ETHNOBOTANICAL SURVEY AND COMPARATIVE ABUNDANCE OF *FICUS BENGHALENSIS* AND *FICUS RELIGIOSA* IN AGAIE LOCAL GOVERNMENT AREA NIGER STATE, NIGERIA

*Ogbevire Philip.[1], Ogie-Odia A. Efosa[1], Imade N. Francis[1], Ekpenyong Adetokunbo[2], Aliyu Yahaya[3] and Asaye C. Dabobelemabo[4]

[1] Department of Plant Science and Biotechnology, Ambrose Alli University, Ekpoma
[2] Department of Medical Laboratory Science, University of Benin
[3] Department of Human kinetic and health education, Ibrahim Badamasi Babangida University Lapai Niger state
[4] Department of Plant Science and Biotechnology, University of Port-Harcourt.

*Corresponding authors' email: philipogbevire@gmail.com
Corresponding authors'Phone: +2348104819724

Abstract

Ficus benghalensis and *Ficus religiosa* are culturally, ecologically and medicinal significant tree species in the tropics, yet little is known about their distribution and utilization in Niger State, Nigeria. This study investigated their abundance and ethnobotanical significance in Agaie Local Government Area using stratified random sampling, morphological identification and ethnobotanical survey with 54 informants. A total of 2,293 trees were recorded, comprising 1,691 *F. benghalensis* and 602 *F. religiosa*. *F. benghalensis* was more abundant with the highest density (316 trees) recorded in G.R.A Area 3. Both Species were cited for multiple uses including shade provision, goat fodder and fever treatment, typhoid, headaches, and body pain. Quantitative indices revealed higher relative frequency of citation (RFC = 0.74) and use value (UV = 2.09) for *F. benghalensis* compared to *F. religiosa* (RFC = 0.48; UV = 0.56). Fidelity levels revealed high cultural dependence with *F. benghalensis* exclusively cited for fever (100%) and *F. religiosa* strongly associated with body pain relief (96%). Both species demonstrated strong informant consensus (ICF ≥ 0.96). These results highlight the ecological dominance and cultural preference for *F. benghalensis* but reaffirm the sustained medicinal importance for both species. Conservation and phytochemical studies are recommended to ensure their sustainable use.

Keywords: Agaie, Comparative Abundance, Ethnobotanical surveys, *Ficus benghalensis* and *religiosa*, Random sampling

1.0   INTRODUCTION

Ethnobotanical surveys play a significant role in understanding the relationships between indigenous cultures and their local flora. The significant value of ethnomedicinal studies include providing insights into how plants are utilized for contemporary drugs from ethnomedicinally important plant, nutritional, and cultural purposes (Cox 2000; Gilani and Rahman 2005; Gupta, Sung, Kim, Prasad, Li and Aggarwal 2013; Kumar *et al*. 2021a; Kumar *et al*. 2021b). It also play an important role in the aspect of human ecology by defining the link between people and the plants around them (Ubelejit, Adoyi, Sunday and Yakubu , 2018).

The plant in focus for this survey is *Ficus benghalensis*, commonly known as banyan tree. *F. benghalensis* is widely recognized for possession of numerous pillar-like aerial roots supporting the several long transverse branches and spreading canopy. In contrast, *Ficus religiosa* produces aerial roots but they are not as numerous or extensive as those of *F. benghalensis* (Devendra *et al*, 2023), possessing wider leaves in addition.

Ficus benghalensis, commonly known as the banyan tree happens to be one of the prominent species belonging to the Moraceae family with over 800 species in the form of evergreen trees, vines, shrubs, epiphytes, and hemiphytes distributed mostly in tropical and sub-tropical climatic conditions such as Asia, America, Australia, and Africa (Outfy *et al*., 2005; Rønsted *et al*., 2008; Rahman and Khanom, 2013 ; Devendra *et al*, 2023). These species are ecologically and culturally indispensable due to their roles in nutrient cycling, microclimate regulation, and provision of food, fodder, medicine, and shelter to both humans and wildlife (Okeke *et al*., 2021; Sinha and Singh, 2023).

Ficus benghalensis is a laticiferous, tremendous evergreen tree with over 2000 sub-varieties [Daniel, Devi and Augusti, 2003; Devendra *et al*, 2023). It is one of the most important species of the Ficus genus due to its wide cultivation, religious, cultural and medicinal uses (Rajan *et al*, 2023). Other morphological features includes; greenish white bark, leaves which are simple, alternate, and arranged often in clusters at the ends of branches, they are stipulate, 5-12 cm broad and 10-18 cm long, entire, broadly elliptic to ovate, bear fruits that are achenes; which are small, crustaceous, and enclosed in the common fleshy receptacles, having red outside color, the young bark is somewhat smooth having a transverse and longitudinal row of lenticels, while in the older bark, the lenticels are numerous and closely spaced, the outer bark flakes off easily, fresh-cut surface of the bark is pink to flesh-colored and exudes plenty of latex and the innermost part of the bark adjoining the wood is nearly white and fibrous (Khaliq, 2017; Devendra *et al*, 2023).

