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ETHNO-BOTANICAL SURVEY OF *IRVINGIA GABONENSIS AND IRVINGIA WOMBOLU* IN SELECTED MARKETS IN AKINYELE LOCAL GOVERNMENT AREA, OYO STATE, NIGERIA

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ABSTRACT

This study investigated the ethnobotanical uses, market availability, and challenges associated with *Irvingia gabonensis* and *Irvingia wombolu* in selected markets within Akinyele Local Government Area, Oyo State, Nigeria. Data were collected from 80 respondents, comprising herbal practitioners and herb sellers, through structured questionnaires and interviews and analyzed using descriptive statistics. Results revealed that 57.5% of respondents were male, with the majority aged between 51 and 60 years, while 76.25% were married. Awareness of the species was generally high, with most respondents sourcing them from forests and marketing different plant parts such as seeds, bark, leaves, and fruits, predominantly during the rainy season. The plants were reported to possess strong medicinal value, with 96.3% of respondents affirming their therapeutic effectiveness in treating ailments such as fever, dysentery, and stomach disorders. Preservation methods largely relied on sun and air drying. Major challenges faced by respondents included high transportation costs (95%), inadequate capital (85%), poor road networks (82.5%), deforestation (75%), and seasonal scarcity (61.25%). Suggested solutions included reduction of transport costs, afforestation programs, and improved road infrastructure. The study underscores the socio-economic and medicinal importance of *Irvingia* species while highlighting the need for sustainable utilization and conservation strategies to ensure their long-term availability.

Keywords: *Irvingia gabonensis, Irvingia wombolu*, Ethnobotany, Medicinal plants, Market survey, Conservation, Nigeria

INTRODUCTION

Nigeria is one of the most biologically diverse countries in the world and relies heavily on ethnomedicine, largely because medicinal plants are more accessible and affordable than conventional medical systems (Ameri *et al.,* 2015). However, much of the indigenous knowledge on medicinal plants remains undocumented, being preserved mainly within local communities (Leakey and Newton, 2016). Preserving and transmitting this knowledge through participatory research is therefore crucial for future generations.

Among Nigeria's most valuable forest resources are the *Irvingia* species, commonly called African bush mango. Belonging to the family Irvingiaceae, these trees are widespread in the lowland forests of West and Central Africa and serve as important non-timber forest products (Kengni *et al.,* 2011). Of the seven species found in Africa, *Irvingia gabonensis* (sweet fruit) and *Irvingia wombolu* (bitter fruit) are predominant in Nigeria (Ladipo, 2000). The seeds, popularly known as *ogbono*, are widely consumed as soup thickeners and are valued for their nutritional and medicinal benefits, including cholesterol reduction and weight management (Ejiofor, 2002; Ekpo *et al.,* 2007). The bark and leaves are used to treat fever and stomach disorders (Agbor, 1994; Omokhua *et al.,* 2012), while the pulp is a rich source of vitamin C and beta-carotene (Okwunodolu *et al.,* 2019). Beyond food and medicine, the trees also play environmental roles such as serving as windbreaks (Leakey and Newton, 2016).

Despite their economic, nutritional, and therapeutic importance, knowledge on the utilization and management of *I. gabonensis* and *I. wombolu* remains limited and poorly documented (Kengni *et al.,* 2011). Increasing threats such as deforestation, overharvesting, and rapid urbanization have further reduced their availability (Lowe *et al.,* 2000). Understanding current ethnobotanical uses, market dynamics, and conservation practices is therefore essential to ensure sustainable utilization. This study was conducted to assess the socio-demographic profiles of traders and practitioners, their knowledge and use of *Irvingia* species, market availability, perceived efficacy, and the challenges associated with their trade in Akinyele Local Government Area, Oyo State.

In addition to their food and medicinal uses, *Irvingia* species are valued hardwoods for construction, furniture, and household items (Leakey and Newton, 2016). Their seeds, bark, and leaves also have industrial applications in margarine, cosmetics, and pharmaceuticals (Mukherjee *et al.,* 2019). They remain vital sources of income for rural dwellers and contribute to Nigeria's non-timber forest product economy (Agbor, 1994). However, growing scarcity driven by environmental degradation underscores the need for improved marketing strategies, sustainable harvesting, and deliberate conservation efforts to safeguard their continued availability.

