Diversity and Distribution of Ferns Species in Shere Hills of Jos North L.G.A Plateau State, Nigeria

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---ABSTRACT--
Diversity distribution of ferns species in Shere-hills was carried out. Twenty (20) contiguous quadrats of 20m x 20m were established Similarly, three 2m x 2m subplots were established within each 20m x 20m quadrats in the study site in consideration of the occurrence and distribution of the plants that were sampled. Species of ferns that did not occur in any of the plots established is considered as incidental species co-ordinates of each plots were recorded using G.P.S (Geographical Positioning System). The percentage composition was computed in Microsoft Excel 2016 and calculated using species cumulative richness formulas. A total number of nine (9) ferns species were identified and one (1) unidentified, making a total of ten (10) species, belonging to four (4) families). Out of the species listed, seven (7) incidental species were not recorded in the sample plots while four (4) species were found in the study area. Species cumulative curve revealed there was not much species diversity as species richness did not increase with increase in plot number. The percentage composition of fern species revealed, Anemia sessilis and Nephrolepis undulata had the highest percentage composition of 45% and 37% respectively.
KEYWORDS: Pteridopytes, habitat, diversity, extinction, adiantaceae, sporophytic.

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I. INTRODUCTION

Fern is a class of nonflowering vascular plants that possess true roots, stems and complex leaves and that reproduce by spores. the number of know extant fern species is about 10,500, but estimates have ranged as high as 15,000, the number varying because certain groups are as yet poorly studied and because new species are still being found in unexplored tropical areas. the ferns constitute an ancient division of vascular plants, some of them as old as the carboniferous period (beginning about 358.9 million years ago) and perhaps older types of life cycle, dependent upon spores for dispersal, long preceded the seed-plant life cycle, dependent upon, monilophytes, has gained currency in modern botanical literature (George 2020).

A fern is any one of a group of about 20,000, species of plants classified in the phylum or division pteridophyta, also known as filicophyta. The group is also referred to as polypodiophyta, or polypodiosida when treated as a subdivision of tracheophyta (vascular plants). The term pteridophytes has traditionally been used to describe all seedless vascular plants so is synonymous with "ferns and fernallies". This can be confusing given that the fern phylum pteridophyta is also sometimes referred to as pteridophytes (George 2020).

A fern is a vascular plant that differs from the more primitive lycophytes in having true leaves (megaphylls), and from the more advanced seed plants (gymnosperms and angiosperms) in lacking seeds. Like all vascular plants, it has a life cycle, often referred to as alternation of generations, characterized by a diploid sporophytic and a haploid gametophytic phase. Unlike the gymnosperms and angiosperms, in ferns the gametophyte is free –living organism. (S.W.S.2007). ferns first appear in the fossil record in the early – carboniferous period. By the Triassic, the first evidence of ferns cretaceous, when many modern families of ferns first appeared.

Ferns have traditionally been grouped in the class filices, but modern classifications assign them their own division in the plant kingdom, called pteridophyta (George 2020).

Traditionally, three discrete groups of plants have been considered fern: the adders – tongues, moonworts, and grape-ferns (opioglossophyta), the Marattiaceae, and the leptosporagiate ferns. The Marattiaceae are a primitive group of tropical ferns with a large, fleshy rhizome, and are now thought to be a sibling taxon to the main group of ferns, the leptosporangiate: fern several other groups of plants were considered "fern allies". The clubmosses, spikemosses, and quillworts in the lycopodiophyta, the whisk ferns in psilotaceae, and the horsetails in the Equisetaceae. More recent genetic studies have shown that the