In West Africa, Ficus benghalensis (Indian banyan) and Ficus religiosa (sacred fig) are prominent species often associated with sacred groves, community assemblies, and traditional healing practices. Their expansive canopies and year-round foliage also make them vital for environmental cooling and soil stabilization (Adedeji *et al*., 2022; Umar *et al*., 2025). Despite their wide distribution and recognized significance, there remains limited quantitative information on the relative abundance and ethnobotanical uses of these species within many Nigerian communities. Existing studies have mainly focused on their medicinal constituents or general ethnobotanical relevance, with little comparative assessment of their population structure and cultural valuation at local scales (Ibrahim *et al*., 2023; Ali and Abdullahi, 2024). Understanding the population dynamics and traditional uses of *F. benghalensis* and *F. religiosa* is crucial for effective conservation, sustainable utilization and
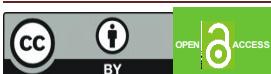
integration of indigenous knowledge into biodiversity management strategies.

Due to recent infrastructural development and extension or construction of double lane road, this study, therefore, was designed to assess the comparative abundance and ethnobotanical importance of *F. benghalensis* and *F. religiosa* among some of the indigenous wards in Agaie Local Government Area of Niger State Nigeria which is renowned for its rich biodiversity of this plants which is usually found in almost each houses with at least one or two of this plant species present and planted along road-side mainly for shade. Specifically, it sought to: Determine the relative abundance and distribution of the two species across different wards, areas, major places and some major roads within the community, Document and analyze their ethnobotanical uses among local residents and Evaluate the degree of cultural dependence and informant consensus regarding their applications.

By addressing these objectives, the study aims to provide baseline data that will contribute to regional conservation planning, enhance understanding of human plant interactions and promote sustainable use of native Ficus species in Nigeria (Odeyemi *et al*., 2022; Rao & Singh, 2024).

2.0 MATERIALS AND METHOD

2.1 Study Area

Agaie Local Government Area (LGA) of Niger State, Nigeria shares boundary with Lapai LGA in the East, Katcha LGA in the West, Paiko LGA in the north and Kogi LGA in the south with River Niger as demarcating line. Agaie is situated in between Lapai and Bida area of Niger. The land area of Agaie is 874 Square miles or a total land area of 1,948.984kmsq with latitude 90 01' 00'' North of the Equator and longitude 60 19' 00'' East of the Equator and had a population of 110,000 as of the 2006 census. Rainfall concentration somewhere in July and August with 1,600mm in the south with 1,200mm in the North with duration of 150 -210 days and a temperature of 32ºC (Baba, Olorunsanya and Galadima, 2019; Isa, Raphael, Souleman and Chukwunonyelum, 2024).

The area is mainly occupied by people from the Nupe ethnic group, who use Nupe, Fufulde, Hausa, and to a small degree, English. The headquarters of the Local Government Area are located in Agaie town, covering a number of wards. Agriculture forms the backbone of Agaie's economy. The large arable area in this area is favorable for growing a diversity of crops ranging from rice to melon, millet, groundnut, cassava, yam, maize, and soya beans. In addition to this, commercially useful trees like shea, mango, and citrus are major contributors to its farming productivity. The area is also famous for shea butter production, to which local and foreign investments have been attracted.
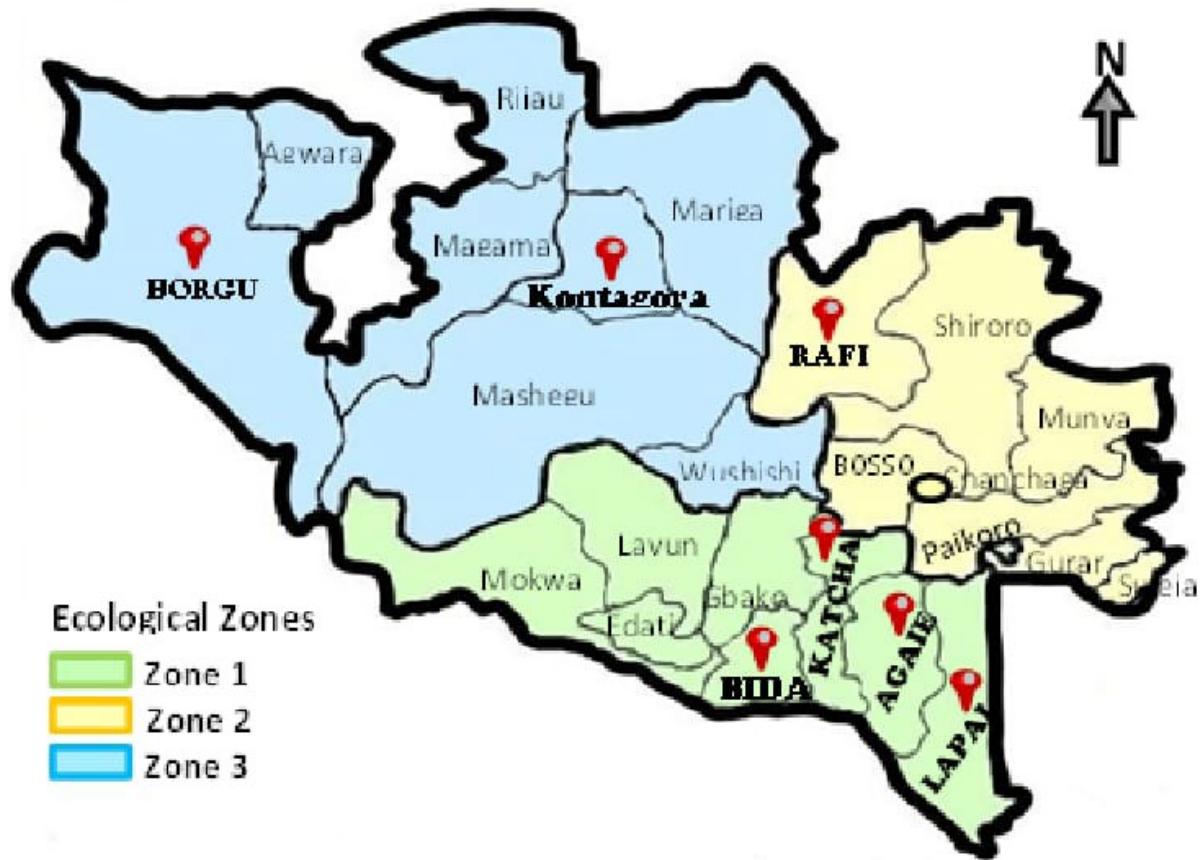
Fig1: Map of Niger State Showing, Showing the Study Area Agaie (Gafar, 2022).