MATERIALS AND METHODS

Methodology

The study was carried out in Akinyele Local Government Area (LGA) of Oyo State, which was created in 1976 with its headquarters located at Moniya. The LGA is one of the eleven LGAs in Ibadan and covers a land area of about 464.9 km² with an estimated population of 206,444 people, who are predominantly Yoruba. It shares boundaries with Afijio, Lagelu, Ido, and Ibadan North LGAs. The area has a rich cultural heritage, including the popular Oke Ibadan festival, and is characterised by a population density of 516 persons per km². Climatically, Akinyele experiences both dry and rainy seasons, with an average temperature of 29 °C and humidity of about 63%. Agriculture is the major occupation

of the inhabitants, with cocoa, maize, and cocoyam cultivated in appreciable quantities (Ekong, 2003; Matthews-Njoku and Adesope, 2007).

The target population for the study consisted of farmers, herbal practitioners, and herb sellers within Akinyele LGA. Data were obtained from both primary and secondary sources. The primary data were gathered using a well-structured questionnaire administered through interviews, while the secondary data were drawn from relevant theories, journals, and published materials related to the study.

For sampling, purposive sampling techniques were employed to select two major markets within the LGA, as they represent the main centers for herbal trade and practice. The data collected were analyzed using descriptive statistical tools, specifically frequencies and percentages, and the results were presented in tables for clarity and easy interpretation.

