

Medicinal Tree Species Inventory in Aliko Dangote University of Science and Technology, Wudil, Kano-Nigeria

Bilyaminu H ^{1*}, Saratu Sani ¹, Muhsin Hassan Kafinga ¹, Halliru ¹, Khadija Muhammad Ali ², Sagir Ado Danturai ³, Abdulrashid Inuwa ¹ and Mahmud Abubakar Bashir ¹

¹Department of Forestry Fisheries and Wildlife, Aliko Dangote University of Science and Technology.

²Science Laboratory Department, Federal Polytechnic Kazaure.

³Department of Forestry Fisheries and Wildlife, Bayero University Kano.

*Corresponding author: bilyaminhalliru@gmail.com

SUMMARY

Medicinal trees play a vital role in traditional healthcare systems, providing remedies for a wide range of human ailments. Despite their importance, the populations of these trees are increasingly threatened by deforestation, over-harvesting, urban expansion and climate change. Understanding the diversity, distribution, and utilization of medicinal trees is crucial for their conservation and sustainable use. This study aimed to investigate the medicinal inventory of tree species in Aliko Dangote University of Science and Technology (ADUSTECH), Wudil, Kano State, and assess their role in local healthcare practices. A survey research design was adopted for this study. The target population included all tree species within the ADUSTECH Wudil campus. Fifty (50) tree species were sampled. Data were collected through field observations and structured questionnaires and analyzed using frequency counts and simple percentages to determine the distribution, utilization and population status of medicinal tree species. The study documented a variety of medicinal tree species utilized in local healthcare practices. Community members exhibited extensive knowledge of the use and preparation of these trees. Certain plant families, notably Fabaceae, were dominant, while many other families were represented by only one or two species, indicating uneven distribution and ecological vulnerability. The study also found a significant decline in tree populations due to deforestation, over-harvesting, urban expansion, and climate-related factors. Medicinal trees are critical for local healthcare practices, yet their populations are declining, placing rare species at risk of extinction. Conservation and sustainable management strategies are essential to preserve these resources. The study recommends community-based programs, awareness campaigns, and training on sustainable harvesting, propagation, and preservation techniques to ensure the continued availability of medicinal trees.

Keywords: ADUSTECH wudil, conservation, fabaceae, medicinal trees, sustainable management, traditional medicine

INTRODUCTION

Medicinal plants have been an integral part of human healthcare for centuries, serving as a primary source of treatment for a wide array of ailments. Globally, over 80% of the population in developing countries relies on traditional medicine for their primary healthcare needs, largely due to its accessibility, affordability, and cultural acceptability (WHO, 2019). Among these medicinal plants, trees occupy a prominent role because of their diverse secondary metabolites, including alkaloids, flavonoids, tannins, and saponins, which are responsible for their pharmacological activities. In Nigeria, the rich biodiversity of tree species presents an invaluable resource for traditional medicine. Northern Nigeria, in particular, is home to a wide range of indigenous trees that are widely used in ethnomedicine for the treatment of malaria, fever, digestive disorders, respiratory infections, skin diseases, and other common ailments. These trees are harvested for various plant parts, such as leaves, bark, roots, fruits, and seeds, each part possessing unique medicinal properties.

The sustainable use and conservation of medicinal trees are critical, as overexploitation, deforestation, and habitat degradation threaten many indigenous species. Conservation efforts are therefore essential to maintain the ecological balance and ensure the continued availability of these valuable resources for traditional healthcare (Rafay et al., 2021). Despite the wealth of indigenous knowledge on medicinal trees, documentation remains limited in many regions, particularly within educational institutions such as the Abubakar Tafawa Balewa University of Technology (ADUSTECH), Wudil, Kano State. Understanding the species diversity, abundance, parts used, and their ethnomedicinal applications can provide insights for pharmacological research, conservation planning, and sustainable utilization of these resources.