2.2 Sampling Technique

The Study employed a stratified random sampling technique to ensure representative coverage of all wards, areas, major places and some major roads to minimize biases. Each wards was treated a stratum and sampled thoroughly (Cochran, 1977; Kent and Coker, 1992; Martin, 1995).

2.3 Data Collection Procedure

2.3.1 Field Survey

In each sampling ward, all plant belonging to the two target plant species were identified, counted and recorded. Samplings of *F. benghalensis* and *F. religiosa* were differentiated using distinct morphological

features (leaf and root) (Hutchinson and Dalziel, 1954; Keay, 1989; Burkill, 1985).

2.3.2 Data Analysis

The data collected were analyzed to:

I. Determine the total number of *F. benghalensis* and *F. religiosa* in Agaie local government area

II. Compare the relative abundance of the two species across different wards within the community

III. Provide quantitative measure of cultural significance and informant agreement by calculating RFC (relative frequency abundance); number of informant who mentioned species at least once (FC) all over

the total number of informant (N), UV (use value); number of different use mentioned by informant divided by total informant, FL% (fidelity level); informant citing the species for a particular ailment over informant citing the specie for any ailment and ICF (informant consensus factor); total use report in category (Friedman *et al*, 1986; Trotter and Logan, 1986).

2.3.3 Survey on Plant Uses

An oral interviews and structure questionnaire was distributed to local residence (Famers, Teachers, House services and Herbal practitioners) to gather information on the uses of plant species. The questionnaire included both open-ended and closed-ended questions forcusing on the economic and medicinal uses of the plant. Response was analyzed using descriptive statistics (Martin, 1995; Alexiades, 1996).

3.0   RESULTS AND DISCUSSION

The survey in Agaie Local Government Area covered various wards and locations, documenting the distribution and abundance of the two tree species: *F. benghalensis* and *F. religiosa* with a total of 2293 comprising of 1691 *F. benghalensis* and 602 *F. religiosa* respectively (Tables 1 & Fig 1). The following findings were recorded:

G.R.A Area 3 had the highest tree density (389), and among the sampled trees, *F. benghalensis* (316) was more dominant than *F. religiosa* (73). This was followed by Ecowugi Ward with 320 trees, with *F. benghalensis* (250) as the dominant tree. These low tree counts were noted at Roundabout to Saint Leonard Catholic Church off Kacha Road Junction (32) and Sunday Market Garage (34), where *F. religiosa* was very uncommon.

Abundance values also indicate the dominance of *F. benghalensis* in most of the sites. G.R.A Area 3 recorded the highest species abundance for *F. benghalensis* (14.66) followed by Ecowugi Ward (11.6). On the other hand, the lowest species abundance was recorded for Kuchitagi Ward (1.90), indicating sparseness in distribution. For *F. religiosa,* maximum species abundance was recorded in G.R.A Area 2 (4.22) followed by G.R.A Area 1 (3.29), and the minimum at the Sunday Market Garage (0.19).

The demographic survey (Table 2) showed that most of the respondents were men (79.63%), of whom the majority were graduates (37.04%). The 45-55 years group (24.07%) was the most dominant in age. The students (29.63%) formed the largest group under occupation, followed by farmers and working individuals (20.37% each).

Traditional and Medicinal Uses (Tables 3 & 4) cited extensively included shade provision, fodder for goats, and medicine for fever, typhoid, headaches, and body pains. Ethnobotanical indices (Table 5) quantitatively indicated some clear differentiation among the species. *F. benghalensis* was found to have ranked higher in RFC (0.74) and UV (2.09) when compared with *F. religiosa* (RFC = 0.48, UV = 0.56). Fidelity level percentages (FL%) found *F. benghalensis* with highest fidelity for fever (100%), whereas *F. religiosa* had high citations for body pains (96%). Informant consensus factor (ICF) values remained high (0.96–0.98), demonstrating considerable informant agreement on the medicinal importance between the species. In general, both plant species are mainly use for shade hence, these plants are usually found in almost each houses with at least one or two of the plant species present and planted along road-side leading to its rich biodiversity in Agaie Local Government Area of Niger State Nigeria.

