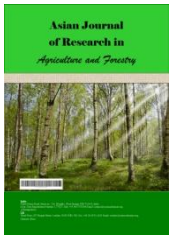

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Tree Species Composition, Richness and Diversity in the Northern Guinea-Savanna Taraba State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study investigated tree species composition, diversity and abundance in the Guinea savanna ecosystem, Taraba State, Nigeria. Three transects with a distance of 500 m apart were used for the study. Four sample plots of 25 m x 25 m size were laid in alternate positions along each transect at 250 m intervals. Identification of trees/shrubs was carried out in the forest reserves. Biodiversity indices such as; Shannon-Wiener diversity index, Species evenness, Simpson's diversity index, Margalef's richness index and Menhinick's diversity index, were estimated at the end of the study. The result of floristic diversity assessment showed that the two forest reserves were able to conserve trees/shrubs species diversity. This was reflected by the value obtained for diversity indices for the two land use types: Shannon- Weinner (3.29, 3.08), species evenness (0.47, 0.49), Simpson (0.95, 0.93), Margalef (6.83, 6.49), Minhinck's index (2.09, 1.79) for Sonkpa and Jabwanje forest reserves respectively. The density of fruit trees/shrubs encountered in the two forest reserves were (279, 414) which accounted for (47% and 56%) of the total woody population in Sonkpa and Jabwanje forest reserves respectively. Among the prominent fruit trees/shrubs

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encountered were *Nauclea latifolia, Gardenia aqualla, Annona senegalensis, Prosopis africana, Vitellaria paradoxa, Vitex doniana, Strychnos innocua.* However, the absence of *Irvingia gabonensis* and lower density of *Afzelia africana* was an indication that some important species are already going to extinction while others are endangered. Hence, the State government should, intensify the management of savanna forest by controlling the intensity of tree harvesting, stop illegal felling and encourage enrichment planting. Genetic improvement through germplasm collection and propagation studies should be carried out on the under exploited edible fruit species for genetically improved cultivars production.

Keywords: Abundance; ecosystem; biodiversity; endangered; germplasm; diversity.

1. INTRODUCTION

Africa has the largest savanna occupying about 50% of the continent or about 15.1 million km2 [1]. Savannas biome characterized with low tree species diversity and high diversity of herbaceous plants because of stringent ecological requirements. The physiognomy of the biome is described as a combination or discontinuous woody perennials and a continuous grassland matrix [2]. Tropical forests and savannahs account for more than 60% of terrestrial productivity and plays important roles in the welfare and economy of man [3,4]. However, West African savanna ecosystems are undergoing severe changes in their vegetation composition due to the impact of human land use and changes in climatic conditions [5]. The most dramatic changes in the recent times are ever increasing human population and consequently an increase in land use intensity often related to extension of agricultural lands, increased livestock density, seasonal fire and shortening of fallow periods [6]. These changes influence the structure, composition, biodiversity of all plants life forms and sustainable land use [7,8]. However, plants of the savanna biome have diverse mechanisms of adaptation to drought and fire. Some of these include drought evasion as annuals, dormancy in the dry season, small sizes, slow growth and extensive root systems. Most trees also have deep roots, thick fire-resistant barks while those in African savannas often have spines to protect them from browsing herbivores [9,10].

There are 31 forest reserves in Taraba State, covering a total area of 115, 597ha of which 34.5% or 39,837 ha are forested as recorded by Forestry Management Evaluation and Coordination Unit [11]. This represent only two percent of the total land area of the State, hence fall short of the internationally proposed standard of 25 percent as recorded by the Nigerian Environmental Study/Action Team [12]. Most of these forest reserves have been de- reserved and hence will affect biodiversity functions of the State. Valuable tree species considered vulnerable and threatened or endangered were majorly fruit trees such as Irvingia *gabonensis, Parkia boglobosa, Vitellaria paradoxa* and *Prosopis africana* [11].