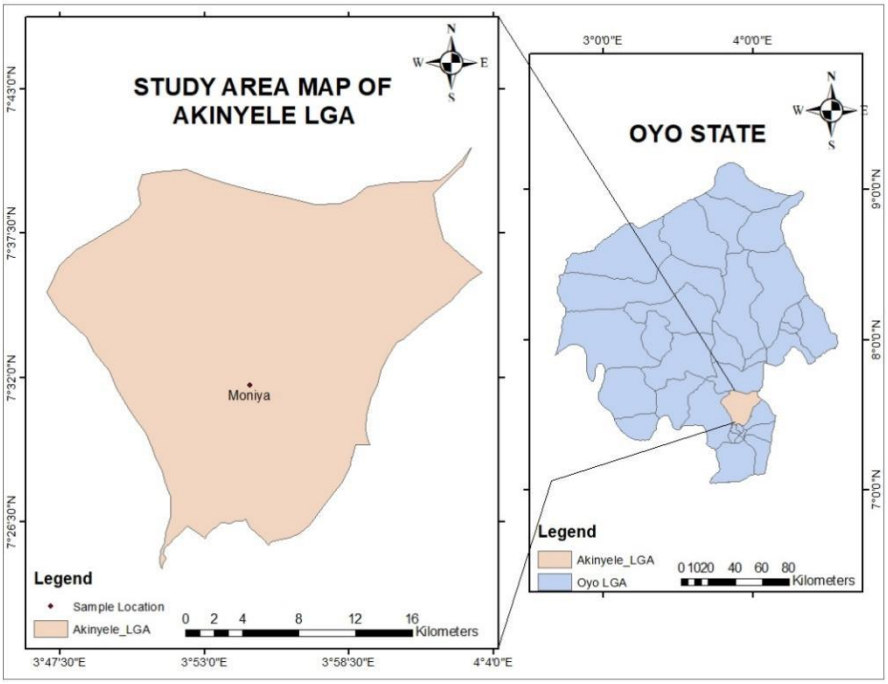

Figure 1: Map of the Area of the Study

RESULT AND DISCUSSION

Socio-Demographic Characteristics of the Respondents

The socio-demographic characteristics of respondents (Table 1) involved in the ethnobotanical survey of *Irvingia gabonensis* and *Irvingia wombolu* in selected markets of Akinyele Local Government Area revealed a fair representation across gender, age, marital status, occupation, and educational background. The study showed that males (57.5%) were slightly more represented than females (42.5%), indicating that men were more actively involved in the trade and utilization of *Irvingia* species in the study area. In terms of age distribution, respondents were predominantly within the economically active group, with half (50%) aged between 51–60 years, while 26.3% were between 41–50 years. A smaller proportion fell within the younger categories of 21–30 years (20%) and 31–40 years (3.8%), suggesting that the trade in *Irvingia* products is dominated by older individuals with long-standing experience in indigenous plant use. Marital status revealed that the majority of respondents were married (76.3%), followed by singles (17.5%), while only 6.3% were divorced. This implies that family responsibilities and household needs may influence active participation in the trade. With respect to occupation, more than half of the respondents (58.8%) identified primarily as herb sellers, 36.3% as herbal practitioners, while only 5% combined both occupations, indicating that the sale of *Irvingia* species is a more common livelihood strategy compared to herbal practice alone. The educational profile of respondents showed a wide distribution across different levels of formal education. The highest proportion (38.8%) had no formal education, followed closely by those with secondary education (35%). About 23.8% had primary education, while only 2.5% attained tertiary education. This suggests that despite low literacy levels, indigenous knowledge and utilization of *Irvingia* species remain strong cultural and economic practices in the study area, sustained mostly by those with little or no formal education.

The socio-demographic profile of respondents indicates that the trade and utilization of *Irvingia* species in Akinyele Local Government is largely driven by older, married individuals who rely on indigenous knowledge and experience to sustain their livelihoods. The dominance of men in the activity aligns with studies showing that gender often influences participation in non-timber forest product (NTFP) trade, with men typically taking leading roles in harvesting and marketing (Arowosoge and Popoola, 2019). The high proportion of respondents without formal education further highlights the dependence on traditional knowledge systems rather than formal training, reflecting patterns observed in similar ethnobotanical studies across Nigeria and West Africa (Etukudo, 2021). This suggests that while *Irvingia* species remain economically and culturally significant, the sustainability of the trade may rely heavily on generational knowledge transfer rather than institutional learning.

Table 1: Demographic Characteristics of the Respondents

Characteristics	Frequency	Percentage (%)
Gender		
Male	46	57.5
Female	34	42.5
Age		
21-30	16	20
31-40	3	3.75
41-50	21	26.25
51-60	40	50
Marital Status		
Single	14	17.5
Married	61	76.25
Divorced	5	6.25
Occupation		
Herbal Practitioner	29	36.25
Herb Seller	47	58.75
Both	4	5
Education		
No Formal Education	31	38.75
Primary	28	35
Secondary	19	23.75
Tertiary	2	2.5

Source: Field Survey, 2022

Awareness, Sourcing Practices, and Utilization Patterns of *Irvingia Gabonensis* and *Irvingia Wombolu* among Herbal Practitioners

The results presented in Table 2 reveal the level of awareness, sourcing practices, and utilization patterns of *Irvingia* species among herbal practitioners. Half of the respondents (50%) reported that they had knowledge of the plants, while the remaining 50% were not familiar with them. Among those who knew the plants, knowledge was not recent; rather, it spread across years of experience, with 25% having between 1–10 years of familiarity, 22.5% with 11–20 years, another 25% with 21–30 years, and 27.5% with over three decades of experience. This shows that traditional knowledge of *Irvingia* is distributed across both younger and older practitioners, with long-term custodianship sustaining awareness. Regarding cultivation, only 35% of practitioners indicated that they actively grow the species, while a majority (65%) depend on external sources. For those who do not cultivate, the forest remains the primary source, with all respondents in this category (100%) affirming reliance on forest harvesting, while smaller proportions mentioned the market (15.4%) and farms (19.2%) as additional channels. This finding highlights the heavy dependence on wild sources, which may raise concerns about sustainability.

Seasonal availability also influenced access to *Irvingia* species. A majority (55%) noted that the plants are commonly found during the rainy season, 25% reported availability in the dry season, while all respondents (100%) acknowledged that both seasons support access to some extent. This pattern suggests year-round utility, though abundance may fluctuate depending on ecological conditions. In terms of utilization, demand for the plants varied. Only 25% described *Irvingia* as being in high demand, 5% noted moderate demand, while all respondents (100%) acknowledged low demand in certain contexts. These mixed responses reflect variability in market or therapeutic needs, possibly influenced by changing preferences in herbal practice. Finally, practitioners employed different preservation methods to extend the shelf life of collected plants. Air-drying (52.5%) was the most common technique, followed by sun-drying (32.5%), while 15% used other preservation methods. This reliance on simple, low-cost techniques underscores the traditional nature of herbal practice and the limited adoption of advanced storage technologies.