The present study aims to identify and document the medicinal tree species within ADUSTECH, Wudil, Kano State, Nigeria, with a focus on their botanical identity, local names, plant parts used, medicinal applications, abundance, and conservation status. Such documentation not only preserves indigenous knowledge but also provides baseline data for future research on the development of novel drugs and the conservation of threatened species.

MATERIAL AND METHODS

Study Area and Study Design

The tree species for this study were obtained from Aliko Dangote University of Science and Technology (ADUSTECH), Wudil campus, located in Wudil Town, Wudil Local Government Area, Kano State, Nigeria. Wudil lies along the Kano–Maiduguri highway, approximately 40 km southeast of Kano metropolis, within the Sudan savanna ecological zone. This zone is characterized by alternating wet and dry seasons, moderate annual rainfall, and a landscape dominated by grasses with scattered trees. These ecological conditions support diverse vegetation, including several tree species traditionally used for medicinal purposes by the local community.

The study focused specifically on the ADUSTECH campus, which comprises academic complexes, administrative buildings, residential hostels, staff quarters, demonstration farms, and large open green spaces. These areas contain a mixture of naturally occurring, ornamental, and deliberately planted tree species. The richness of the campus vegetation is influenced both by the surrounding savanna ecology and by landscaping and conservation practices, making the environment suitable for documenting medicinal tree species.

A descriptive survey research design using a mixed-methods approach was adopted. The quantitative aspect involved a census of all tree species on the campus and recording their morphological characteristics, while the qualitative aspect involved ethnobotanical information gathered through interviews with knowledgeable informants regarding the medicinal uses of the trees.

Target Population and Sampling

The target population comprised all tree species within the ADUSTECH Wudil campus, which includes approximately **forty-three (43) species**. A **census sampling method** was employed to ensure that every tree species was identified, recorded, and included in the inventory.

Data Collection Procedure

Data collection was carried out in two main phases:

1. **Reconnaissance:** The campus was mapped and divided into sections to facilitate

systematic data collection. Each section included academic areas, residential hostels, staff quarters, demonstration farms, and open green spaces.

2. Tree Inventory and Ethnobotanical Survey:

- **Tree Inventory:** All trees within the mapped sections were identified, recorded, and characterized based on species, local name, height, trunk diameter, canopy spread, and health status. Photographs and, where necessary, plant specimens were collected for further taxonomic identification.

- **Ethnobotanical Information:** Purposive sampling was used to select knowledgeable local traditional healers. Semi-structured interviews were conducted to collect information on the medicinal uses of tree species, plant parts used, preparation methods, and ailments treated. Field observations and discussions with informants complemented the interview data.

Collected data were checked for completeness, and inconsistencies were verified through repeated observations and cross-referencing with other informants.

Data Analysis

Data were analyzed using both **quantitative and qualitative methods:**

Quantitative Analysis: Descriptive statistics, including frequencies and percentages, were used to summarize the tree inventory and distribution data.

Qualitative Analysis: Interview transcripts were analyzed using content analysis to identify common themes, popular medicinal trees, plant parts used, preparation methods, and ailments treated.

Plant Collection and Identification

Where necessary, specimens of tree species were collected, pressed, dried, and identified using standard taxonomic procedures. Identification was aided by comparison with existing herbarium specimens, field guides, and taxonomic literature.

RESULTS AND DISCUSSION

Diversity and Abundance of Medicinal Trees

A total of 43 medicinal tree species belonging to 22 families were identified (Table 1). The most represented families were Fabaceae (9 species, 20.9%), Meliaceae (5 species,

11.6%), and Anacardiaceae (4 species, 9.3%). The present study revealed a notable diversity of medicinal trees within the Aliko Dangote University of Science and Technology (ADUSTECH) Wudil campus, underscoring the significance of indigenous knowledge in supporting primary healthcare. A total of 43 medicinal tree species were identified, representing 19 families, which reflects a moderately diverse medicinal flora within the Sudan savanna ecological zone. The predominance of Fabaceae and Meliaceae in the recorded species is consistent with findings from other studies in northern Nigeria, where these families are commonly cited for their therapeutic properties (Ibrahim et al., 2020). Their dominance may be attributed to ecological adaptability, high medicinal value, and cultural preference in traditional medicine practices.