Table 1: Distribution and Abundance of *Ficus benghalensis* and *Ficus religiosa* in Agaie Local Government Area

| Ward/Area/Places Sampled	Total Number	Total Number		Specie Abundance	
		F. benghalensis	*F. religiosa*	*F. benghalensis*	*F. religiosa*
Ecosa Ward	139	81	58	3.76	2.69
Ekobaddagi Ward	185	134	51	6.22	2.37
Ekowuna Ward	271	204	67	9.46	3.11
Ecowugi Ward	320	250	70	11.6	3.25
G.R.A Area 1	210	139	71	6.45	3.29
G.R.A Area 2	320	229	91	10.62	4.22
G.R.A Area 3	389	316	73	14.66	3.39
Kuchitagi Ward	61	41	20	1.90	0.93
Monchuko Area	147	110	37	5.10	1.72
Handala Bread Area	98	69	29	3.20	1.35
Roundabout to Saint Leonard Catholic Church off Kacha Road Junction	32	20	12	0.93	0.56
Sunday market road both side	87	68	19	3.15	0.88
Sunday Market Garage	34	30	4	1.39	0.19
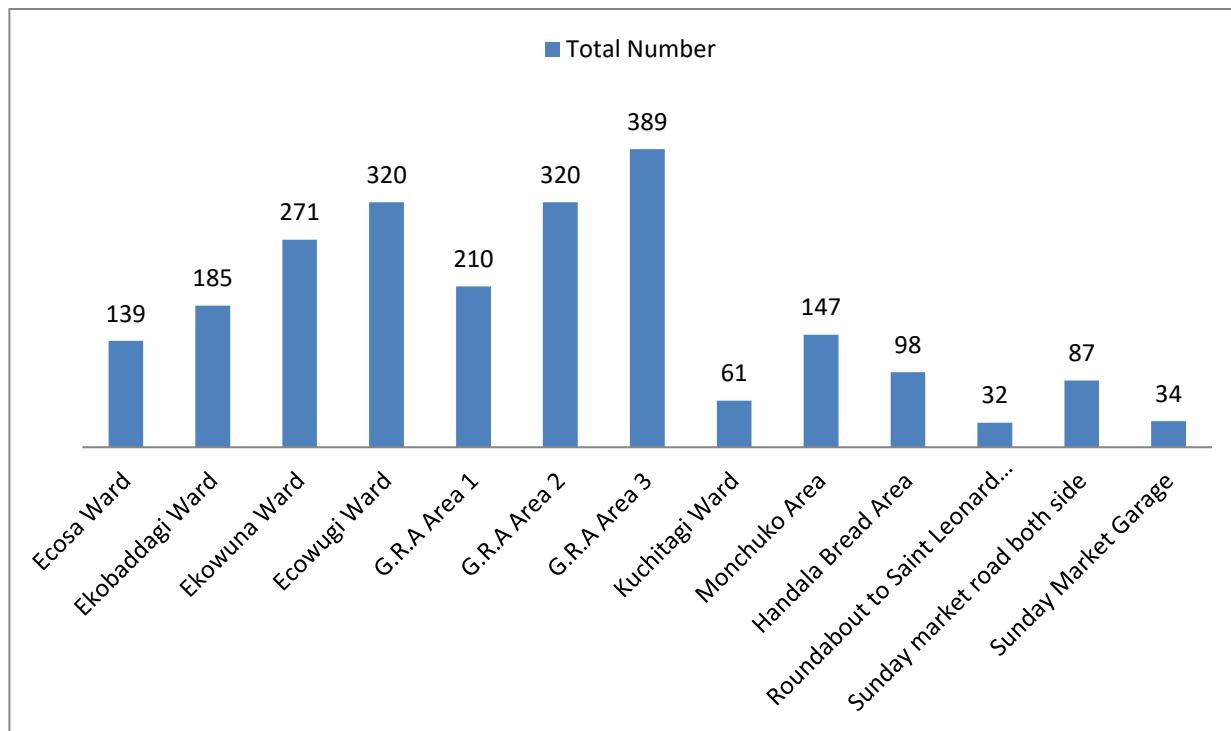
Fig 2: Bar Chart Showing the Comparative Distribution of *F. benghalensis* and *F. religiosa* in Agaie Local Government Area/Ward
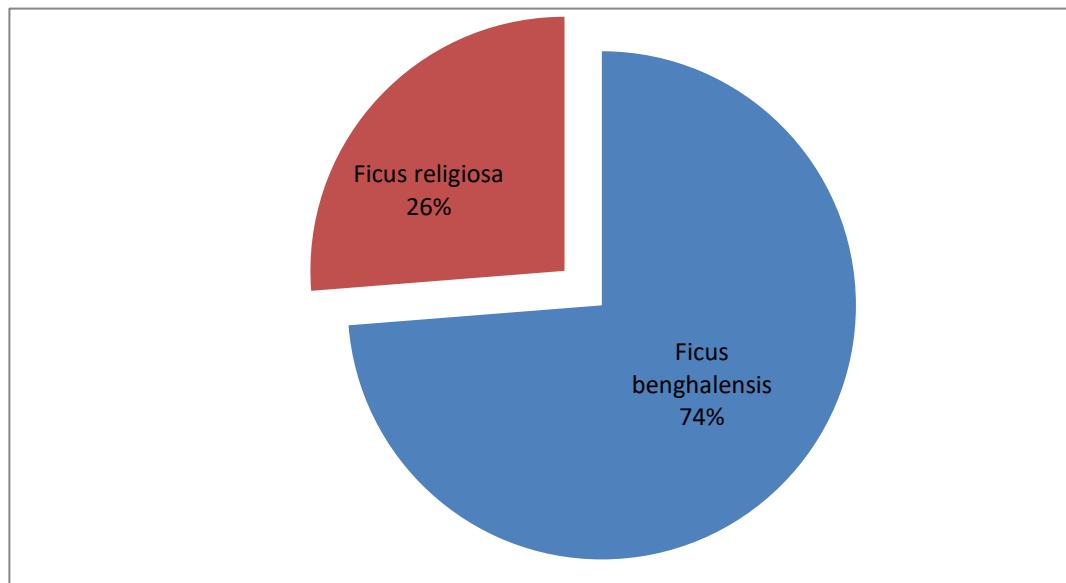

