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SPECIES COMPOSITION AND DIVERSITY OF VASCULAR PLANTS IN RHIZHA MOUNTAIN FOREST JOS, PLATEAU STATE NIGERIA

J.J. Azila*, [1] D.D. Jeridas, [2] J.J. Mbah, [1] Selbut R. Longtau, [3]
Felix Ifeanyi Nwafor[4] and Yohanna Christopher Tumba[5]

[1]*Federal College of Forestry Jos Plateau, Nigeria.*
[2]*Intergrated Dairies Limited (Farmfresh) No. 6, Keana Road Jos, Plateau State, Nigeria*
[3]*Botanical Resources & Habitat, 31 Daku, Abattoir, Jos.*
[4]*Department of Plant Science and Biotechnology, University of Nigeria Nsukka 410001, Enugu State Nigeria.*
[5]*University of Jos biological conservatory A.P Leventis ornithological research institute*

Corresponding author: *J.J. Azila
Email : jjazila39@gmail.com

ABSTRACT

Aim: Vascular plants have undergone different level of disturbance due to unprecedented increase in anthropogenic activities, which have led to cutting of plants for fuel wood, charcoal production and infrastructural development. This paper ascertained the species Composition and diversity of vascular plants in the Rhizha mountain forest area of Jos North Plateau State Nigeria.

Methods: Six plots were systematically established. A 20×20 m plot was used for the sampling of trees, lianas and climbers. Plot of size 5×2 m were used for sampling of shrubs and saplings, which were nested in the 20×20 m plot. The grasses and herbs were sampled in smaller plots measuring 2×0.5 m, which were randomly nested in the 20 × 20 m plot.

Results: One hundred and twenty six (126) species (99 woody, 19 herbaceous and 8 grasses were sampled belonging to fifty two (52) families with 1501 individual with 2.89% of grass covers. Rubiaceae has highest species abundance of (363).The results showed restricted abundance of some species which may be attributed to competition for nutrients, limited light by canopy trees and destruction of undergrowth during tree snapped and logged on the forest floor.

Conclusion: This study revealed that Rhizha mountain forest has high species of (Woody plants, herbs and grasses) diversity. Families noted with dominant species in the study area Rubiaceae and Asteraceae for both woody and herbaceous species respectively.

It was recommended that effective conservation and sustainable management of the forest would make it possible for the said forest to continue providing goods and services necessary for communities around the Rhizha montane forest.

KEYWORDS

Plant diversity, Rhizha mountain forest, Abundance ratio, floristic enumeration, Species richness.

INTRODUCTION

Vascular plants appear to be the final organisms to colonize glacial forelands, after the barren substrate has already been significantly transformed by cryptogam colonization and soil-forming processes. However, studies have shown that vascular plants are usually not the last group of colonizers, and some species may even appear as first colonizers (Wietrzyk et al., 2016).The Earth's ecosystems are under ever-increasing pressure of global change due to anthropogenic activities. In addition to the direct pressure of land use change where natural ecosystems are altered by human activities, indirect pressure is growing due to increased deposits of nutrients and changing climate due to increased greenhouse gas emissions (IPCC,2013).These global changes will likely have large impacts on ecosystem processes (Field et al.,2007).

Within the last decades biodiversity became a central topic of social, political and scientific discussion. The currently most recurrent issues relative to biodiversity are its conservation and sustainable use. The estimated number of vascular plant species (flowering plants, conifers, cycads and fern species) in Nigeria range from 4600 and 4715 (IUCN, 2004). Close to 1200 plant species are known to have their native origin traced to Nigeria out of which 205 are considered as endemics. Generally, Nigeria is known to habour a sizable number of critically endangered plants with 170 confirmed as threatened plants (FMEnv, 2001). Current estimates of plant diversity in Nigeria are sketchy and some of the major constraints to the generation of a comprehensive National Biodiversity Strategy and Action Plan (NBSAP) in Nigeria are inadequate capacity, lack of database and poor understanding of the importance of biological diversity in the national economy (FMEnv, 2001). Overexploitation has resulted in the rapid loss of vascular plant diversity and is recognized as a major environmental and economic problem around the World (Mani and Parthasarathy,2006). Therefore, information on composition, diversity of vascular plant communities is of primary importance in the planning and implementation of biodiversity conservation efforts (Suratman,2012). The knowledge of vascular plants flora of a community will enable inhabitants to positively relate with the plants as well as promote other plants life form especially the bryophytes.