Savanna has both ecological and economical importance, they sustain a lot of plant and wildlife and play a crucial role in regulating the global climate by storing lots of carbon [13]. In recent time, there is upsurge of interest in conservation of African Savannah consequent to threatened and persistent fragmentation of savanna grassland. In addition, long-term data on vegetation changes are generally lacking for most savanna areas (Lykke, 1998) [14]. Hence there is a growing interest in quantifying habitat characteristics such as forest structure, floristic composition and species richness in Savanna ecozone [15]. Due to the recent increasing human-caused disturbances and landscape fragmentation, ecotones will become even more common and important to the dynamics of the ecosystems on either side of the transition, redefining boundaries and influencing their structure and function [16]. Species currently perceived as abundant might actually be endangered while those previously perceived as endangered might be nearing extinction [17,4]. Thus, insight into the woody vegetation component will provide a more reliable index on habitat status and would contribute to the management and conservation of trees. Therefore, this study aimed at assessing the composition and abundance of trees/shrubs species in Guinea savanna region of Taraba State, Nigeria.

2. METHODOLOGY

2.1 Study Area

The study was conducted in Sonkpa and Jabwanje forests in Wukari Local Government Area, Taraba State, Nigeria. Sonkpa forest

reserve lies between latitude 7°54ˈ- 7°56'N and longitude 9°49'E - 9°51ˈE (Fig.1). The area of the reserve is 1,890.69 ha and the topography of the area is slightly elevated plain which is almost featureless. The soil type of the forest varies from sandy loam to sand and the area is open savanna woodland [18]. Jabwanje forest reserve lies between latitude 7°50 ˈN - 7°51 ˈN and longitude 9°50' E - 9°51' E (Fig. 2).The reserve covers an area of 1,964 ha with plane topography and gradual slope southwards. The soil type varies from sandy loam to sandy soil and clearly marked by the presence of hard pan [11]. Both reserves experiences seasonal fire outbreak and repeated firewood and timber exploitation on regular basis. The reserves were already seriously degraded and some portion of the reserves were already converted to farmlands while a portion has been designated for plantation of exotic species such as *Gmelina arbborea, Tectona grandis, Eucalyptus camaldulensis* leaving a considerable portion under natural forest cover. The wet season in the study area is between April to October while the dry season is from November to March for both locations. Annual rainfall ranges from 1058 to 1300 mm, with annual temperature which varies from 23°c to 39.4° and relative humidity varies from 32-70% [19].

2.2 Data Collection

Data was collected using three systematic lines transect laid within each forest reserves (Fig. 3). Within each forest ecosystems, 0.75 hectare plot was divided into twelve (12) temporary sample plots where species inventory was conducted. Four (4) sample plots of 25 m x 25 m were placed along each line transects at regular intervals of 250m as described by White and Edward [20]. Identification of all the trees / shrubs in the reserves was carried out while the diversity and density of all identified indigenous trees/shrubs in the reserves were assessed. All encountered trees/shrubs were assigned to families and number of species in each family was obtained for tree species diversity classification. Total density of all identified edible fruit trees/shrubs encountered in the reserves were calculated and classified according to their life forms. Frequency of occurrence was obtained for species abundance and richness. This was repeated for the entire trees encountered in the entire sample plots for the study area. Biodiversity indices were used to obtain tree species richness and evenness within the forest reserves.

2.3 Data Analyses

Species relative density (RD) and relative frequency (RF) of each site were computed using equations 1 and 2. While diversity indices computed were, Shannon–Wiener diversity index, species evenness, Margalef's species richness, Simpson's species diversity and Menhinick's diversity indices (Equation 3, 4. 5, 6, 7).

