire focused on endogenous knowledge of the species, its uses, its invasion dynamics, and the impact of its invasion. During the survey, respondents were divided into three age groups: young people (age < 30), adults (age ranging from 30 to 60), and older people (age ≥ 60), following recommendation of Assogbadjo *et al*. (2008). Thus, to ensure that the sample size was representative, the number of respondents at each site was calculated following the recommendation of Dagnelie (1998) through the formula:

$$N = \frac{U^2{}_{1-\alpha/2} * p(1-p)}{d^2}$$

N represents the total number of respondents; U²1-α/2 is the value of the normal random variable for a probability value of α; U1-α/2 = 1.96 if α = 0.05; p is the proportion of individuals who know or use *M. suaveolens*; d = 0.05 is the marginal error.

Based on that, a total of 260 respondents were selected randomly and interviewed across the two climate zones.

Data processing and analysis

The data analysis involved calculating ethnobotanical indices and performing statistical tests (Table 2):

The ethnobotanical use value (EUV) of *M. suaveolens* was subjected to a multinomial analysis in order to test its variation based on the climate zones, sociocultural groups, age groups, and gender. The Chi-square test was used to test the perceptions of local people on *M. suaveolens* based on age group, gender, and ethnicity. Correspondence Factor Analysis (CFA) was used to distinguish between different sociocultural groups. All statistical analyses were performed using R software version 4.3.2 (R Core Team, 2023).

Table 2. Calculation of ethnobotanical indices

Index	Formula	Description	Authors
Relative citation frequency (RCF)	$RCF = \frac{Np}{N} * 100$	RCF is the relative citation frequency for each usage category of *M. suaveolens* expressed in percentage; Np is the number of respondents who mentioned a specific use of the species, and N is the total number of respondents	Friedman *et al.* 1986
Use value (UV)	$UV = \sum_{I=1}^{I_n} U_i /n$	U_i is the total number of mentioned uses by respondent i of a social group, and n is the total number of surveyed persons for the considered social group	Phillips *et al.* 1994
Use Value per plant organ	$T = 100 *_N^S$	S represents the number of respondents who answered positively ('yes') regarding the considered plant organ, and N is the total number of respondents.	Maregesi *et al.* 2007)

Results

Factors influencing the invasion of *Mesosphaerum suaveolens*

In both climate zones, livestock and runoff water (Figure 3) were cited as the main factors contributing to the spread *of M. suaveolens*. A significant difference was observed between the factors contributing to the spread of this species based on climatic zones (X^2= 24.44; df = 5; P < 0.001). Livestock were identified as the main factor for the species spreading, accounting for 49.23% and 50% of citations in the Sudano-Sahelian and the Sudanian zones, respectively. Runoff water contributes to the dispersal of the species, with a citation rate of 22.31% and 31.82% in the Sudano-Sahelian and the Sudanian zones, respectively (Table 3). Specifically, in the Sudano-Sahelian zone, respondents cited the effects of climate change, and transport as the second most important factor in the spread of *M. suaveolens*, while in the Sudanian zone, wind and human activity as appeared to be the second most important factors in the dispersal of this species.

Table 3. Perceptions of local communities on the dissemination of *Mesosphaerum suaveolens*

Variables	Sudano-sahelian zone		Sudanian zone		
Invasion factors	N	%	N	%	Chi-2
Livestock	64	49.23	55	50.00	
Climate change	15	11.54	03	02.73	
Water	29	22.31	35	31.82	X^2=24.44
Human activities	07	05.38	05	04.55	P < 0.001*
Transport	14	10.77	02	01.82	
Wind	01	00.77	10	09.09	