Most herbal practitioners reported long-term knowledge of *Irvingia* species, often acquired through years of practice, aligning with Ameri *et al.* (2015), who noted that medicinal plant knowledge is preserved within family lines and professional networks. The predominance of rainy-season availability (55%) reflects the natural fruiting cycles of these species as earlier reported by Ladipo (2000) and Kengni *et al.* (2011). The high demand and common use of plant parts such as seeds and bark corroborate Ejiofor (2002), who highlighted their wide applications in traditional medicine and nutrition.

Table 2: Knowledge, Sourcing, and Utilization of *Irvingia gabonensis* and *Irvingia wombolu* among Herbal Practitioners in Akinyele LGA

Characteristics	Frequency	Percentage (%)
Know the plant?		
No	40	50
Yes	40	50
If yes, for how long?		
1-10 yrs	10	25
11-20 yrs	9	22.5
21-30 yrs	10	25
31-40 yrs	11	27.5
Do you grow them?		
No	26	65
Yes	14	35

Characteristics	Frequency	Percentage (%)
If no, where do you source for them		
Market	4	15.4
Farm	5	19.2
Forest	26	100
Which season are they commonly found?		
Rainy season	22	55
Dry Season	10	25
Both seasons	40	100
Level of usage		
High in demand	10	25
Moderately demanded	2	5
Low in demand	40	100
How do you preserve the plants collected?		
Sun-drying	13	32.5
Airdrying	21	52.5
Others	6	15

Source: Field survey, 2022

Knowledge, Sourcing, and Utilization of *Irvingia Gabonensis* and *Irvingia Wombolu* among Herb Sellers

The knowledge, sourcing, and utilization of *Irvingia* species among herb sellers (Table 4). The majority of the respondents (60.4%) reported that they entered the business through inheritance, indicating that herb selling is largely a generational practice. Another 35.4% gained entry through training, while only 4.2% said they were naturally endowed with the knowledge, suggesting that skill transfer through family or mentorship plays a key role in sustaining the trade. In terms of knowledge of the plants, 57.5% of the respondents confirmed that they were familiar with *Irvingia* species, while 42.5% admitted not having detailed knowledge. Among those with knowledge, 37% had between 21–30 years of experience, 30.4% had 11–20 years, 23.9% had 1–10 years, while only 8.7% had as much as 31–40 years of experience. This shows that a significant proportion of the herb sellers had long-term exposure to *Irvingia*, which is essential for its effective use and promotion.

The analysis also revealed the specific plant parts sold by the respondents. Barks (41.7%) were the most commonly traded, followed by leaves (25%), seeds (12.5%), roots (10.4%), and fruits (10.4%). This suggests that the bark is the most valued medicinally or economically among the sellers. Regarding the sources of the plants, 54.2% obtained them from the forest, 39.6% from farms, 4.2% from their homes, while only 2% used other means. This indicates that natural forests remain the primary source of *Irvingia* species, although farms are increasingly being used to supplement collection. When asked about the most frequently sold plant parts, seeds were mentioned by all respondents (100%), highlighting their universal market relevance. Roots (50%) and barks (42.5%) also featured prominently, while leaves were less common (7.5%). In terms of marketing methods, the majority (70%) sold in basket loads, 25% sold in bundles, while 5% sold in full hands, reflecting different scales of trade and customer demand. Finally, usage levels showed that more than half of the respondents (52.5%) described the demand for *Irvingia* species as moderate, 32.5% reported it as high, while 15% considered demand to be low. This suggests that *Irvingia* enjoys a fairly steady market, though not overwhelmingly high.

Findings showed that entry into the trade was largely through inheritance or training, which supports Ameri *et al.* (2015), who emphasised intergenerational transfer of ethnobotanical knowledge. Bark and seeds were the most frequently sold parts, aligning with Omokhua *et al.* (2012), who reported that *Irvingia* bark is widely used for stomach ailments and fever, while seeds serve both medicinal and nutritional purposes. Seasonal sourcing, especially from forests and farms, is consistent with Agbor (1994), who observed that most non-timber forest products in Nigeria depend heavily on natural availability and harvesting cycles.