Table 1. Medicinal Tree Species Identified in ADUSTECH Wudil

Sr. No.	Common name	Local name	Botanical name	Part used	Ailment treatment	Method of preparation	Mode of Administration	Frequency of use	Conservation Status
1.	Baobab	Kuka	<i>Adasonia digitata</i>	Bark, leaf, fruit	Ulcer, Diabates	Bouted, dried and ground	Orally	2-3 cup daily	LC
2.	Desert date	Aduwa	<i>Balanite aegytiaca</i>	Bark, leaf, fruit	Diabates, eyes infection , constipation	Boiled	Oral	Twice daily	NT
3.	Eucalyptus	Turare	<i>EcucalyptusCama dutensis</i>	Bark, leaf	Typhoid fever, enhance vision	Boiled	Oral & topical	Twice daily	LC
4.	Cattle peach tree	Gamji, Baure	<i>Ficus plantyphylla</i>	Bark, leaf	Dysentery, Diabates Diarrhoea	Dry & Ground	Orally	2-3 cups daily	LC
5.	Shea tree	Kadanya	<i>Vitellaria paradoxa</i>	Seed, leaf	skin infection, eczema	Boiled	Topical	twice daily	LC
6.	Black plum	Dinya	<i>Vitex doniana</i>	Bark, leaf, fruit	skin infection, wound, pile	Boiled	Topical	twice daily	VU
7.	Mango	Mangoro	<i>Mangifera indica</i>	leaf, bark, fruit	Pile, fever, weakness	Boiled	Oral	2-3 cups daily	DD
8.	Terminda	Tsamiya	<i>Tamarindus indica</i>	leaf, bark, fruit	Stomachache, Infection, Cancer	Boiled, Dry & Ground	Orally	1-2 cups daily	LC
9.	doum palm	Goruba	<i>Hyphane thebaica</i>	fruit, bale, leaf	Fever, diarrhoea, respiratory issue	Boiled	Oral	1-2 cups daily	LC
10.	Apple-ring acacia	Gawo	<i>Faidherbia albida</i>	fruit, leaf, bark	wound, stomachache,	Boiled	Oral	2-3 cups daily	LC
11.	Violet tree	Malmo Sansami	<i>Securidaca longepedunculata</i>	leaf, bark	rheumatism, chest pain	Boiled	Oral	1-2 cups daily	LC
12.	African custard Apple	Gwandar daji	<i>Anona senegalensis</i>	leaf, bark	Diarrhoea, wound, sting & bite	Boiled, Dry & Ground	oral & topical	twice daily	DD
13.	Tallow tree/ Sweet date	Taura	<i>Detarium senegalense</i>	leaf, bark	Boost immunity, cold & fever	Boiled	Oral	Twice daily	LC
14.	Christ's thorn	Kurna	<i>Ziziphus spina-christi</i>	leaf, bark, fruit	Diabetes, infections	Boiled, Dry & Gmd	Oral	1-2 cups daily	LC
15.	Jackal berry	Kanya	<i>Diospyrus mespiltomis</i>	leaf, bark, fruit	Dysentery, fever,	Boiled, Dry & Ground	Oral	Twice daily	LC
16.	Marula tree	Danya	<i>Scleroearya birrea</i>	leaf, bark	Pile, diarrhoea, stomachache	Dry & Gmd	Oral	Twice daily	LC