Fig3: Pie Chart Showing Species Distribution Proportion of *F. benghalensis* and *F. religiosa* in Agaie Local Government Area/Ward

Table 2: Demographic features of informant from the study area.

Factors	Categories	Respondents	Percentage (%)
Age			
	15-25	8	14.81
	25-35	11	20.37
	35-45	11	20.37
	45-55	13	24.07
	55-above	11	20.37
	Total	54	
Gender			
	Male	43	79.63
	Female	11	20.37
	Total	54	
Education			
	Illiterates	18	33.33
	Secondary	6	11.11
	Tertiary	10	18.52
	Graduate	20	37.04
	Total	54	
Profession/ Occupation			
	Famer	11	20.37
	Herbal practitioners	5	9.26
	Teacher	2	3.70

Student	16	29.63
Employed	11	20.37
House services	9	16.67
Total	54	

Table 3: Traditional Uses of Both plants

Part Used	Purpose
Whole Plant	Shade
Leaves	Feeding goat

Table 4: Medicinal Uses of Both plants

Medicinal Uses	Part Used	Method of Preparation	Method of Administration
Typhoid Fever	Leaves	Boiling	Bathing and Inhaling
Body pain	Leaves	Boiling	Bathing
Normal Fever	Root	Boiling	Oral
Headache	Root	Sun drying, Pounding and heating on fire	Inhaling

Table 5: Quantitative ethnobotanical indices for *Ficus benghalensis* and *Ficus religiosa*

Species	Relative Frequency Abundance (RFC)	Use Value (UV)	Fidelity Level (FL)%			Informant Consensus Factor (ICF)		
			Fever	Body Pain	Headache	Fever	Body Pain	Headache
Ficus benghalensis	0.74	2.09	100	55	40	0.98	0.98	0.96

|							
Ficus religiosa	0.48	0.56	69.2	96	31	0.98	0.98	0.96
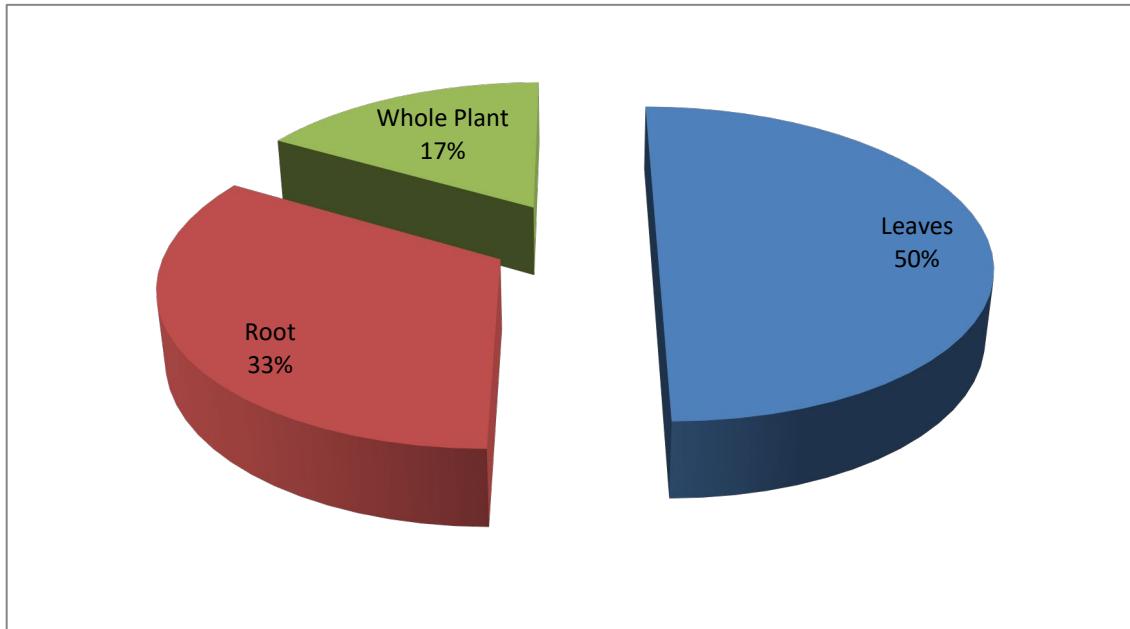
Fig 4: Percentage of Plants part used

3.1 Discussion

The present study outlined the frequency and ethnobotanical usage of *Ficus benghalensis* and *Ficus religiosa* in the Agaie Local Government Area of Niger State. A total of 2,293 specimens was recorded, showing that *F. benghalensis* (1,691) was more frequently observed than *F. religiosa* (602). This result implies the ecologically dominant status of *F. benghalensis* in the studied area, a deduction that is consistent with earlier reported findings in tropical and subtropical rainforest habitats (Logesh, 2023; Singh, 2023). As a case in point, Rajan *et al*. (2023) reported that *F. benghalensis* shows a preference for disturbed/anthropogenously altered habitats, a situation that could justify its dominance in an urbanized area like G.R.A Area 3. Similarly, Devendra *et al*. (2023) reported that *F. benghalensis* is more tolerant to a suite of soil and climatic factors when contrasted with the situation for *F. religiosa* .