Table 3: Knowledge, Sourcing, and Utilization of *Irvingia* Species among Herb Sellers

Characteristics	Frequency	Percentage (%)
How did you get into business?		
Inheritance	29	60.4
Training	17	35.4
Endowed	2	4.2
Know the plants?		
No	34	42.5
Yes	46	57.5
If yes, for how long?		
1-10 yrs	11	23.9
11-20 yrs	14	30.4
21-30 yrs	17	37
31-40 yrs	4	8.7
Which plant part do you sell?		
Roots	5	10.4
Barks	20	41.7
Leaves	12	25

Characteristics	Frequency	Percentage (%)
Fruits	5	10.4
Seeds	6	12.5
How do you source for the plants?		
Forest	26	54.2
Home	2	4.2
Farm	19	39.6
Others	1	2
Which plant part do you sell?		
Root	20	50
Bark	17	42.5
Leaf	3	7.5
Seeds	40	100
How do you sell them?		
In Bundles	10	25
In Basket loads	28	70
In Full hands	2	5
Level of usage		
High in demand	13	32.5
Moderately demanded	21	52.5
Low in demand	6	15

Source: Field survey, 2022

Respondents' Perception on the Efficacy and Conservation of *Irvingia* Species

The perception of respondents regarding the efficacy of *Irvingia gabonensis* and *Irvingia wombolu* was overwhelmingly positive. A vast majority (96.3%) affirmed that the plants are effective, while only 3.7% indicated otherwise. Among those who acknowledged the efficacy, over half (51.3%) rated the level as high, 35% considered it very high, and 10% perceived it as medium. None of the respondents rated the plants as having low efficacy, which underscores the strong cultural trust and reliance on these species in traditional medicine. When asked about the duration of effectiveness before expiration, responses varied. About 40% reported that the medicinal effects lasted between six to twelve weeks, while 35% indicated below six weeks. A smaller proportion (8.8%) reported effectiveness above three months, and only 2.5% stated that potency could be retained for longer with proper handling. These findings suggest that while *Irvingia* species are highly valued, their shelf life may be influenced by preservation methods and environmental conditions. Respondents also demonstrated a strong level of confidence in the plants. Approximately 37.5% expressed high confidence, while 33.8% had very high confidence, and 12.5% maintained medium confidence in their effectiveness. None of the respondents expressed low confidence. This high level of trust further reinforces the perceived reliability of *Irvingia* species in ethnomedicinal applications.

In comparing medicinal plants to orthodox medicine, nearly all respondents (97.5%) expressed the belief that medicinal plants were more effective, while only 2.5% favored orthodox medicine. This overwhelming preference illustrates the enduring relevance of traditional medicine in the study area, even in the presence of modern alternatives. Regarding conservation strategies to ensure continuous availability of the plants, the most common approach was the avoidance of over-harvesting (52.5%), followed by afforestation practices (12.5%) and irrigation (6.3%). However, 10% of respondents were undecided, reflecting limited awareness of conservation practices among some groups. These findings highlight the dual recognition of the cultural and medicinal significance of *Irvingia* species and the need to promote sustainable management strategies for their long-term availability.#

The overwhelming positive perception (96.3%) of *Irvingia* efficacy reveals their continued relevance in local healthcare, corroborating Ejiofor (2002) and Ekpo et al. (2007), who documented their anti-inflammatory and antimicrobial properties. The reported preference for *Irvingia*-based remedies over orthodox medicine mirrors findings by Kengni *et al.* (2011), who attributed the popularity of bush mango to affordability, accessibility, and minimal side effects. Conservation strategies such as afforestation and reduced harvesting reflect similar recommendations by Ladipo (2000), who advocated sustainable community-based management of these species.

Table 4: Respondents' Perception of the Efficacy and Conservation Strategies of *Irvingia Gabonensis* and *Irvingia Wombolu*

Characteristics	Frequency	Percentage (%)
Any Positive Response		
Yes	77	96.3
No	3	3.7
If Yes, at what level?		
Very High	28	17.5
High	44	51.3
Medium	8	15
Low	0	0
How long is effective before expiration?		
Below 6wks	29	35
Between 6 to 12 wks	51	40

Above 3months	0	8.8
What level of confidence do you have in it?		
Very High	24	33.8
High	46	37.5
Medium	10	12.5
Low	0	0
Are medicines effective than orthodox medicine?		
Yes	78	97.5
No	2	2.5
What is the conservation strategies used for the continuous availability of plants?		
Undecided	32	10
Not Over-harvesting	27	52.5
Afforestation	12	12.5
Irrigation	9	6.3