N is the absolute frequency of citation

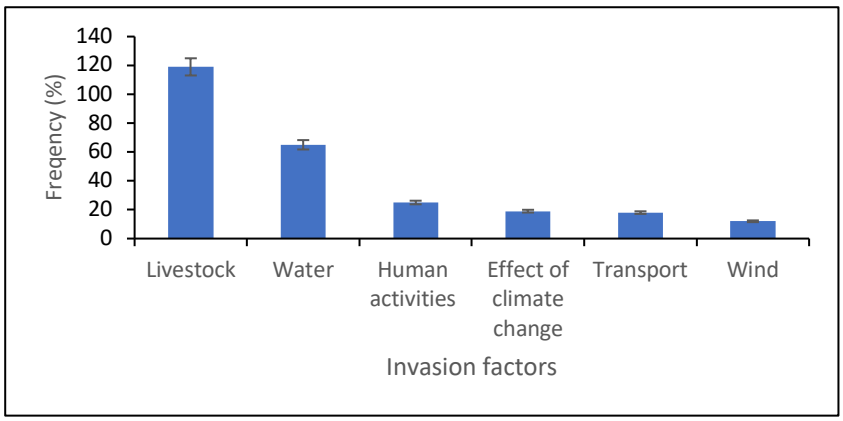

Figure 3. Invasion factors of *Mesosphaerum suaveolens*

Use of *Mesosphaerum suaveolens*

In total, six categories of use of *M. suaveolens* were cited (Figure 4). The most frequent use category is medicine (69.61%), followed by mosquito repellent (4.61%). Furthermore, 21% of respondents declared to have no knowledge of the use of this plant. Its uses as an income source (1.53%), energy (1.53%), seed conservation product (1.15%), and food (0.76%) were rarely mentioned. The most commonly used part of the plant was the leaves (52.69%) (Figure 5). Leafy twigs are used as mosquito repellent, either directly or in the form of incense, while leaf powder was used for crop seed conservation. Dry stems, which account for 4.61% of cited used parts, were used for energy purposes. In traditional medicine, M. suaveolens was used for various therapeutic applications. Thus, this species was cited to be used for the treatment of malaria and gastrointestinal diseases by 17% and 7% of respondents, respectively. The leaves were used as decoctions to treat malaria, while gastrointestinal disorders were treated with decoctions or infusions of the plant organs.