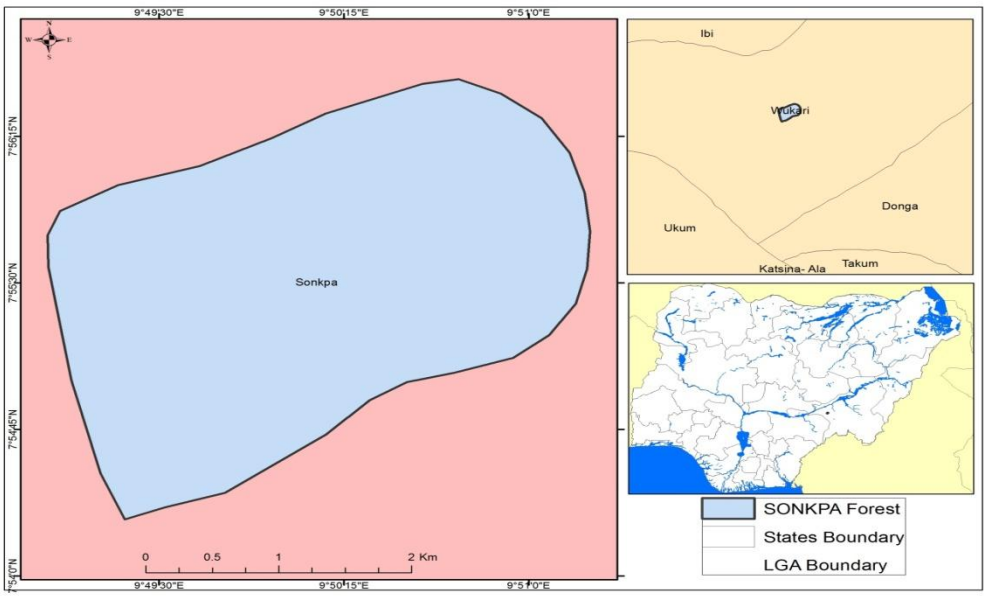

Fig. 1. Sonkpa forest reserve

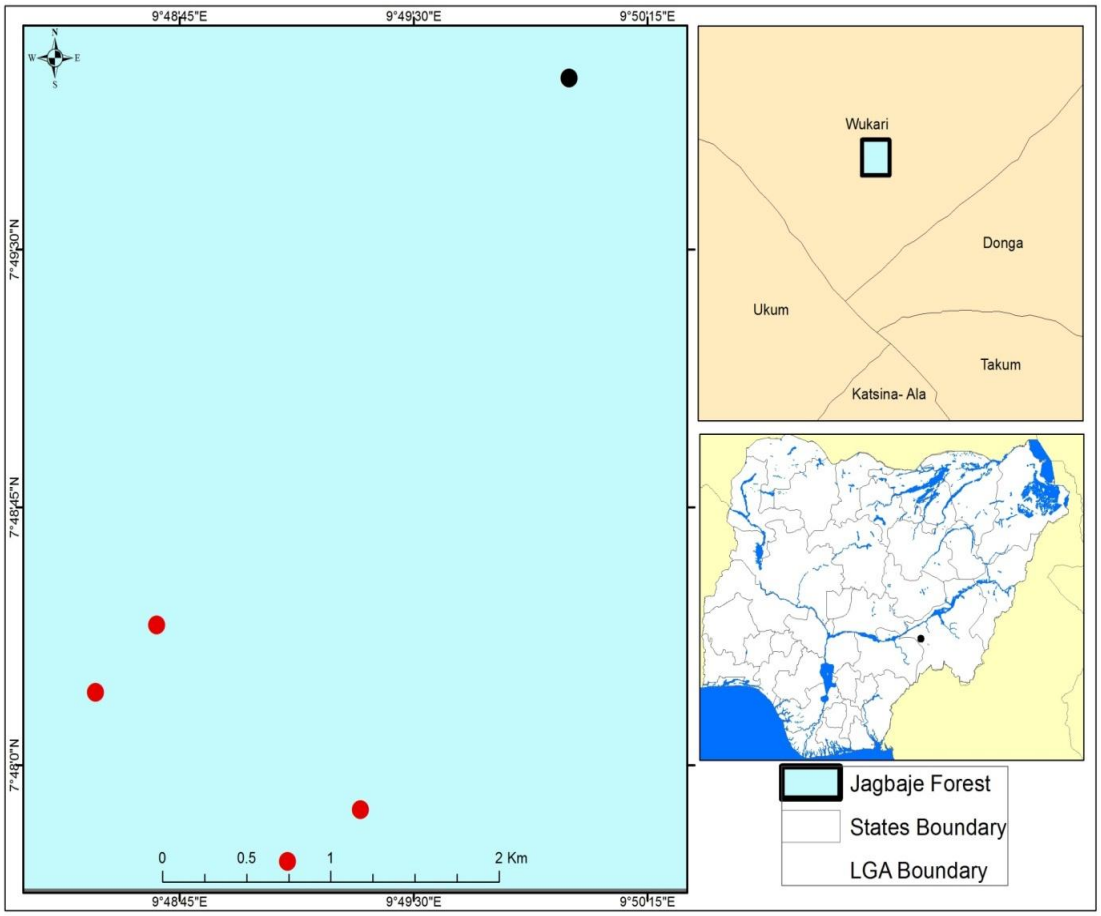

Fig. 2. Jabwanje forest reserve

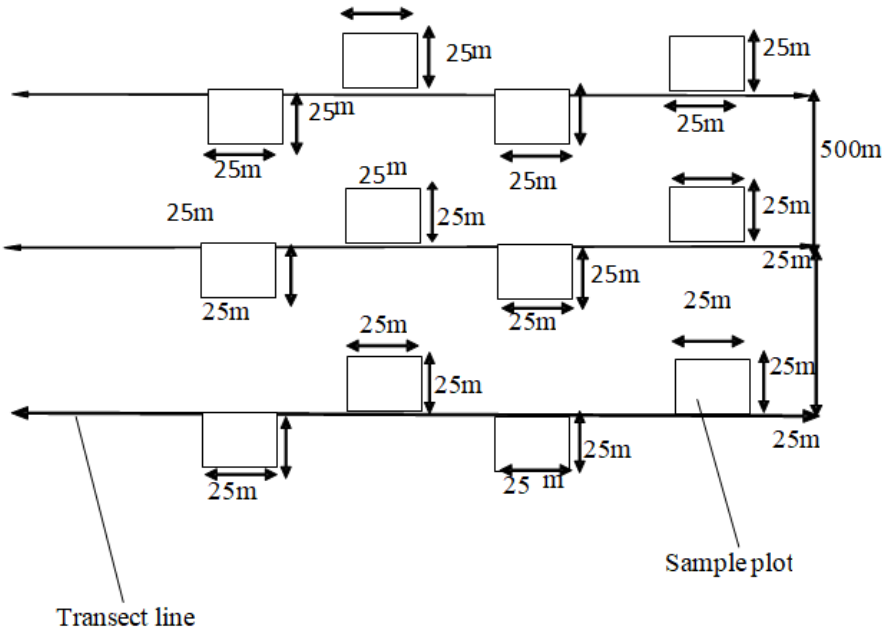

Fig. 3. Plot layout with systematic line transect sampling techniques

(a). Species Relative Density (RD): This refers to the number of individuals of a given species divided by the total number of individuals of all species.

$$RD = \left[\frac{ni}{N}\right] X\ 100 \quad (1)$$

Where:

RD = Relative density
n_i = Number of individual species i
N = Total number of individual in the entire population

(b). Relative Frequency (RF): Was obtained using the formula given by Oduwaiye *et al*. [21]:

$$RF = \frac{\sum Fi\ X\ 100}{Fn} \quad (2)$$

Where:

RF = Relative frequency
Fi = Number of plot where species was found
Fn = Total frequency of all species.

Species diversity index was calculated using Shannon–Wiener diversity index (equation 3), while Shannon's equitability index (E_H) (equation 4) was adopted for estimating species evenness.

Shannon-Wiener Diversity Index given by Price [22] was adopted.

$$H^1 = \sum_{=1}^{s} PiLnPi \quad (3)$$

Where:

H^1 =Shannon diversity index
S= total number of species in the community
Pi= proportion of a species to the total number of plant in the community
Ln= natural logarithm

Species Evenness Index in each forest community was determined using Shannon's Equitability (E_H):

$$E_H = \frac{H}{Hmax} = \frac{\sum_{i=1}^{S} piln(pi)}{\ln(S)} \quad (4)$$

Margalef's Species Richness index was calculated using the equation below:

$$D = \frac{\mathbf{S-1}}{\mathbf{\ln N}} \quad (5)$$

Where:

D = Margalef's index
S = Number of species
N = Number of individuals

Simpson's Species Diversity index

$$D = \frac{\sum ni(ni-1)}{N(N-1)} - 1 \quad (6)$$

Where:

D = Simpson's index
n_i = number of individual species i
N = total number of all tree species in the entire community

Menhinick's diversity index

$$D_{mn} = \frac{S}{\sqrt{N}} \quad (7)$$

Where N = the total number of individuals in the sample and S = the number of species recorded.