Therefore, remarkable developments in phylogenetic over the past 20 years are beginning to resolve some of these seemingly in soluble problems and have brought the remaining critical questions into much sharper focus. It is clear now that all land plants shares a common ancestral origin and that vascular plants probably are in an important evolutionary sense of just bryophytes with a highly modified life history (Suratman, 2012).

To begin to identify and appreciate the importance and need to conserve native plant diversity and be able to recognize many recently introduced ones, documentation and handy checklist of the vascular plants of the Rhizha montane forest become invaluable tools for plant experts as well as to other plant enthusiasts as this this research aimed in assessing the composition and diversity of vascular plants species of the study area.

Despite the significance of vascular plants in maintenance of life on earth there is no study conducted to assess vascular plant composition and diversity of the study area or otherwise of this venture. These necessitate a comprehensive study on documenting the vascular plants species in the study area. It is believed that the findings of the study would be useful tools for plant experts as well as to other plant enthusiasts .It is also expected that the study will provide an analytical frame work for those currently engaged in plant ecology and taxonomy.

Materials and Methods

Study Location

The study was carried out at Rhiza Retreat Centre which is located at Bauchi Road, Jos, Nigeria, Plateau (state).A protected forest covering an area of about 100 hectares. It is located in Rigizah district, 2 km away from Jos North on the Jos Plateau in North Central Nigeria on latitude 9°56'21.73" N and longitude 8°54'7.96" E(Nipost,2009).it is bounded in the north by Bassa local government, to the east by Bauchi state. The climate of Jos North Plateau is dominantly influenced by its relatively high altitude and position along the Inter Tropical Convergence Zone (ITCZ) and has an average height of about 1250 m above mean sea level. It has a mean minimum and maximum temperature of 16-26 ºC. It is controlled by 2 wind systems that affect the Nigerian

climate, moist South-westerly winds during the rainy season and the dry North Easterlies during the dry season. The South-westerly winds are responsible for much of the rains occurring between April and October, while the North Easterlies are responsible for the dry season lasting from November to March (Wuyep and Daloeng, 2020).