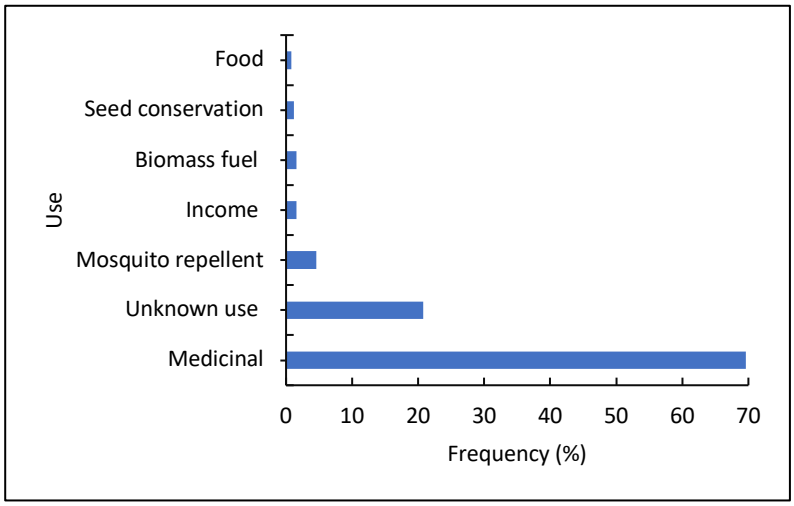

Figure 4. Citation frequency of the different uses of *Mesosphaerum suaveolens*

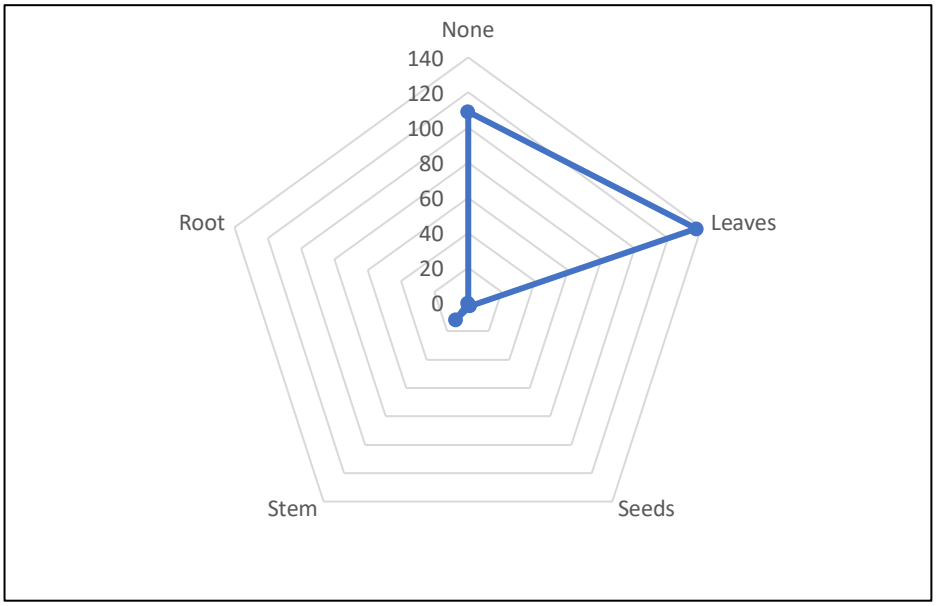

Figure 5. Relative frequency of citation of used plant organs of *Mesosphaerum suaveolens*

Effect of climatic zones and ethnic groups on the use of *Mesosphaerum suaveolens*

The use value of *M. suaveolens* varied significantly ($P < 0.0001$) among ethnic groups and climatic zones (Table 4). Age and gender did not affect the use of the species organs ($P > 0.05$).

In the Sudanian zone, local communities such as Bobo and Dagari appeared to share common knowledge on the use of *M. suaveolens* organs for food, medicine, and economic purposes, revealing a diversified valorisation of the plant. In contrast, organs of the species were found to be weakly used by Senoufos. In the Sudano-Sahelian zone, Mossi and Gourounsi were the ethnic groups who used more M. suaveolens for medicinal purposes, while Fulani used more its organist for energy and mosquito repellent, reflecting a more targeted use of *Mesosphaerum suaveolens* (Figure 6).

Table 4. Effect of climate zone and socio-cultural factors on the use value of *Mesosphaerum suaveolens*

Factor	Df	Variance	F	Pr(>F)
Age (Classe 2)	1	0.001675	1.6194	0.188
Age (Classe 3)	1	0.000543	0.5249	0.616
Sexe (Male)	1	0.001872	1.8096	0.140
Sudano-Sahelian zone	1	0.004803	4.6439	0.011 *
Ethnic (Dagari)	1	0.000789	0.7627	0.513
Ethnic (Gourounsi)	1	0.009439	9.1264	0.002 **
Ethnic (Mossi)	1	0.000760	0.7347	0.497
Ethnic (Senoufo)	1	0.000999	0.9660	0.358

Df: Degrees of freedom F: F-statistic Pr: p-value

Perception of local communities on the proliferation and impact of *Mesosphaerum suaveolens*

In both climatic zones, respondents reported an increased proliferation of *M. suaveolens* in their environment. It was stated that, in recent decades, this species has almost colonized all environments, whereas previously it was only observed along the roadsides. Thus, 93.7% of the respondents perceived an increased proliferation of *M. suaveolens*, while 6% reported its decrease. Regarding the impact of the species, 75.4% of respondents considered the proliferation of *M. suaveolens* to be a threat. Furthermore, 10.8% of respondents have no opinion on the impact of the species proliferation. The cited main impacts of *M. suaveolens* were the reduced ecological service and grazing areas, the disappearance of herbaceous species, and soil depletion. In the agriculture sector, the proliferation of *M. suaveolens* stands for a real threat to crop development. Indeed, it has a highly competitive capacity compared to crops and leads to reduced agricultural yield. However, no difference was observed between climatic zones ($X^2=3.1769$; df = 2; $P = 0.2042$) in terms of the cited threats caused by the proliferation of *M. suaveolens*. With regards to the impact of the invasion on biodiversity, a significant difference ($X^2=23.08$; df = 2; $P < 0.0001$) was observed between the two climatic zones (Table 5). Respondents reported that *M. suaveolens* exhibited rapid growth, threatening the development of certain species in the colonised areas. In addition, it was reported that the disappearance of some species, especially those from the Poaceae family, was due to the competitiveness of M.