3. RESULTS

The result of this study showed the density, diversity and abundance of trees/shrubs in Guinea savanna ecosystem Taraba State as presented by two selected locations for this study. Four hundred and five (405) individual trees/shrubs belonging to 42 species in 21 families were encountered in Sonkpa forest reserve, while five hundred and fifty three (553) individual trees/shrubs belonging to 41 species in 31 families were encountered in Jabwanje forest reserve (Table 1 and 2) respectively. 53 species distributed among 28 families were encountered at both sites (Table 3). The species with the highest number of individual ha^{-1} was *Nauclea latifolia* with relative density of 14.07% in Sonkpa and 14.65% in Jabwanje forest reserve (Table 1 and 2). The family with the highest number of species in the ecosystem was leguminoseae with seven species in Sonkpa, four species in leguminoseae family were found in Jabwanje forest reserve. This was followed by family rubiaceae, euphorbiaceae and combretacea with four species each in Sonkpa forest while fabaceae had three species, family chrysobalanaceae, moraceae and anacardiceae had two species each respectively. The richest family in Jabwanje forest was moraceae with five species. Family combretaceae and leguminoceae had four species each while family chrysobalanaceae, euphorbiaceae, meliaceae, anacardiaceae had two species each. The predominant species in Sonkpa forest reserve were *Nauclea latifolia, Piliostigma thonningii, Annona senegalensis, Gardenia aqualla, Crossopteryx febrifuga, Stereospermum kunthianum, Daniella oliveri, Lophira lanceolata,*

Bridelia scleroderma, Perinari excelsa, Terminalia glaucescens which accounted for 63.21% of the total woody plant population in the forest reserve, while the predominant species in Jabwanje forest reserve were *Nauclea latifolia, Lophira lanceolata, Annona senegalensis, Raphia sudanica, Uapaca togoensis, Daniella oliveri, Pseudocedrela kotschyi, Bridelia ferruginea, Stereospermun kunthianum, Vitex doniana, Piliostigma thonningii, Combretum glutinosum, Vitellaria paradoxa*, these accounted for 75.41% of the total woody plant population.

Table 1. Density and diversity of Trees and shrubs in the 0.75 ha of Sonkpa forest reserve

S/N	Species	Family	Density (Ha^{-1})	R.D	Pi*Ln(Pi)
1	*Nauclea latifolia*	Rubiaceae	76	14.07	-0.28
2	*Gardenia aqualla*	Rubiaceae	31	5.68	0.16
3	*Parinari excelsa*	Chrysobalanaceae	20	3.70	-0.12
4	*Parkia biglobosa*	Leguminosae	13	2.47	-0.09
5	*Vitex doniana*	Euphorbiaceae	13	2.47	-0.09
6	*Terminalia macroptera*	Combretaceae	5	0.99	-0.05
7	*Bridelia scleroderma*	Euphorbiaceae	20	3.70	-0.12
8	*Ficus sur*	Moraceae	9	1.73	-0.07
9	*Strychnos innocua*	Loganiaceae	9	1.73	-0.07
10	*Ficus sycomorus*	Moraceae	3	0.49	-0.03
11	*Vitellaria paradoxa*	Sapotaceae	7	1.23	-0.05
12	*Daniella oliveri*	Leguminosae	21	3.95	-0.13
13	*Annona senegalensis*	Annonaceae	37	6.91	-0.18
14	*Piliostigma thonningii*	Leguminosae	52	9.63	-0.23
15	*Acacia seyal*	Leguminosae	11	1.98	-0.08
16	*Entada africana*	Leguminosae	5	0.99	-0.05
17	*Phoenix reclinata*	Arecaceae	4	0.74	-0.04
18	*Syzygium guineense*	Myrtaceae	7	1.23	-0.05
19	*Mitragyna inermis*	Rubiaceae	12	2.22	-0.08
20	*Ziziphus abyssinica*	Rhamnaceae	7	1.23	-0.05
21	*Crossopteryx febrifuga*	Rubiaceae	29	5.43	-0.16
22	*Brachystegia spiciformis*	Leguminosae	4	0.74	-0.04
23	*Pseudocedrela kochi*	Meliaceae	12	2.22	-0.08
24	*Prosopis africana*	Leguminosae	4	0.74	-0.04
25	*Isoberlinia doka*	Leguminosae	5	0.99	-0.05
26	*Anogeissus leiocarpus*	Combretaceae	3	0.49	-0.03
27	*Maytenus senegalensis*	Celastraceae	13	2.47	-0.09
28	*Borassus aethiopum*	Arececeae	4	0.74	-0.04
29	*Acacia sieberiana*	Leguminosae	1	0.25	-0.01
30	*Lannea acida*	Anacardiaceae	4	0.74	-0.04
31	*Lophira lanceolata*	Ochnaceae	19	3.46	-0.12
32	*Terminalia glaucescens*	Combretaceae	13	2.47	-0.09
33	*Newbouldia laevis*	Chrysobalanaceae	8	1.48	-0.06
34	*Combretum glutinosum*	Combretaceae	1	0.25	-0.01
35	*Lannea shcimperi*	Anacardiaceae	3	0.49	-0.03
36	*Stereospermum kunthianum*	Bignoniaceae	23	4.20	-0.13
37	*cussonia barteri*	Araliaceae	3	0.49	-0.03
38	*Burkea africana*	Caesalpinaceae	5	0.99	-0.05
39	*Hymenocardia acida*	Euphorbiaceae	7	1.23	-0.05
40	*Boswellia delzielii*	Burseraceae	4	0.74	-0.04
41	*Detarium microcarpum*	Leguminosae	9	1.73	-0.07
42	*Bridelia ferruginea*	Euphorbiaceae	3	0.49	-0.03
			600	H^1	3.29