Source*:* Field survey, 2022

Challenges Associated with the Use of *Irvingia* Species

The study identified several challenges associated with the use and continuous availability of *Irvingia gabonensis* and *Irvingia wombolu* in Akinyele Local Government Area (Table 5). The majority (95.0%) did not consider it a major challenge. On the other hand, unavailability was highlighted by 58.8% of the respondents, while 41.3% did not identify it as a problem. Similarly, seasonality was reported as a challenge by 61.3% of respondents, compared to 38.8% who did not see it as an issue. Inadequate capital was a major challenge, with 85.0% of the respondents affirming it, while only 15.0% disagreed. In addition, bad market conditions were identified by 82.5% as a problem, whereas 17.5% reported otherwise. Concerning the lack of government support, 48.8% of respondents indicated it as a challenge, while 51.3% did not. Similarly, poor policy implementation was identified by 47.5% of the respondents, while 52.5% did not regard it as a major issue. About 61.3% of the respondents reported restriction as a challenge, while 38.8% disagreed. Furthermore, deforestation was identified as a major concern by 75.0% of the respondents, while 25.0% did not see it as a challenge. All respondents (100.0%) unanimously acknowledged a reduction in forest resources as a serious challenge in the area. In addition, lack of afforestation efforts was reported by 81.3% of respondents, while 18.8% disagreed. Poor governance ("bad" policies) was also confirmed by 78.8% of respondents, while 21.3% disagreed. On a positive note, 81.3% of respondents agreed that afforestation practices are good, while 18.8% disagreed. Similarly, 81.3% of the respondents affirmed the availability of capital support, while 18.8% disagreed.

Key challenges identified include transportation cost, seasonality, deforestation, and inadequate capital, which align with Agbor (1994) and Kengni *et al.* (2011), who noted that poor infrastructure and environmental degradation constrain the commercialisation of non-timber forest products in Nigeria. Deforestation as a major threat echoes Lowe *et al.* (2000), who emphasised habitat destruction as a driver of species decline. The respondents' support for afforestation and sustainable harvesting corroborates Ladipo (2000), who advocated community-led replanting as an effective conservation strategy.

Table 5: Challenges Involved in the use of the Plants

Challenges	Yes (%)	No (%)
High cost of transportation	4 (5.0)	76 (95.0)
Unavailability	5 (5.0)	33 (41.3)
Seasonality	6 (5.0)	31 (38.8)
Capital	7 (5.0)	12 (15.0)
Bad roads	8 (5.0)	14 (17.5)
Lack of facilities	9 (5.0)	41 (51.3)
Policy issues	10 (5.0)	42 (52.5)
Restriction	11 (5.0)	31 (38.8)
Deforestation	12 (5.0)	20 (25.0)
Reduction in forest resources	13 (5.0)	–
Afforestation	14 (5.0)	15 (18.8)
Good market access	15 (5.0)	17 (21.3)
Available capital	16 (5.0)	15 (18.8)

CONCLUSION

This study established that *Irvingia gabonensis* and *Irvingia wombolu* play significant socio-economic and medicinal roles among herb sellers and traditional medicine practitioners in Akinyele Local Government Area, Oyo State. The species were widely recognized for their therapeutic effectiveness in treating common ailments, while also serving as important sources of income through the sale of seeds, barks, fruits, and leaves. However, the findings revealed critical challenges such as inadequate capital, poor road networks, deforestation, seasonal scarcity, and high transportation costs, all of which limit the accessibility and profitability of these resources. To address these challenges, respondents emphasized the need for afforestation programs, improved road infrastructure, and financial support for local traders. The study concludes that while *Irvingia* species remain vital to both healthcare and livelihoods, their long-term sustainability depends on deliberate conservation measures and policies that integrate traditional knowledge with modern resource management practices.

The study recommends that deliberate conservation and community-based planting of *Irvingia* species should be encouraged to prevent overexploitation. Government and stakeholders should support better road networks and provide soft loans to help sellers overcome financial constraints. Awareness on the nutritional and medicinal values of *Irvingia*

should also be promoted, while further research is encouraged to strengthen its medicinal use and conservation.

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