suaveolens. The proliferation of *M. suaveolens* appeared to be a serious threat to livestock farming. Indeed, in the two climatic zones, there was a significant difference between the citation frequencies on the perception of the impacts of the species ($X^2 = 107.79$; df = 2; $P < 0.0001$). In this study, 76.92% of respondents in the Sudano-Sahelian zone and 71.53% in the Sudanian zone reported that the proliferation of the species was responsible for the disappearance of some native plant species of high pastoral value. This led to a reduction of the fodder value in the grazing areas. Most respondents (79.10%) considered *M. suaveolens* to be an unpalatable weed for livestock.

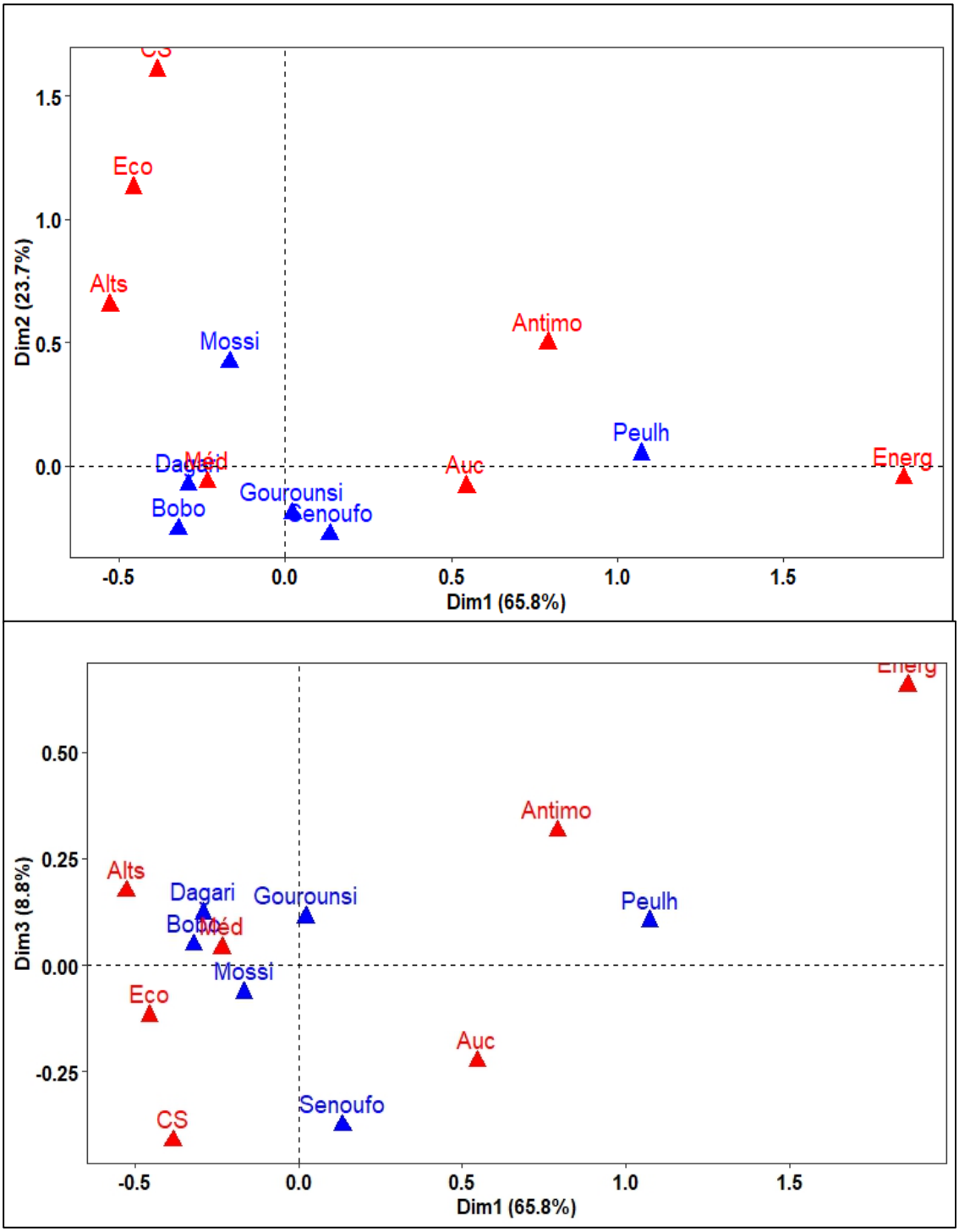

Figure 6: Use value according to ethnic groups. SC: Seed conservation; Antimo : mosquito repellent ; Med : Medicine ; Eco : Income ; Alts : Food ; Energ : Biomass fuel ; Auc : Unknown use

Table 5. Perceptions of local people on threats from *Mesosphaerum suaveolens*

	Sudano-Sahelian zone		Sudanian zone		
Variable	N	%	N	%	Chi-square test
Invasion of *M. suaveolens* over time					
Increase	124	0.95	111	0.87	X^2=16.67
Decrease	05	0.04	16	0.13	df = 2
Stable	01	0.01	00	00	P < 0.0001***
Threats of *M. suaveolens* on biodiversity					
Yes	100	76.92	93	71.53	X^2=23.08
No threat	7	05.38	30	23.07	df = 2
Unknown use	23	17.69	7	05.38	P < 0.0001***
Threats of *M. suaveolens* to agriculture					
Yes	106	81.53	95	73.07	X^2=3.17
No threat	16	12.30	20	12.30	df = 2
Unknown use	8	06.15	15	11.53	P = 0.2042
Threats of *M. suaveolens* on livestock farming					
Yes	13	10.00	93	71.53	X^2=107.79
No threat	78	60.00	15	11.53	df = 2
Unknown use	39	30.00	22	16.92	P < 2.2e-16

N: Effective; %: frequency

Discussion