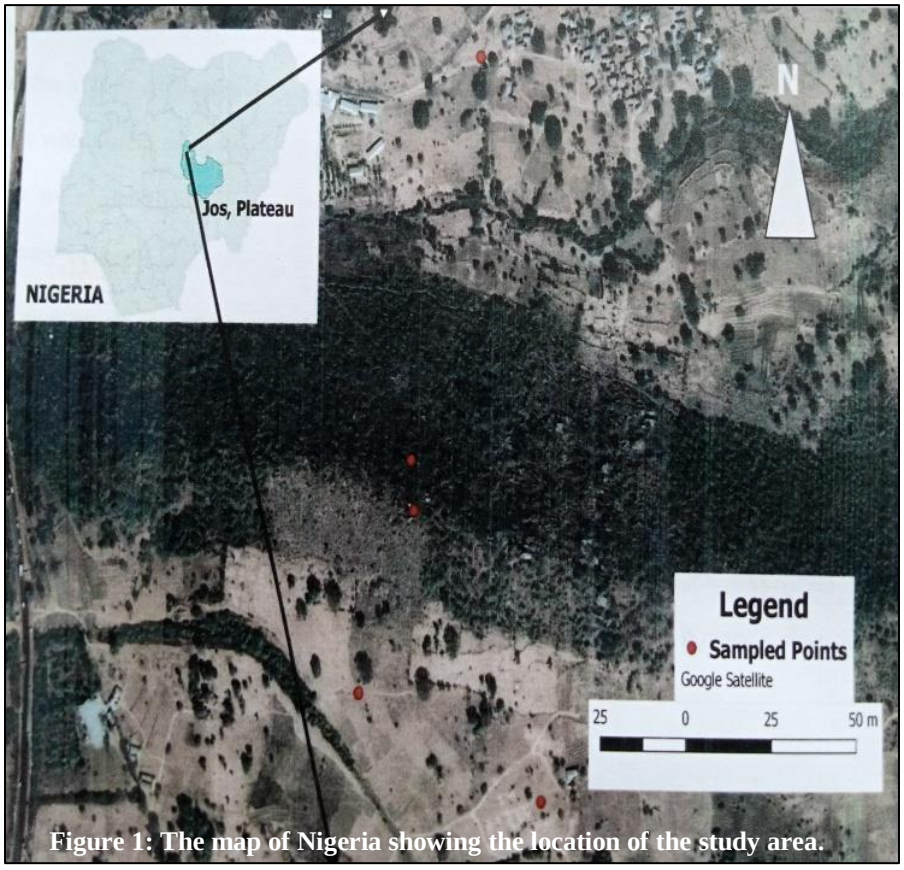

Figure 1: The map of Nigeria showing the location of the study area.

Source: Quantum Geographical Information System (QGIS) panama 3.0

Sample and Sampling Procedures

Six plots were systematically established. A 20×20 m plot was used for the sampling of trees and plot of size 5×2 m were used for sampling of shrubs and saplings, which were nested in the 20×20 m plot. The grasses and herbs were sampled in smaller plots measuring 2×0.5 m, which were randomly nested in the 20 × 20 m plot. All plant life forms assessed in the subplots were combined to form a composite sample in the 20×20 m plot. The smaller plots nested in the larger plots were established to simplify the sampling of herbs and grasses. In this research, plant specimens were identified to the species level in the field, for species that were not easily identifiable, voucher specimens were taken to Forest Herbarium Ibadan (FHI) where they were identified by matching with preserved herbarium specimens.

Data Analyses: Data was obtained on the vascular plants within the study area was compiled using Microsoft Excel 2007® and analyzed using R Statistical Software version 3.0.2. Plant species diversity was calculated using Shannon – Weiner's diversity index (Clarke and Warwick, 2001).

$$H = -\sum_{i-1}^{S} Pi\ 1nPi$$

Where Pi is the proportion of individual species and s is the total number of species in the community.

Results

A total of 126 species (99 woody, 19 herbaceous and grass species; table 3, 4 and 5) were sample belonging to 52 families with 1501 individuals (Table 1). The grass cover was 2.89% (Table 1).

Table 1: Comparative diversity of Wood and Herbaceous species

	Woody plants	Herbs	Grass
Species Richness	99	18	8
Abundance	1355	146	
Shannon wiener Diversity	0.83	1.53	