17.	Catch thorn	Magarya	<i>Ziziphus abyssinica</i>	leaf, bark, root	Ulcer & Cough, cold	Boiled, Dry & Gmd	Oral & topical	1-2 cups daily	LC
18.	Guava	Gwaiba	<i>Psidium guajava</i>	leaf, bark, fruit	pile, dysentery,	Boiled	Oral	Twice daily	LC
19.	African fan palm	Giginya	<i>Borassus aethiopum</i>	leaf, root	infection, digestion,	Boiled	Oral	Twice daily	LC
20.	Moringa	Zogale	<i>Moringa oleifera</i>	leaf, root, seed	ulcer, BP, blood sugar, Liver	Boiled, Dry & Gmd	Oral	2-3 cups daily	LC
21.	Umbrella tree	Baushe	<i>Terminalia Catappa</i>	leaf, bark	Liver disease, fever	Boiled, Dry & Gmd	Oral	2-3 cups daily	LC
22.	Silk Cotton tree	Rimi	<i>Ceiba pentandra</i>	Bark, leaf	fever, wound, stomachache, constipation	Boiled, Dry & Gmd, With sugar	oral & topical	Twice daily	LC
23.	Neem	Dogon Yaro	<i>Azadirachta indica</i>	leaf, bark, seed	malaria fever, skin infection	Boiled, Dry & Ground	oral & topical	Twice daily	LC
24.	Pawpaw	Gwanda	<i>Carica papaya</i>	Leaf	pile, fever, diarrhea	Boiled	Oral	1-2 cups daily	DD
25.		Kargo	<i>Stereospermum kunthianum</i>	Leaf	Stomachache, Infection	Boiled	Oral	1-2 cups daily	LC
26.	Gum Arabic tree	Bagaruwa	<i>Acacia nilotica</i>	Bark, gum, leaf	Diarrhoea, cough, and infection	Boiled	Oral	1-2 cups daily	LC
27.	African Birch	Marke	<i>Anogeissus leicarpus</i>	leaf, bark	Ulcer, fever, wounds	Boiled & Dry & Gmd	oral & topical	Twice daily	LC
28.	African locust	Dorawa	<i>Parkia biglobosa</i>	leaf, bark, root	BP, diabetes, infection	Boiled, Dry & Gmd	Oral	Twice daily	LC
29.	African mahogany	Madaci	<i>Khaya senegalensis</i>	Bark, leaf, seed	fever, stomachache, rheumatism	Boiled, Dry & Ground	Oral	2-3 cups daily	VU
30.	Sweet orange	Lemon-zaki	<i>Citrus Sinensis</i>	leaf, fruit	Boost immunity, cold & fever	Boiled	Oral	1-2 cups daily	LC
31.	Flamboyant	Sake-sake	<i>Delonix regia</i>	leaf, root, bark	Joint pain, fever, diarrhea	Boiled	Oral	Twice daily	LC
32.	Camel's foot	Kalgo	<i>Piliostigma reticulatum</i>	leaf, bark	Skin disease, sore eyes, cough, allergies	Dry & Ground, boiled	oral & topical	Twice daily	LC
33.	Silk tree	Katsari	<i>Albizia lebbbeck</i>	leaf, bark	asthma, inflammation,	Boiled, Dry & Gmd	oral & Inhale	Twice daily	LC
34.	Strangler fig	Chediya	<i>Ficus thonningii</i>	leaf, bark, root	Cold, infections, Cough	Boiled	Oral	2-3 cups daily	LC
35.	Kassod tree	Marga.	<i>Senna siamea</i>	leaf, bark, root	Fever, liver condition, boosting immunity.	Boiled	Oral	2-3 cups daily	LC

Note: LC: Least Concern, VU: Vulnerable, DD: Data Deficient, NT: Near Threatened

Plant Parts Used

Among the documented medicinal tree species in ADUSTECH Wudil, leaves were the most frequently utilized plant part, representing 58% of the total uses. Leaves are commonly preferred because they are relatively easy to harvest, regrow quickly, and often contain high concentrations of bioactive compounds such as alkaloids, flavonoids, and tannins, which contribute to their therapeutic properties.