Local perception of the invasion of *Mesosphaerum suaveolens*

Based on the opinion of local communities, the rapid proliferation of *M. suaveolens* in Burkina Faso is mainly due to livestock. These results were consistent with those of Ka *et al.* (2023), who reported that the species has been introduced in the Upper Casamance, in Senegal, by cattle from different locations. This highlighted the fact that local people have a good understanding of changes in their environment with regards to natural resources (Gaoue *et al*. 2011). In addition, livestock was the most important factor in the spread of *Senna obtusifolia* (L.) H. S. Irwin & Barneby, an invasive species in semi-arid areas, according to Zare (2023). Apart from that, the most frequently cited factors of the species invasion were runoff water, anthropogenic factors, and the adverse effects of climate change. Indeed, human activities such as logging, intensive agriculture, and transhumance promote the disruption of ecosystem balance, leading to the proliferation of *M. suaveolens* (Aboh 2008). According to Burgess *et al*. (2004) and Zare (2023), in West African countries, 60 to 80% of the natural habitats have been transformed into agricultural and residential areas, contributing to the establishment and proliferation of invasive species. It was also reported by CBD (2009) that human activities such as international trade and maritime and air transport play a major role in the introduction of exotic species into new territories or habitats. Furthermore, the effects of climate change, such as changes in abiotic conditions, could accelerate the invasion of *M. suaveolens* by altering local environmental conditions (Afreen *et al*. 2024; IPBES *et al*. 2019).