Figure 2: Species richness across the habitat

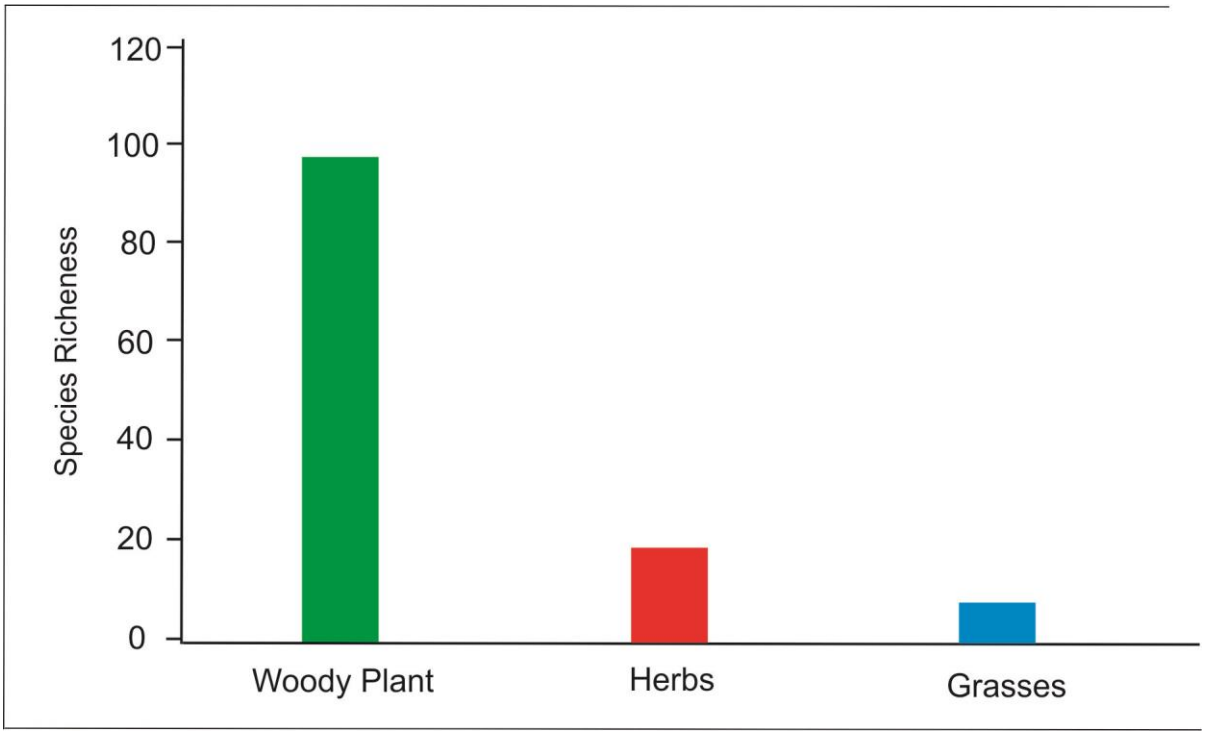

Figure 2 above showed that woody plant has the highest species richness compared to herbs and grasses.

Table 2: Woody plant species

S/N	Family	Species code	Species	Abundance
1	Papilionaceae	ABPR	*Abrus precatorius* Linn	1
2	Papilionaceae	ADPR	*Adenodolichus paniculatus* Hutch	270
3	Mimosaceae	ALZY	*Albizia zygia* Fabailis	39
4	Sapindaceae	ALAF	*Allophylus africanus* Beauv.	5
5	Sapindaceae	ASPI	*Allophylus spicatus* Radlk	12
6	Sapindaceae	ALSP	*Allophylus spp* Poir.	10
7	Annonaceae	ANSE	*Annona senegalensis* Pers.	7
8	Combretaceae	ANLE	*Anogeissus leiocarpa* Guill & Perr.	5
9	Asparagaceae	ASAF	*Asparagus africanus* Lam	6
10	Melianthaceae	BEAB	*Bersema abyssinica* Fresen.	1
11	Malvaceae	BOCO	*Bombax costatum* Pellegr & vuill	27
12	Burseraceae	BODA	*Boswellia dalzielii* Hutch	1
13	Euphorbiaceae	BRFE	*Bridelia ferruginea* Benth.	9
14	Euphorbiaceae	BRMI	*Bridelia micrantha* Baill	1