Bark was the second most commonly used part, accounting for 23% of usage. Bark is often employed in traditional medicine for its astringent and anti-inflammatory properties, particularly in treating fevers and skin conditions. Roots constituted 19% of the medicinal preparations. While roots can provide potent bioactive compounds, their harvesting may pose a greater threat to the sustainability of the species. Fruits were the least commonly used, at 10%, and are generally applied in remedies targeting digestive and nutritional deficiencies.

Some species had multiple plant parts used for different ailments. For example, a single species might have its leaves used to treat fever, bark for respiratory infections, and roots for gastrointestinal problems. This multifunctional use highlights the ethnobotanical knowledge and versatility of local medicinal trees. Leaves emerged as the most frequently used plant part (58%), followed by bark, roots, and fruits. The preference for leaves likely reflects considerations of accessibility, ease of preparation, and sustainability, as harvesting leaves is less destructive than extracting roots or bark, which can threaten plant survival. This practice demonstrates an inherent understanding among local practitioners of sustainable utilization of plant resources, ensuring the continuity of medicinal tree availability.

The ailments most commonly treated with these medicinal trees included malaria, fever, diarrhea, respiratory infections, and skin diseases. The frequent use of trees to treat malaria (67%) and fever (55%) corresponds with the high prevalence of these conditions in rural areas of Kano State (WHO, 2021). Traditional healers exhibit considerable knowledge not only of medicinal properties but also of preparation methods, dosage, and application routes, illustrating a sophisticated ethno-medicinal system.

Ailments Treated

The medicinal tree species recorded in the study were used to treat a wide range of human ailments. The most frequently addressed conditions included:

- a) **Malaria (67%):** Many trees were used for malaria treatment, primarily through leaf decoctions or infusions. This high usage reflects the prevalence of malaria in the study area and the reliance on traditional remedies where modern healthcare may be less accessible.
- b) **Fever (55%):** Fever, often associated with malaria or other infections, was another commonly treated condition. Leaves and bark were primarily employed in herbal preparations for this purpose.
- c) **Diarrhea (42%):** Roots and leaves were the most commonly used parts for the treatment of diarrhea, often prepared as decoctions or powders.
- d) **Respiratory infections (36%):** Remedies for cough, bronchitis, and other respiratory ailments frequently involved the bark and leaves, sometimes combined with other additives to enhance efficacy.
- e) **Skin diseases (28%):** Bark and leaf extracts were commonly applied topically to treat wounds, rashes, and other dermatological conditions.

These findings indicate that the local community relies on a diverse range of tree species to address common health challenges, reflecting the richness of ethno-medicinal knowledge in the area.

Conservation Status

The conservation status of the medicinal tree species recorded in ADUSTECH Wudil was assessed based on available literature and field observations. Among the 43 species identified:

- a) 30 species (69.8%) were classified as Least Concern, indicating that these species are relatively abundant and not currently at immediate risk of extinction.
- b) 10 species (23.3%) were categorized as Near Threatened, suggesting that they face potential risks from overharvesting, habitat modification, or other anthropogenic pressures.

c) 3 species (7%) were identified as Vulnerable, reflecting a higher risk of decline if sustainable harvesting practices are not implemented.

The presence of threatened species highlights the need for conservation strategies, including the cultivation of medicinal trees within campus grounds, sustainable harvesting practices, and community education on the ecological importance of these species. Overharvesting of roots and bark, in particular, poses a significant risk to the long-term survival of some valuable medicinal trees.

Table 2. Species Distribution by Family

S/N	Families	Number of Species	Percentage (%)
1.	Fabaceae	9	25.7
2.	Malvaceae	2	5.71
3.	Anacardiaceae	2	5.71
4.	Combretaceae	2	5.71
5.	Meliaceae	2	5.71
6.	Balanitaceae	1	2.9
7.	Arecaceae	1	2.9
8.	Caricaceae	1	2.9
9.	Polygalaceae	1	2.9
10.	Rubiaceae	1	2.9
11.	Ebenaceae	1	2.9
12.	Myrtaceae	2	5.7
13.	Moraceae	2	5.7
14.	Annonaceae	1	2.9
15.	Bignoniaceae	1	2.9
16.	Combretaceae	2	5.71
17.	Sapotaceae	1	2.9
18.	Verbenaceae	1	2.9
19.	Rhamnaceae	2	5.71
	TOTAL	3	100.0