Table 2. Density and Diversity of Trees and Shrubs in 0.75 ha of Jabwanje Forest Reserve

S/NO	Species	Family	Density(Ha^{-1})	R.D	Pi*ln(Pi)
1	*Nauclea latifolia*	Rubiaceae	108	14.65	-0.28
2	*Gardenia aqualla*	Rubiaceae	11	1.45	-0.06
3	*Perinari excelsa*	Chrysobalanaceae	16	2.17	-0.08
4	*Parkia biglobosa*	Leguminosae	8	1.085	-0.05
5	*Vitex doniana*	Verbenaceae	21	2.893	-0.10
6	*Terminalia macroptera*	Combretaceae	9	2.893	-0.10
7	*Bridelia Scleroderma*	Euphorbiaceae	15	1.989	-0.08
8	*Ficus sur*	Moraceae	15	1.989	-0.08
9	*Strychnos innocua*	Loganiaceae	4	0.542	-0.03
10	*Ficus sycomorus*	Moraceae	4	1.989	-0.08
11	*Vitellaria paradoxa*	Sapotaceae	17	2.351	-0.09
12	*Daniella oliveri*	Leguminosae	31	4.159	-0.13
13	*Annona senegalensis*	Annonaceae	117	15.91	-0.29
14	*Piliostigma thonningii*	Leguminosae	20	2.712	0.10
15	*Phoenix reclinata*	Arecaceae	3	0.362	-0.02
16	*Syzygium guineense*	Myrtaceae	12	1.627	-0.07
17	*Ziziphus abyssinica*	Rhamnaceae	1	0.181	-0.01
18	*Crossopteryx febrifuga*	Rubiaceae	4	0.542	-0.03
19	*Pseudocedrela kotschyi*	Meliaceae	32	4.34	-0.14
20	*Prosopis africana*	Leguminosae	3	0.362	-0.02
21	*Lophira lanceolata*	Ochnaceae	59	7.957	-0.2
22	*Terminalia glaucescens*	Combretaceae	5	0.723	-0.04
23	*Parinari excelsa*	Chrysobalanaceae	7	0.904	-0.04
24	*Combretum glutinosum*	Combretaceae	17	2.351	-0.09
25	*Lannea shchimperi*	Anacardiaceae	4	0.542	-0.03
26	*Stereospermum kunthianum*	Bignoniaceae	25	3.436	-0.12
27	*Cussonia barteri*	Araliaceae	11	1.447	-0.06
28	*Burkea africana*	Caesalpinaceae	13	1.808	-0.07
29	*Detarium microcarpum*	Leguminosae	15	1.989	-0.08
30	*Bridelia ferruginea*	Euphorbiaceae	33	4.521	-0.14
31	*Raphia sudanica*	Palmea	37	5.063	-0.15
32	*Khaya senegalensis*	Meliacaea	3	0.362	-0.02
33	*Monotes kerstingii*	Dipterocarpaceae	1	0.181	-0.01
34	*Ximenia americana*	Olacaceae	4	0.542	-0.03
35	*Ficus engous*	Moraceae	3	0.362	-0.02
36	*Isobelina doka*	Moraceae	4	0.542	-0.03
37	*Uapaca togoensis*	Phyllanthaceae	37	5.063	-0.15
38	*Ficus capensis*	Moraceae	3	0.362	-0.02
39	*Vitex simplicifolia*	Verbenaceae	1	0.181	-0.01
40	*Bombax costatum*	Bombacaceae	1	0.181	0.01
41	*Combretum fragrans*	Combretaceae	3	0.362	-0.02
			737	H’	3.08

The result of the Shannon-Weinner diversity index (H’) for the Sonkpa and Jabwanje forest were 3.29, 3.08 while Species evenness were 0.47,0.49. However, Simpson’s diversity index, Mangalef index and Minhinck’s index values for Sonkpa and Jabwanje forest ecosystem were (0.95, 0.93), (6.83, 6.49) and (2.08, 1.79) respectively (Table 3).