15	Euphorbiaceae	BRSC	*Bridelia scleroneura* Hochst.	4
16	Caeasalpinaceae	BUAF	*Burkea africana* Hook.	14
17	Apocynaceae	CAED	*Carissa edulis* L.	1
18	Vitaceae	CAMO	*Cayratia mollissima* Gagnep.	1
19	Apocynaceae	CESP	*Ceropegia spp* L.	1
20	Menispermaceae	CIMU	*Cissampelos mucronata* A.Rich	5
21	Vitaceae	CIAR	*Cissus araliodes* Namn.	2
22	Vitaceae	CIPO	*Cissus populnea* Guill. &Perr.	8
23	Vitaceae	CIRU	*Cissus rubiginosa* Welw ex. Bak.	7
24	Vitaceae	CISP	*Cissus spp* L.	1
25	Rutaceae	CLAN	*Clausena anistata* Hook. F. ex Benth	8
26	Ranunculaceae	CLHI	*Clematis hirsuta* Guiil. & Perr.	6
27	Lamiaceae	CLCA	*Clerodendrum capitatum* Hochst.	278
28	Euphorbiaceae	CRZE	*Croton zembesicus* Burch.	1
29	Araliaceae	CUAR	*Cussonia arborea* Thunn.	1
30	Caesalpinaceae	DAOL	*Daniellia oliveri* Benn.	1
31	Papilionaceae	DEVE	*Desmodium velutinum* Wild. DC	65
32	Minosaceae	AICI	*Dichrostachys cinerea* Wight et Arm.	20
33	Dioscoreaceae	DISP	*Dioscorea spp* Tamus L.	5
34	Ebenaceae	DIOS	*Diospyros spp* L.	3
35	Ebenaceae	DIME	*Diospyrus mespiliformis* Hochest. Ex A. DC	11
36	Moraceae	FIAB	*Ficus abutilifolia* Miq.	12
37	Moraceae	FICO	*Ficus cordata* Thunb.	1
38	Moraceae	FIGL	*Ficus glumosa* Delile.	10
39	Moraceae	FILE	*Ficus lecardii* Dumort	1
40	Moraceae	FIRE	*Ficus religiosa* Forssk.	1
41	Moraceae	FISU	*Ficus sur* Forssk.	18
42	Moraceae	FITH	*Ficus thonningii* Blumbe.	1
43	Moraceae	FIUM	*Ficus umbellata* Vahl.	2
44	Malvaceaa	GRFL	*Grewia flavescens* Benth.	6
45	Anacardiaceae	HEIN	*Heeria insignis* Gamble.	5
46	Anacardiaceae	HERE	*Heeria reticulata* Meisn.	1
47	Apocynaceae	HOFL	*Holarrhena floribunda* T. Dur & Schinz	12
48	Hymenocardiaceae	HYAC	*Hymenocardia acida* Tul.	1
49	Convolvulaceae	IPSP	*Ipomoea spp* Moench.	2
50	Caesalpinaceae	ISDO	*Isoberlinia doka* Craib & Stapf.	59
51	Caesalpinaceae	ISTO	*Isoberlinia tomentosa* Craib & Stapf.	31
52	Oleaceae	JADI	*Jasminum dichotomum* Vahl.	4
53	Oleaceae	JAOB	*Jasminum obtusifolia* Wall.	2
54	Oleaceae	JAPA	*Jasminum pauciflorum* Benth.	14
55	Euphorbiaceae	JACU	*Jatropha curcas* L.	2
56	Rubiaceae	KEVE	*Keetia venosa* Bridson.	1
57	Meliaceae	KHSE	*Khaya senegalensis* A. Juss.	10
58	Asteraceae	KLCL	*Kleinia cliffordiana* Hutch.	1
59	Anacardiaceae	LACA	*Lannea schimperi* Hiern.	5
60	Verbenaceae	LACA	*Lantana camara* L.	4
61	Phyllanthaceae	MADI	*Margaritaria discoidea* G.L.Webster.	4
62	Papilionaceae	MUPO	*Mucuna poggei* Adans.	22
63	Musaceae	MUAC	*Musa acuminata* Colla	4
64	Musaceae	MUBA	*Musa barbata* Rottb.	1
65	Ochnaceae	OCRH	*Ochna rhizomatosa* L.	3
66	Ochnaceae	OCSC	*Ochna schweinfurthiana* L	14