Use of *Mesosphaerum suaveolens* in Burkina Faso

The perception of local communities about the use of *M. suaveolens* revealed that it is widely integrated into the practices of local people in Burkina Faso. Indeed, this species was used not only for its medicinal properties, but also for food, cosmetics, and as a mosquito repellent. However, medicinal use of the species was the most frequently cited. These results corroborate with studies by several authors, such as (Ka *et al*. 2023, Sédégan *et al*. 2024). *Mesosphaerum suaveolens* is used as an antimalarial and for the treatment of stomachaches, according to the respondents. These traditional uses are supported by several scientific reports, which have demonstrated the medicinal properties of this species against many diseases (Mishra *et al*. 2021). The species is particularly recognised for its use as a mosquito repellent, antimalarial, and antibacterial properties (Ahoton *et al*. 2010, Ka *et al*. 2023). In addition, the leafy branches of *M. suaveolens* are used as a mosquito repellent and the leaf powder for seed preservation. In this regard, Dossa *et al*. (2024) pointed out that the leaves of *M. suaveolens* contain metabolites with significant pharmacological properties. These compounds include essential oils with antimicrobial, antioxidant, and anti-inflammatory effects. In addition, the leaves of *M. suaveolens* are burnt in some African regions to repel mosquitoes (Mohanta *et al*. 2023). According to Mihin *et al*. (2019), *M. suaveolens* contains essential oils that could be used as natural preservatives in the food industry or cosmetics. Furthermore, Mishra *et al*. (2021) claim that this species contains unique terpenoid metabolites, such as suaveolic acid, suaveolol, methyl suaveolate, beta-sitosterol, ursolic acid, as well as phenolic compounds, such as rosmarinic acid and methyl rosmarinate, which could replace traditional

medicine for treating resistant and emerging bacterial and viral pathogens. In Burkina Faso, *M. suaveolens* was considered a plant used to control insects, ticks, animal parasites, and disease-carrying insects, as well as for the preservation of both cereal and legume seeds in Bobo communities (Kassamba *et al*. 2024).

Influence of ethnic groups on the use of *Mesosphaerum suaveolens*

The use of *M. suaveolens* varies from one ethnic group to another, but it has certain common characteristics linked to the climate zone. Most ethnic groups in both climate zones cited the medicinal and mosquito repellent uses of *M. suaveolens*. According to Kassamba *et al* (2024), Bobo communities in the Sudanian zone use a combination of plants, including *M. suaveolens*, to control mosquitoes. In the Sudano-Sahelian zone, Mossi, Gourounsi, and Fulani ethnic groups use it mainly to repel mosquitoes. These results corroborate those of Savadogo *et al.* (2016), who reported that Mossi used leaves of *M. suaveolens* to repel mosquitoes and other harmful insects in the central plateau region of Burkina Faso. It is known to be an aromatic plant with a strong, particular odour, which is considered a powerful mosquito repellent (Savadogo *et al.* 2016). Furthermore, its leaves are used either directly or ground into powder by Mossi to preserve cereals and legumes against pests (Savadogo *et al.* 2016). Several studies have demonstrated the repellent properties of volatile compounds emitted by *M. suaveolens* (Kossou *et al.* 2007, Traoré-Coulibaly *et al.* 2013, Sané 2021). In addition, previous studies have reported that this species can significantly improve health by effectively targeting vectors of human and livestock diseases (Ka *et al.* 2023, Kassamba *et al.* 2024).