The indigenous fruit trees and shrubs encountered during the field survey in the two forest reserve are presented in Table 4. A total of 23edible trees/shrubs species in which were Nineteen (19) species belonging to 13 families were encountered in Sonkpa forest. Ten (10) individual were categorized as trees while nine (9) of the identified species were shrubs. The predominant fruit trees/shrubs in the reserve includes; *Nauclea latifolia, Gardenia aqualla, Perinari excelsa, Annona senegalensis, Prosopis africana, Vitellaria paradoxa, Ficus sur, Strychnos innocua, Vitex doniana.* The density of

fruit trees / shrubs in the reserve was 279 which accounted for 47% of the total woody tree population in the reserve. Likewise in Jabwanje forest reserve, sixteen (16) edible fruit species belonging to 13 families were encountered. The life form of eight (8) individual are trees while nine (9) species were categorized as shrubs. The predominant fruit trees/shrub in the reserve includes; *Annona senegalensis, Nauclea latifolia, Lophira lanceolata, Vitex doniana, Vitellaria paradoxa, Perinari excelsa Detarium microcarpum, Parkia biglobosa.* The density of fruit trees / shrubs in the reserve was 414 which accounted for 56% of the total woody species population in the reserve.

4. DISCUSSION

The species diversity indices for the two forest reserves were high and very closely related as shown in Table 1 and 2. The species diversity in Sonkpa was relatively higher than that of Jabwanje forest but the values are still within the ranged categorized as highly diverse ecosystem. Research have shown that value less than 1 is characterized as heavily disturbed ecosystem, while value above 3 signifies stable environmental conditions [23-27]. This showed that tree species diversity was reasonably conserved at the sites and the land use sustains relatively a stable environmental condition. From the E_H values obtained for the two forest, we conclude that tree species are most evenly distributed in Sonkpa forest as compared to Jabwanje forest. This is an indication that the level of forest degradation was higher in Jabwanje forest, hence a need for adequate measure to reduce the level of forest exploitation. This is in support of the findings of Onyekwelu *et al*. [26] that species diversity and distribution could be a reflection of forest degradation. The relative density of trees and shrubs species associated with flora diversity in the two forest reserves studied reflects their availability in the area. Moreover, the tree density (737) recorded in Jabwanje forest reserves was close to 752.08 trees ha^{-1} reported by Oke and Jamala [7] in a derived savanna region, Adamawa State, Nigeria. However, the density of trees/shrubs ha^{-1} recorded in this study was lower than 1,967 trees/shrubs ha^{-1} recorded in Sudan savanna forest in Burkina Faso by Nikiema [28], which means that savanna ecozone could be more diverse than what was obtained in our study site, hence sustainable forest management could increase the floral biodiversity of the savanna ecosystem. The higher trees/shrubs density recorded in this study compare to 513 trees ha^{-1} and 508 trees ha^{-1} obtained for Oluwa and Elephant forest in Onyekwelu [26] could be as a result of the diameter range sampled and the nature of savanna vegetation which are mostly characterized by small trees and shrubs, whereas the research of [26] was conducted in the tropical rainforest in Nigeria, and her trees were characterized by tall trees with different diversity of trees in the location. More so, Attua and Pabi [29] reported a flora diversity of 43 to 52 species in savanna ecotone in Ghana and this fall within the same range obtained in this study while it is below the value obtained 55 and 69 species by Adekunle [9] in rainforest ecosystem of South-West, Nigeria and Agbelade *et al*. [30] who conducted their research in Federal capital territory (FCT) Abuja, Nigeria. These further elucidate the assertion of Zakaria (2016) that tropical rain forests are the most diverse among the world ecosystem in vegetation structure and composition. It was also deduced from this study that 23 edible fruit trees and shrub in 17 families were present in the study area. This is an indication that the guinea savanna region of Taraba State offers diversity of indigenous fruit trees/ shrubs plant resources suitable for agroforestry system and beneficial for improved livelihood. The composition of tree species in the study area was typical of West African Guinea savanna species as reported by Ikyagba *et al*. [4]. A total of 53 trees/shrubs species were identified in the reserves and 23 of these species were known to produce edible fruits and nuts. The most abundant fruit trees/shrubs in the reserves are *Nauclea latifolia, Parinari excelsa, Annona senegalensis, Lophira lanceolata, Detarium micrcarpum, Parkia biglobosa, Vitex doniana.* However, some important species (*Irvingia garbonensis, Afzelia africana)* earlier reported by FORMECU [11] to be endangered in the study area were absent during the course of the study, this is an indication that over exploitation of these important species might be responsible for to their extinction. Findings from this research have shown that the major drivers of the degradation in both reserves were unregulated timber extraction and logging, fuel wood collection, livestock grazing uncontrolled fire and encroachment of the reserve area by farmers. However, since tree species diversity were reasonably conserved at the sites, and there was a vast array of edible indigenous fruit trees on the two forest landscape. Hence, there is need for concerted effort on the conservation of the genetic resources and possible domestication of the endangered species in plantation and agroforestry landscape.