Ethnobotanical studies across West Africa, South Asia and in Nigeria have invariably stressed the medicinal and cultural importance of the Ficus species (Rafiu *et al*., 2025; Mukaila and Ajao, 2025). Ubelejit *et al*. (2018) reported that Ficus species are widely grown in Rivers State to serve the roles of providing shade, medicines, and fodder, supporting this present finding in Agaie. Ethnopharmacological and phytochemical studies further corroborate traditional applications: both species contain flavonoids, tannins, alkaloids and other bioactive constituents that plausibly underlie

their use for fever, gastrointestinal complaints, wound care and inflammatory conditions (Rahul, 2024; Gaur, 2024). Furthermore, a work by Olowokudejo *et al*. (2008) in Nigeria supported this by describing the multiplicity of medicinal roles of F. benghalensis which include the management of fevers, wounds, and skin problems. Pharmacological evidence like this and ongoing record of ethnomedicinal uses in differing localities in Nigeria supports Agaie's ethnobotanical accounts and cultural reliance of Ficus species to provide basic health needs.

Widespread studies across the globe also support these findings. Rahman and Khanom (2013) demonstrated that *F. benghalensis* and *F. religiosa* are used extensively in Bangladesh to treat diabetes, gastrointestinal diseases, and dermatological disorders. Likewise, Khaliq (2017) studied the therapeutic potential of *F. benghalensis* with reference to its anti-inflammatory and antimicrobial activities that validate its traditional use in Agaie for treating fever and infections. In addition, Devendra *et al*. (2023) reported that both species contain bioactive phytochemical compounds such as flavonoids, tannins, and alkaloids that are responsible for their therapeutic value.

The much greater prevalence of *Ficus benghalensis* than of *Ficus religiosa* in the Agaie area may reflect distinctive cultural agricultural practices. *Ficus benghalensis* (the banyan tree) is frequently regarded as a sacred tree and is deliberately grown along roadsides and in residential settlements due to its shading, religious, and scenic value (Rønsted *et al*., 2008; Kumar, 2021a; Logesh, 2023). This pattern is consistent with findings in India, where *Ficus benghalensis* is more widespread than *Ficus religiosa* due to its multiple functional roles and symbolic meaning (Gupta *et al*., 2013). Throughout South Asia, *Ficus religiosa* is typically associated with proximity to temples and shrines (Rahman and Khanom,

2013; Rahul, 2024), and so may account for its comparatively low prevalence in mainly Islamic cultures such as Agaie Niger State (Rafiu *et al*., 2025).

The demographic features of the study informants shed light on transmission lines of ethnobotanical information. The overwhelming dominance of male informants, who represent 79.6%, is supported by other ethnobotanical studies from Nigeria and beyond, where males have regularly played the custodian roles of land and trees (Omosun *et al*., 2008; Rafiu *et al*., 2025). However, the high percentage of students and graduates implies a comparative recent knowledge base that combines conventional approaches with scientific information, a critical factor to consider in upcoming conservation and domestication efforts. Additionally, the representation of herbal practitioners (9.26%) highlights the historical importance of Ficus species in the local pharmacopeia (Mukaila and Ajao, 2025; Indigenous Ficus study, Burkina Faso, 2025). Together, these prevalence patterns and uses are consistent with previous studies in Nigeria and are generally in accord with the world ethnobotanical literature. The ubiquitous occurrence of *F. benghalensis* indicates its ecological versatility and cultural valence, while the consistent presence of *F. religiosa* indicates its continued though more restricted use in certain ecological and cultural contexts.

4.0   CONCLUSION

This study revealed clear ecological and cultural patterns in the distribution and use of Ficus benghalensis and Ficus religiosa within Agaie Local Government Area, Niger State. The findings disclosed a wider distribution and ecological dominance of *F. benghalensis,* while both species remain highly valued for their multiple cultural, medicinal and environmental roles. Quantitative indices such as RFC, UV, FL, and ICF confirmed strong local knowledge systems and community reliance on these
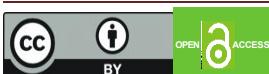
species for diverse health and livelihood purposes.

The observed high cultural fidelity and consensus among informants underscore the continued relevance of Ficus species to traditional healthcare and ecosystem services in northern Nigeria. However, increasing anthropogenic pressures, urban expansion and inadequate conservation awareness threaten their persistence. Sustainable management approaches such as community based conservation, replanting programmes and integration of ethnobotanical knowledge into biodiversity policy are urgently needed to maintain these species ecological and cultural functions (Adebayo *et al.*, 2023; Ibrahim *et al.*, 2024; Rao and Singh, 2024). Future studies should focus on phytochemical bases of the above medicinal uses and the conservation status of the Ficus plants in the face of expanding urbanization and land-use changes.