Impact of *Mesosphaerum suaveolens*

This study showed that invasion of *M. suaveolens* across the study area began in the last two decades, whereas previously it was observed only sporadically along roadsides. These findings corroborate those of Thiombiano et al. (2009), who noted an abnormal proliferation of M. suaveolens on the National Road No.1 in Burkina Faso. Indeed, these same authors found that two sites of proliferation of the species were observed in the southern part of Ouagadougou in the 2000s. According to the same authors, the species was able to cover 100% of the study area. *Mesosphaerum suaveolens* is considered to be an invasive competitive weed in many parts of the world, particularly in Africa, Asia, and the Pacific (Ahoton *et al.* 2010, Ka *et al.* 2023). With regards to its invasion capacity, it was revealed in this study that *M. suaveolens* represents a significant threat to agriculture, livestock farming, and ecosystem services (Figure 7). The proliferation of the species leads to soil degradation, competes directly with crops, causes the extinction of certain herbaceous species with forage value, and gradually occupies areas intended for grazing. It reduces agricultural productivity and produces allelochemicals that inhibit the germination of other plant species in the vicinity (Ka *et al.* 2023). Indeed, Aboh (2008) reported that the proliferation of *M. suaveolens* affects herbaceous species diversity. As underlined by Oumorou *et al.* (2010) and Thiombiano *et al.* (2009), forage quality and quantity decrease following the proliferation intensity of *M. suaveolens*. *Mesosphaerum suaveolens* is not palatable to livestock (Aboh *et al.* 2008), and its proliferation in rangelands leads to a reduction in biomass and livestock carrying capacity (Aboh *et al.* 2019, Oumorou *et al.* 2010. Among the Fulani farmers from Upper Casamance (Senegal), *M. suaveolens* is primarily recognized as an invasive species that adversely affects pastoral systems by decreasing the availability of fodder plants, which results in biodiversity loss and creates challenges for livestock management (Oumorou *et al.* 2010, Ka *et al.* 2023). Moreover, the high intensity of its proliferation modifies the diversity of plant communities and has an impact on ecosystem services. According to Padalia *et al.* (2014), *M. suaveolens* is one of the most harmful weeds in the world. They reported that the species is rapidly invading tropical ecosystems worldwide, including India, and poses a significant threat to local biodiversity, ecosystems, and communities' livelihood.

Conclusion

This study revealed that the proliferation of *M. suaveolens* in Burkina Faso dates back to the last two decades. Zoochory and hydrochory are the main cited factors favoring its proliferation. Although *M. suaveolens* is an invasive species, respondents mentioned its usefulness in different use categories, among which traditional medicine and mosquito repellent appear most common. This confirms our first hypothesis. Leaves appear to be the main organs of the species, particularly as mosquito repellent. Local people's knowledge about the use of *M. suaveolens* varied significantly according to climatic zones, confirming our second hypothesis. Additionally, a wide proliferation of *M. suaveolens* has been observed over the past two decades, with colonisation extending to almost all environments. This proliferation has negative impacts on natural resources, such as loss of local biodiversity, thereby reducing the services of affected ecosystems. This confirms our third hypothesis, stating that perceptions vary according to climatic zones. This study provides evidence that local communities possess valuable endogenous knowledge that can help guide sustainable management strategies for ecosystems affected by the invasion of *M. suaveolens* in Burkina Faso. These findings could help policymakers formulate policies and programs to manage the proliferation of this species for its use in medicine.

Figure 7. A millet (*Sorghum bicolor* (L.) Moench) field invaded by *Mesosphaerum suaveolens* at Dano, in the Sudanian zone. (source: Sawadogo Ousmane, September 2024)

Declarations

List of abbreviations: RCF: Relative citation frequency; UV: Use value; EUV: Ethnobotanical use value; Df: Degrees of freedom; F: F-statistic; Pr: p-value; MEEVCC: Ministry of Environment, Green Economy, and Climate Change; MSRI: Ministry of Scientific Research and Innovation of Burkina Faso; CBD: Convention on Biological Diversity.

Ethics approval and consent to participate: This study was conducted in accordance with ethical code no. 2015-1319/PRES-TRANS/PM/MSRI of the Ministry of Scientific Research and Innovation of Burkina Faso. In addition, in compliance with the ethical code, consent was obtained from the research participants.

Consent for publication: Not applicable

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Author contributions: OS, WFK, and AO designed the study. Data collection was conducted by OS and PS under the supervision of WFK and AO. OS performed the statistical analyses and wrote the first draft of the manuscript. PS contributed to the statistical analyses. All authors participated in the revision of the manuscript and have read and approved the final version.

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