67	Ochnaceae	OCSE	*Ochna serrulata* Walp.	1
68	Lamiaceae	OCCA	*Ocimum spp*. Bremek	11
69	Oleaceae	OLSU	*Olax subscorpioides* De wid	1
70	Salicaceae	ONSP	*Oncoba spinosa* Forssk.	2
71	Oleaceae	OPCE	*Opilia celtidifolia* Guiil & perr.	2
72	Poaceae	OXAB	*Oxytenanthera abyssinica* Munro.	1
73	Mimosaceae	PABI	*Parkia biglobosa* R.Br. ex G.Don.	25
74	Rubiaceae	PACO	*Pavetta corymbosa* L.	1
75	Rubiaceae	PASP	*Pavetta spp* L.	1
76	Phyllanthaceae	PHMU	*Phyllanthus muellerianus* miln. redhl	2
77	Caesalpinaceae	PITH	*Piliostigma thonningii* Milne. Redh.	5
78	Myrtaceae	PSGU	*Psidium guajava* L.	3
79	Hypericaceae	PSSE	*Psorospermum senegalensis* walp.	3
80	Rubiaceae	PSVI	*Psychotria viridis* Ruiz & Pav.	1
81	Caesalpinaceae	PTER	*Pterocarpus erinaceus* Poir.	1
82	Anacardiaceae	RHLO	*Rhus longipes* (Engl.)Moffett	6
83	Anacardiaceae	RHNA	*Rhus natalensis* Bernh.	9
84	Rubiaceae	SALA	*Sacoephalus latifolius* Thonn.	81
85	Polygalaceae	SELO	*Securidaca longepedunculata* Fresen.	1
86	Mimosaceae	SEAT	*Senegalia ataxacantha* Boaton.	1
87	Caesalpinaceae	SESI	*Senna singueana* Delile.	16
88	Apiaceae	STAR	*Steganotaenia araliacea* Hochest.	15
89	Steculaiceae	STAQ	*Sterculia quadrifida R. Br.*	2
90	Bignoniaceae	STKU	*Stereospermum kunthianum* Chams.	12
91	Myrtaceae	SYGM	*Syzygium guineense (Willd)DC.subsp.* macrocarpum (Engl.)F.White.	1
92	Lamiaceae	TEGR	*Tectona grandis* R. Br	6
93	Combretaceae	TALA	*Terminalia laxiflora* Engl.	15
94	Combretaceae	TEMA	*Terminalia macroptera* Guiil & perr.	3
95	Meliaceae	TREM	*Trichilia emetica* Vahl.	1
96	Annonaceae	UVCH	*Uvaria chamae* P.Beav.	9
97	Asteraceae	VEAD	*Vernonia adoensis* P. Bear.	24
98	Lamiaceae	VIDO	*Vitex doniana* Ness.	1
99	Sapindaceae	ZAAF	*Zanha africana* (Radlk.)Exell	1
	Total			**1355**

Table 2 above showed that all the woody plants belongs to 99 species in 43 families, *Clerodendrum capitatum* which belongs to Rubiaceae has the highest abundance with 278 species while *Zanha africana* which belongs to Sapindaceae is the lowest abundance plant species with a total number of (1) species.

Table 3: Species Composition by family

	Family	**Species Richness**	**Species Abundance**
1	Anacardiaceae	5	26
2	Annonaceae	2	16
3	Apiaceae	1	15
4	Apocynaceae	3	14
5	Araliaceae	1	1
6	Aspraragaceae	1	6
7	Asteraceae	2	25
8	Bignoniaceae	1	12
9	Malvaceae	1	27
10	Burseraceae	1	1
11	Caesalpinoideae	7	127
12	Clusiaceae	1	3
13	Combretaceae	3	23
14	Concolvulaceae	1	2
15	Cucurbitaceae	1	5
16	Dioscoreaceae	1	5
17	Ebenaceae	2	14
18	Euphorbiaceae	5	17
19	Phyllanthaceae	1	1
20	Lamiaceae	2	7
21	Lauraceae	1	1
22	Meliaceae	2	7
23	Melianthaceae	1	11
24	Mimosaceae	4	1
25	Moraceae	8	85
26	Musaceae	2	46
27	Myrtaceae	2	5
28	Ochnaceae	3	4
29	Ochnaceae	2	18
30	Ochnaceae	3	3
31	Papilonaceae	4	20
32	Phyllanthaceae	2	358
33	Poaceae	1	6
34	Polygalaceae	1	1
35	Ranunculaceae	1	1
36	Rubiaceae	6	6
37	Rutaceae	1	365
38	Salicaceae	1	8
39	Sapindaceae	3	2
40	Malvaceae	1	28
41	Malvaceae	1	2
42	Verbenacea	2	15
43	Vitaceae	3	18
	Total	**97**	**1355**

Table 3 above showed has the total number of 43 families with 97 species richness, Rubiaceaehas the highest number of abundance with 363 plant species while Polygyalaceae has the lowest species abundance with total number of one (1) species.