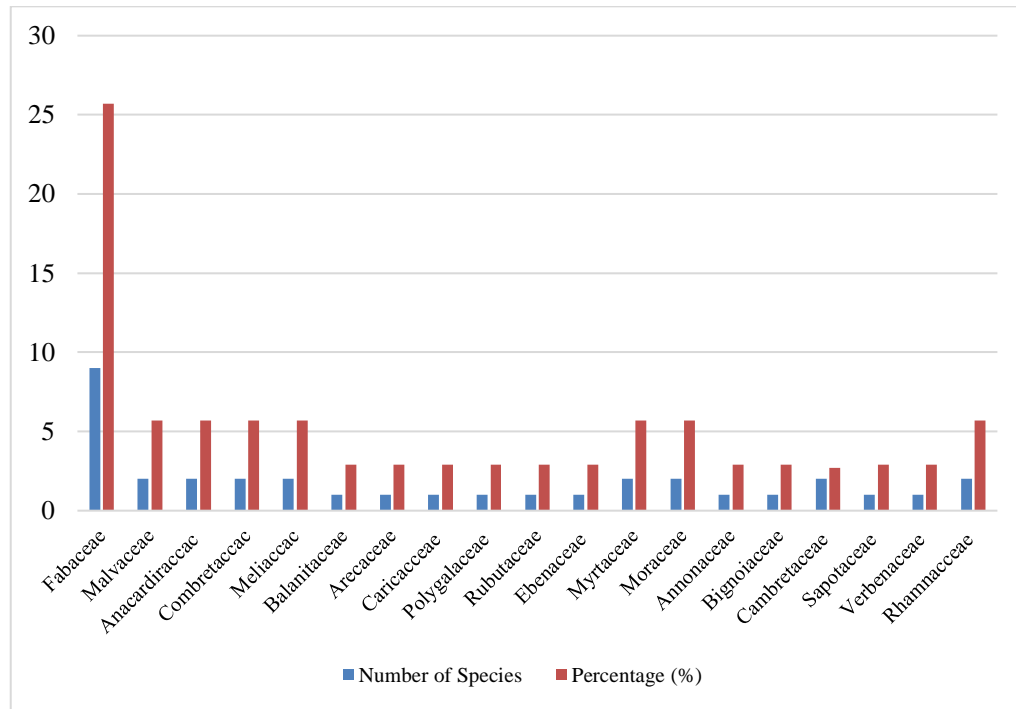


Figure. Species Distribution by Family

Despite the reliance on medicinal trees, certain species, such as *Khaya senegalensis*, are under pressure due to overharvesting and habitat degradation. These species are vulnerable and require conservation measures to ensure their persistence. Ethnobotanical documentation, such as this study, is therefore essential for both biodiversity conservation and the potential discovery of pharmacologically active compounds. By establishing a baseline inventory, the study provides valuable information for future research aimed at validating the therapeutic potential of these trees and integrating traditional knowledge into sustainable healthcare practices.

CONCLUSION

This study documented 43 medicinal tree species in ADUSTECH Wudil, with leaves being the most frequently utilized plant part. The findings highlight the vital role of traditional knowledge in community healthcare, particularly in the treatment of prevalent conditions such as malaria and fever. While the majority of species are categorized as Least Concern, a subset including *Khaya senegalensis* and other vulnerable species requires targeted conservation strategies to prevent overexploitation and ensure sustainable use.

Recommendations:

1. Cultivation of Threatened Species: Encourage the propagation of vulnerable and

near-threatened medicinal trees within community and institutional plantations to reduce pressure on wild populations.

2. Sustainable Harvesting Practices: Raise awareness among traditional healers and community members on methods of harvesting that minimize damage to plants, such as selective leaf collection instead of root or bark removal.