ACKNOWLEDGEMENT

AUTHOR'S CONTRIBUTION STATEMENT

- Philip Ogbevire designed the study and conducted fieldwork, analyzed data and prepared the manuscript.
- Efosa A. Ogie-Odia, Francis N. Imade, Adetokunbo Ekpenyong, Yahaya Aliyu, and Dabobelemabo C. Asaye contributed to data interpretation and critical revision of the manuscript.

DECLARATION OF COMPETING INTEREST

The authors declare no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Adebayo, A. O., Umar, A. M. and Musa, T. L. (2023). Indigenous tree management practices and their implications for biodiversity conservation in northern Nigeria. *African Journal of Ecology*, 61(2): 180–192. https://doi.org/10.1111/aje.13012

Adedeji, O. S., Adebayo, A. A. and Bello, R. A. (2022). Ethnobotanical assessment and conservation status of multipurpose tree species in the Guinea savanna of Nigeria. *Journal of Ethnobiology and Ethnomedicine*, 18(4): 75–88. https://doi.org/10.1186/s13002-022-00545-x

Alexiades, M. N. (1996). *Selected guidelines for ethnobotanical research: A field manual.* New York Botanical Garden.

Ali, S. M. and Abdullahi, A. U. (2024). Comparative study on medicinal uses of Ficus species among traditional healers in northwestern Nigeria. *Ethnobotany Research and Applications*, 27, 1–12.

Baba K. C., Olorunsanya E. O. and Galadima M. A. (2019). Analysis of sesame production in agaie local government area of Niger state, Nigeria. *Lapai Journal of Science and Technology,* 5 (1): 253 - 261

Burkill, H. M. (1985). *The useful plants of West Tropical Africa (Vol. 1).* Royal Botanic Gardens, Kew.

Cochran, W. G. (1977). Sampling techniques (3rd ed.). Wiley.

Cox, P. (2000). Tribal knowledge survives the millennium? *Science.* 287:44-45.

Daniel, R. S. , Devi, K. S. and Augusti, K. T. (2003). Mechanism of action of
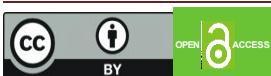
antiatherogenic and related effects of Ficus bengalensis Linn. flavonoids in experimental animals. *Indian Journal Expository Biology*, 41, 296-303.

Devendra, P. S., Aditya, M., Aditya, S., Abhishek, B. , Abhishek, P. and Navneet, K. V. (2023). Medicinal Uses, Phytochemistry, and Pharmacological Actions *Ficus benghalensis* and Ficus Religiosa. *International Journal of Medical and Pharmaceutical Research* 4(3): 350 – 353

Friedman, J., Yaniv, Z., Dafni, A. and Palewitch, D. (1986). A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. *Journal of Ethnopharmacology*, 16(2–3): 275–287. https://doi.org/10.1016/0378-8741(86)90094-2

Gafar, A.A. (2022). Statistics of rice farming activities during COVID-19 pandemic lockdown: The case of Niger State, Nigeria. *Sarhad Journal of Agriculture*, 38(5): 234-239. https://dx.doi.org/10.17582/journal.sja/2022/38.5.234.239

Gaur, R. (2024). Antioxidant potential and pharmacological properties of key Ficus species: A review. Journal of Herbmed & Pharmacology, 13, 1–15.

Gilani A.H and Atta-ur-Rahman. (2005). Trends in ethnopharmacology. *Journal of Ethnopharmacology*. 100: 43-49

Gupta, S. C., Sung, B., Kim, J. H., Prasad, S., Li, S., & Aggarwal, B. B. (2013). Multitargeting by turmeric, the golden spice: From kitchen to clinic. *Molecular Nutrition & Food Research*, 57(9): 1510-1528.

Hutchinson, J., and Dalziel, J. M. (1954). *Flora of West Tropical Africa (Vols. 1–3)*. Crown Agents.

Ibrahim, M. K., Usman, I. A. and Mohammed, A. R. (2023). Ecological assessment of sacred fig (Ficus religiosa) and banyan (Ficus benghalensis) in Nigerian traditional landscapes. *Journal of Plant Ecology and Environment*, 19(2): 119–133.

Ibrahim, N. H., Yakubu, A. A. and Salisu, A. S. (2024). Distributional pattern and cultural relevance of Ficus species in the Middle Belt region of Nigeria. *Plant Diversity*, 46(1): 45–59. https://doi.org/10.1016/j.pld.2023.09.004

Isa A. D., Raphael N., Souleman, L. and Chukwunonyelum, I. (2024). Exploring the geomorphological nature and its consequences in Agaie & Lapai l gas of Niger state and environment using gis & landsat-8 imagery. *Journal of Environmental Impact and Management Policy* 4, (6): 30 - 41

Keay, R. W. J. (1989). *Trees of Nigeria*. Clarendon Press.

Kent, M., and Coker, P. (1992). Vegetation description and analysis: A practical approach. CRC Press.

Khaliq, H. A. (2017). The article presents an in-depth analysis of pharmacognostic, physicochemical, phytochemical, and pharmacological attributes of Ficus benghalensis. *Journal of Scientific and Innovative Research*, 6(4): 151–163.

Kumar S. (2021a). Documentation of Indigenous Traditional Knowledge (ITK) on Commonly Available Plants in Koira Range, Bonai Forest Division, Sundargarh, Odisha, India. *Asian Plant Research Journal*. 8(4): 83-95.