Table 4: Hernaceous composition

S/N	Family	Species code	Species	Abundance
1	Pteridaceae	ADSP	*Adiatum* philippense L.	1
2	Asteraceae	AGCO	*Ageratum conyzoides* L.1753	5
3	Amarantaceae	ALSE	*Alternanthera sessilis* (L.)R.Br.ex DC.	6
4	Asteraceae	ASAF	*Aspilia africana* (Pers.)C.D.Adams	37
5	Asteraceae	BIBI	*Bidens biternata* L.	1
6	Asteraceae	BIPI	*Bidens pilosa L.*	10
7	Caesalpinaceae	CAMI	*Cassia mimosoides* L	6
8	Asteracea	CRRU	*Crassocephalum rubens* S. moore	4
9	Papilionaceae	CRPA	*Crotalaria palida* vahl	3
10	Papilionaceae	CRSP	*Crotalaria spp* Desv	1
11	Papilionaceae	DEGR	*Desmodium grahamii* Desv.	1
12	Asteraceae	EMCO	*Emilia coccinea* Class.	6
13	Acanthaceae	JUIN	*Justicia insularis T.*Anders	22
14	Verbenaceae	LIJA	*Lippia javanica (Burm.f)Spreng*	1
15	Acanthaceae	PHCI	*Phaulopsis ciliata* (Willd.)Hepper.	2
16	Phyllanthaceae	PHCI	*Phyllanthus gagnioevae Brunel & J.P. Roux*	3
17	Asteracea	SIOR	*Sigesbeckia orientalis* L.	16
18	Dioscoreaceae	TALE	*Tacca leonpentaloides* Kuntze.	2
19	Asteraceae	TIDI	*Tithonia diversifolia* A. Gray.	19
				146

Table 4 above showed that all the herbaceous plant belongs to 19 species in 19 families. *Aspilia Africana* belongs to Asteraceae is the most abundance species with a total number of 37 species. *Lippia javanica* which belongs to Verbenaceae family is the lowest plant species with a total number of one (1) species.

Table 5: Composition of herbs by Family

S/N	Family	Species Richness	Abundance
	Acanthaceae	2	24
2	Amaranthaceae	1	6
3	Asteraceae	8	98
4	Caesalpinaceae	1	6
5	Dioscoreaceae	1	2
6	Papilionaceae	2	5
7	Phyllanthaceae	1	3
8	Pteridaceae	1	1
9	Verbenaceae	1	1
	Total	**18**	**146**

Table 5 above showed that all the herbaceaous plants belongs to 9 families and the must abundance family is Asteraceae with a total number of 98 species while Verbenaceae is the lowest abundance family with a total number of (1) species. The total number of richness is 18 whereas the total number of species abundance is 146.

Table 6: Percentage of grasses

S/N	Family	Species code	Species	% occurrence
1	Poaceae	ANGA	*Andropogon gayanus* Kunth	0.02
2	Poaceae	ANTE	*Andropogon teneris* Michx	0.092
3	Poaceae	IMCY	*Imperata cylindria* P. beaux	0.002
4	Nephrolepidaceae	NEEX	*Nephrolepsis undulata(Afzel.ex Sw.)*	0.05
5	Poaceae	PESP	*Pennisetum spp* Schumach	0.072
6	Poaceae	ROCO	*Rottboellia cochinchinensis* L.F	2.07
7	Poaceae	SEBA	*Setaria barbata* Kunth	0.022
8	Poaceae	SPPY	*Sporobolus pyramidalis* Beauv	0.022
				2.35

From the table 6 above showed *Rottbollia cochinchinensis* has the highest percentage of occurrences of 2.07% followed by *Andropon teneris* which has 0.092%.

The Shannon wiener diversity index of 0.83 and 1.53 were recorded for woody and herbaceous plants respectively (Table 1).