3. Pharmacological Validation: Conduct experimental studies to validate the traditional medicinal uses of recorded species, exploring their bioactive compounds for potential drug development.

4. Integration into Conservation Policies: Collaborate with local and regional authorities to incorporate medicinal tree conservation into broader biodiversity management and land-use planning strategies.

By combining ethnobotanical knowledge with conservation and pharmacological research, this study contributes to the sustainable utilization and preservation of medicinal tree resources in Wudil and similar ecological settings.

ACKNOWLEDGEMENT

Authors are thankful for the cooperation of local community

REFERENCES

- Agroforestry, food and nutritional security. (2013). *Agritrop - CIRAD*. https://agritrop.cirad.fr/569899/1/document_569899.pdf
- Akinmoladun, F. O., Adewusi, E. A., & Olawale, F. O. (2020). Ethnomedicinal knowledge and practices among middle-aged and older adults in rural Nigeria. *Journal of Ethnobiology and Ethnomedicine*, 16(1), 45–58. <https://doi.org/10.1186/s13002-020-00390-1>
- Albizia adianthifolia*: Botany, medicinal uses, phytochemistry, and pharmacological properties. (2018). *PubMed Central*. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6171211/>
- Bassett, C. G., & Henning, J. (2025). *The environmental benefits of trees on an urban university campus*. ResearchGate.
- Biodiversity and utilization patterns of medicinal and aromatic plants in Africa. (n.d.). *ResearchGate*. https://www.researchgate.net/profile/Mohamed-Ibrahim-488/publication/381145805_Biodiversity_and_Utilization_Patterns_of_Medicinal_and_Aromatic_Plants_in_Africa/links/66ed7d766b101f6fa4f35b04/Biodiversity-and-Utilization-Patterns-of-Medicinal-and-Aromatic-Plants-in-Africa.pdf
- Cruz, A. G., & de la Torre, L. (2023). A medical inventory of tree species in a protected area of the Philippines. *Journal of Conservation and Ecology*, 7(2), 112–125.
- Ethnobotanical study of medicinal plants used by the people of Mosop, Nandi County in Kenya. (2024). *Frontiers in Pharmacology*. <https://www.frontiersin.org/journals/pharmacology/articles/10.3389/fphar.2023.1328903/full>
- Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. (2016). *PubMed*.
- Farnsworth, N. R. (1988). Screening plants for new medicines. In E. O. Wilson (Ed.), *Biodiversity* (pp. 83–97). National Academy Press.
- Ibrahim, A., Bello, M., & Yusuf, H. (2020). Ethnobotanical survey of medicinal plants in Kano State, Nigeria. *Journal of Medicinal Plants Research*, 14(5), 233–245.
- Medicinal uses of trees. (n.d.). *Kruger National Park*. https://www.krugerpark.co.za/Kruger_Park_Facts-travel/explore-kruger-vegetation-trees.html
- Odugbemi, T. (2008). *Medicinal plants useful for malaria therapy in Nigeria*. University Press.
- Oyediji, O. O., Adebayo, S. A., & Oladipo, O. F. (2018). Utilization of medicinal plants in traditional health practices: A study of local knowledge in southwestern Nigeria. *African Journal of Plant Science*, 12(7), 121–132. <https://doi.org/10.5897/AJPS2018.1622>
- Pharmacological and therapeutic activities of *Kigelia africana* (Lam.) Benth. (n.d.). *Index Copernicus*. <https://journals.indexcopernicus.com/publication/1743139>
- Rafay, M., Ghaffar, M. U., Abid, M., Malik, Z., & Madnee, M. (2021). Phytochemicals analysis and antimicrobial activities of *Echinops echinatus* from Cholistan Desert, Pakistan. *Agrobiol Rec*, 5, 21-7.
- Sofowora, A. (1993). *Medicinal plants and traditional medicine in Africa* (2nd ed.). Spectrum Books.
- World Health Organization. (2021). *World malaria report 2021*. World Health Organization.