Kumar SN, Marndi S and Kumar S. (2021b). Some common medicinal plants in Barsuan Range, Bonai Forest Division, Sundargarh, Odisha. *Asian Journal of Biology.* 13(3): 11- 22.

Logesh, R. (2023). Ficus benghalensis — A comprehensive review on medicinal uses, phytochemicals and ecological
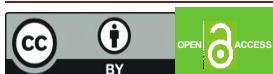
aspects. Current Plant Research and Reviews, 39, 45–63.

Martin, G. J. (1995). *Ethnobotany: A methods manual.* Chapman & Hall.

Mukaila, Y. O. and Ajao, A. A (2025). Ethnobotanical survey of medicinal plants used for oral health in Osogbo, Nigeria. Environmental and Sustainability Studies, 1(1), 12–24. https://doi.org/10.xxxx/xxxx

Odeyemi, I. M., Ajayi, O. O., & Salako, O. M. (2022). Ethnobotanical survey of plants used in traditional healthcare practices in central Nigeria. *Journal of Ethnopharmacology*, 287, 114923. https://doi.org/10.1016/j.jep.2021.114923

Okeke, C. I., Onwudiwe, I. E. and Bamidele, J. T. (2021). Role of multipurpose trees in the maintenance of rural livelihoods and ecosystem services. *Sustainability*, 13(6):3127. https://doi.org/10.3390/su13063127

Olowokudejo, J. D., Kadiri, A. B. and Travih, V. A. (2008). An exploration of herbal marketplaces and medicinal plant species in Lagos State, Nigeria: An ethnobotanical study. *Ethnobotanical Leaflets*, (12): 851–865.

Omosun, G., Okoro, I. A., Anamika, C. A. and Akinmoladun, F. O. (2008). A study exploring the ethnobotanical characteristics of medicinal plants found in Uli, in Anambra State, *Nigeria. Journal of Natural Products*, 1, 29–35.

Outfy, L., Arakish, K., Halifa, K., Ira, E. R. M., Roxb, F., Warb, F. and Ficus, F.L. (2005). Numerical Taxonomic Evaluation of Leaf Architecture of Some Species of Genus Ficus L. *Int. J. Agric. Biol*., 7(3): 352–357.

Rafiu, B. O., Omotayo, A.O., Lawal, I.O. and Aremu, A. O. (2025). Ethnobotanical uses of plants in Nigeria: a bibliometric and thematic analysis (1964–2024). Journal of Ethnobiology and Ethnomedicine, 21, Article 7. https://doi.org/10.1186/s13002-025-00788-y

Rahman, A. H. M. M., and Khanom, A. (2013). A study of the classification and ethnomedicinal values of Moraceae members in the Bangladesh flora. *Research in Plant Sciences*, 1(3): 53–57.

Rahul, R. (2024). Comprehensive review on ethnomedicinal, phytochemistry and therapeutic applications of Ficus religiosa. Frontiers in Ethnopharmacology, 2024, Article ID 11462526. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11462526/

Rajan, L., Saravanan, V. S., Sujarajini, V., Soundararajan, R., Niranjan, D. , Jitendra, P. and Hari, P. D. (2023). *Ficus benghalensis* L. (Moraceae): A review on ethnomedicinal uses, phytochemistry and pharmacological activities. *Current Research in Biotechnology* 6, 100134

Rao, S. P. and Singh, R. D. (2024). Comparative ethnobotany and ecosystem roles of sacred fig species in South Asia. *Journal of Forestry Research*, 35(1): 105–117. https://doi.org/10.1007/s11676-023-01745-y

Research on Indigenous knowledge and uses of Ficus species in Burkina Faso (2025). Ethnobotany Research & Applications, (Article, Jan 2025). Retrieved from Ethnobotany Journal. (PDF

Rønsted, N., Weiblen, G. D., Savolainen, V. and Cook, J. M. (2008). Phylogenetic relationships, biogeography, and ecological attributes of Ficus section Malvanthera (Moraceae) are investigated. *Molecular Phylogenetics and Evolution*, 48(1): 12–22.

Singh, P. (2023). Ficus benghalensis — A comprehensive review on
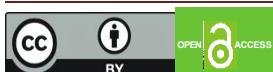
ethnobotanical and pharmacological uses. Journal of Applied Pharmaceutical Science Online, 13, 1–18.

Sinha, A. and Singh, S. P. (2023). Functional importance of Ficus species in sustaining tropical biodiversity. *Plant Ecology and Evolution*, 156(2): 179–191. https://doi.org/10.5091/plecevo.2023.202

Trotter, R. T. and Logan, M. H. (1986). Informant consensus: A new approach for identifying potentially effective medicinal plants. In N. L. Etkin (Ed.), Plants in indigenous medicine and diet: Biobehavioral approaches. Redgrave Publishing, 91–112pp.

Ubelejit, A. , Adoyi, P. , Sunday, A. and Yakubu, D. (2018). Ethnobotanical Survey of Plants in Andoni Local Government Area of Rivers State, Southern Nigeria. *International Journal of Life Sciences Research* 6 (3): 438-448

Umar, L. M., Abdullahi, A. and Dogo, B. A. (2025). Traditional knowledge systems and conservation practices associated with Ficus species in Nigerian savannas. Journal of Plant Ecology, 18(1): 41–54. https://doi.org/10.1093/jpe/rtab025