Discussion

One hundred and twenty six (126) species(99 woody,19 herbaceous and 8 grasses were sampled belonging to fifty two (52) families with 1501 individuals with 2.89% of grass covers. Woody plant has abundance of one thousand three hundred and fifty five (1355) species belonging to forty three (43) families were encountered. The most abundance woody plant family is rubiaceae. This finding is in agreement with Njoh et al.,2013 who recorded that in the shrub layer, the Rubiaceae was the most dominant family in the site. The dominance of this family could be as a result of habitat adaptation and favourable environmental conditions which encourage pollination, dispersal and eventual establishment of species. The highest species richness was recorded in Moraceae (8).Austin et al.,1996 found that edaphic parameter (soil nutrients) played a major role in species richness and establishment in an ecosystem while The families: Poaceae ,Melianthaceae, Lauraceae, Phyllanthaceae, Dioscoreaceae, Cucurbitaceae, Convolvulaceae, Clusiaceae, Burseraceae, Malvaceae, Bignoniaceae, Apiaceae, Araliaceae and Aparagaceae all were recorded with low richness of one (1).The reasons for the poor establishment of some families which showed lowest species may be attributed to competition for nutrients, limited light by canopy trees and destruction of undergrowth during tree snapped and logged on the forest floor. Egbe et al. ,2012 mentioned similar reports in a disturbed and natural regeneration forest in Korup National Park Chauhan et al.,1996 also recorded anthropogenic activities affecting growth and distribution of species.

The composition of woody and herbaceous species, Clerodendrum capitatum and Aspilia africana has the highest abundance of (278) and (37) respectively. This might have resulted from the presence of seeds that could easily be dispersed together with its rapid regeneration as well as the ability to survive well in varying soil types. The lowest species abundance of woody specieswere recorded for: Ochna serrulata, Olax subscorpioidea, Oxytenanthera abyssinica, Pavetta corymbosa, Psychotria viridis,Pterocarpus erinaceus,Securidaca longipedunculata, Senegalia ataxacantha, Syzygium guineense subsp. macrocarpum, Trichilia emetica,Vitex doniana, Zanha africana, Abrus precatorius, Bersama abyssinica, Bridelia micrantha, Carissa edulis, Cayratia mollissima,Ceropegia spp., Cissus spp.,Croton zambesicus ,Cussonia arborea, Daniellia oliveri, Ficus cordata, Ficus religiosa, Ficus thonningii, Heeria reticulata, Hymenocardia acida, Keetia venosa, Kleinia cliffordiana, Musa acuminata, and Pavetta spp.,all has low abundance of one (1) each .The low abundance of these species might have resulted from buried seeds of this species which survived in the soil for longer periods of time Adkins et al., 2002,Samedani et al., 2013.

The most abundance family of herbaceous plants is the Asteraceae. This finding is similar to the finding of George et al., 2021 who reported that the family Asteraceae and Euphorbiaceae were the largest

families of herbs encountered; this is also similar to the report of Oni and Ndiribe 2019. Also, our report is not consistent with similar studies by Iwara et al. 2014 in Calabar where they recorded Asteraceae and Poaceae as the most dominant family of the herbs studied. This could be due to less human activities within this location.

On the other hand, the percentage of grass cover is less than (<2.07%).Their low distribution might have resulted from an adaptation to dry and shady places (Iwara et al. 2014).each. The grass, Rottboellia cochinchinensis had the highest percentage occurrence of (2.07).The high percentage might have resulted from the presence of seeds that could easily be dispersed together with its rapid regeneration as well as the ability to survive well in varying soil types.

Conclusion

This study revealed that Rhizha mountain forest has high species of (Woody plants, herbs and grasses) diversity. Families noted with dominant species in the study area included: Woody species (Rubiaceae and Asteraceae)herbs. However, species richness for some woody and herbaceous species such as:Zanha africana , Lippia javanica, Adiantum philippense, Desmodium grahamii and Bidens biternata were very poor perhaps this could be as a result of an adaptation to dry and shady places .Nevertheless, the high abundance of woody plants especially the Rubiaceae family could be as a result of habitat adaptation and favourable environmental conditions. Effective conservation and sustainable management of the forest would make it possible for the said forest to continue providing goods and services necessary for communities around the Rhizha mountain forest.

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