Table 3. Summary of tree species diversity and distribution in different land use in the study area

Site	No of species	No of families	H^1	H/Hmax	DS =∑ni(ni-1)/N(N-1)	d=(S-)/LnN	(D=S/√N)
Sonkpa forest	42	24	3.29	0.47	0.95	6.83	2.09
Jabwanje forest	41	30	3.08	0.49	0.93	6.49	1.79

H'=Shannon-Weinner diversity index, H/Hmax=Species evenness, Ds=Simpson's index, S-D/lnM= Margalef's index and S/√M =Minhinck's index

Table 4. Density of Indigenous edible fruit trees/shrubs and their life forms in the reserves

	Species	Family	Life form	Sonkpa forest Density ha^{-1}	Jabwanje forest Density ha^{-1}
1	*Nauclea latifolia*	Rubiaceae	Shrub	76	108
2	*Gardenia aqualla*	Rubiacea	Shrub	31	11
3	*Parinari excelsa*	Chrysobalanaceae	Tree	20	16
4	*Parkia biglobosa*	Leguminosae	Tree	13	8
5	*Vitex doniana*	Verbenacea	Tree	13	21
6	*Ficus sur*	Moracea	Tree	9	15
7	*Strychnos innocua*	Loganiacea	Shrub	9	4
8	*Ficus sycomorus*	Moracea	Tree	3	4
9	*Vitellaria paradoxa*	Sapotaceae	Tree	7	17
10	*Annona senegalensis*	Annonaceae	Shrub	37	117
11	*Phoenix reclinata*	Arecaceae	Shrub	4	3
12	*Syzygium guineense*	Myrtaceae	Shrub	7	12
13	*Ziziphus abyssinica*	Rhamnaceae	Shrub	7	1
14	*Prosopis africana*	Leguminosae	Tree	4	3
15	*Borassus aethiopum*	Arececeae	Tree	4	-
16	*Lannea acida*	Anacardiaceae	Tree	4	-
17	*Lophira lanceolata*	Ochnaceae	Tree	19	59
18	*Detarium microcarpum*	Leguminosae	Shrub	9	15
19	*Lennea shamperi*	Anacardiaceae	Shrub	3	-
20	*Sterculia setigera*	Sterculiaceae	Tree	-	-
21	*Afzelia africana*	Leguminosae	Tree	-	-
22	*Oncoba spinosa*	Flacourtiaceae	Shrub	-	-
23	*Vitex simplicifolia*	Labiatae	Shrub	-	-
				279	414

5. CONCLUSION

The result of this study showed the level of tree species diversity, richness and distribution in Guinea Savanna region as represented by the two locations in the study area. Species diversity indices showed that species diversity was reasonably conserved at the sites and land use sustain relatively a stable environmental condition. However the absent of some endangered species previously reported by [11] is an indication of unsustainable and over exploitation of the forest resources. The high percentage of edible trees/shrubs in these forest reserves is also an indication that the northern guinea savanna ecosystem, Nigeria is has a vast array of under exploited indigenous fruits trees/shrubs which can be beneficial to the rural dwellers if domesticated and exploited. Forest policy makers should, therefore, intensify the management of northern guinea savanna, so as to preserve the endangered species and ensure sustainability. Current research effort should be geared towards both in-situ and ex-situ conservation as well as domestication of indigenous wild fruit species for incorporation into farmlands, this will enhanced diversification of fruit species on divers landscape and reduce pressure on the wild population.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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