lycopodiophyta are only distantly related to any other vascular plant, having radiated evolutionarily at the base of the vascular plant clade, while both the whisk fern and horsetails are as much true ferns as are the ophioglossoids and marattiaceae. In fact, the whisk ferns and ophioglossoids are demonstrably a clade, and other horsetails and marattiaceae are arguably another clade (George 2020).
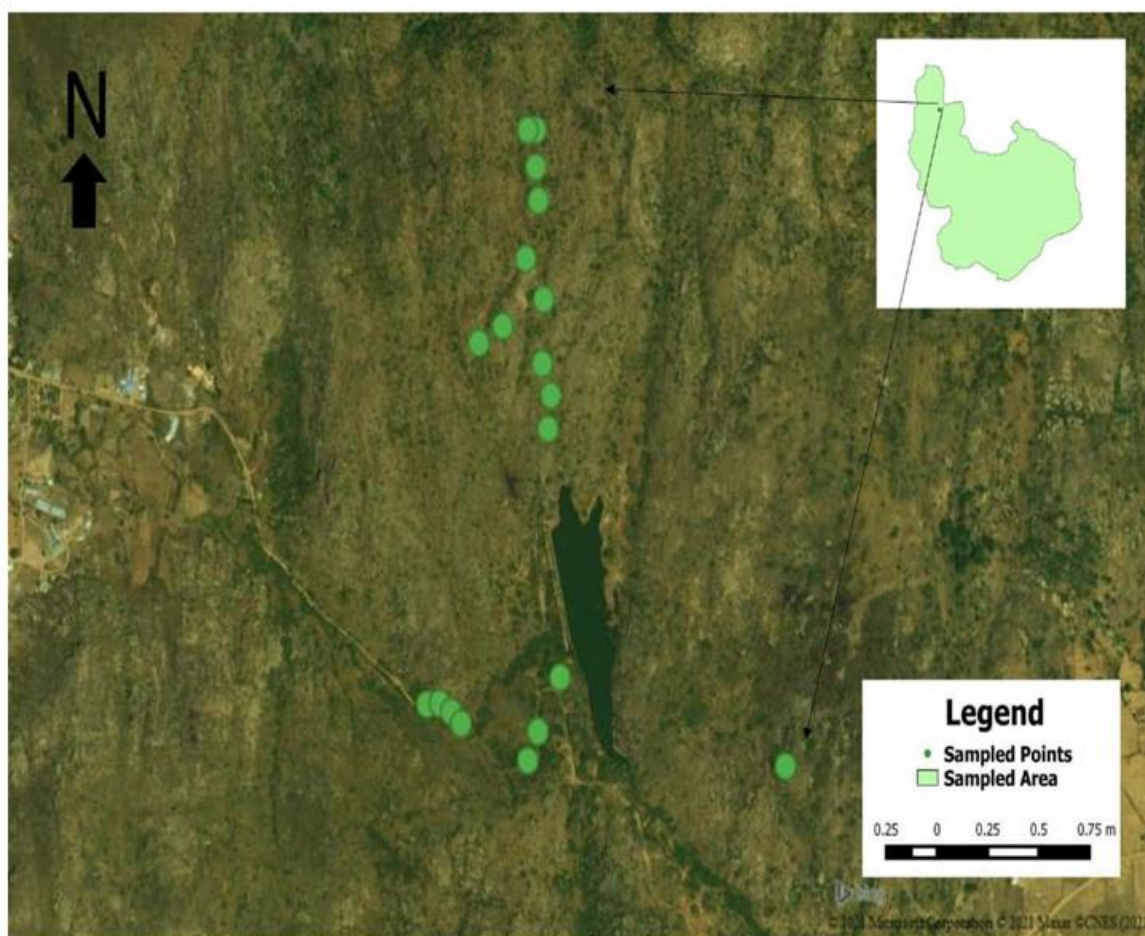
II. MATERIALS AND METHOD

Figure 1: Map of Plateau State, showing the sample points

Study Area

The study was carried out in Shere Hills, Jos Plateau State Nigeria. Shere Hills are a range of undulating Hills and rocks formations on the Jos Plateau (plateaustategov.org 2010) situated about 10km east of the Jos metropolis, the capital of Plateau State in Middle Belt region of Nigeria. The Shere Hills have a numerous high peaks with the highest peak reaching a height of about 1, 829 metres above sea level, the Shere Hills are the highest point of Jos Plateau and they form the third highest point in Nigeria after Chappal Waddi on the Mambilla Plateau averaging about 2,419 metres above sea level and mount Dimlang (Vogel Peak) on the Shebshi Mountains reaching a height of about 2,042 metres above sea level. Dimlang Peak (Mountain Peak, Nigeria). The highest point on the Shere Hills is at Gog and Maggog formation, where the scenic heap of massive boulders attains a maximum height of about 1, 829 meters (Dimlang Peak 2010).

Sampling Procedure

Twenty (20) contiguous quadrats of 20m x 20m were established similarly three 2m x 2m subplots were established inside each 20m x 20m quadrats in the study site in consideration of the occurrence and distribution of the plants to be sampled. Species of ferns that did not occur in any of the plots established is considered as incidental species Co-ordinates of each plots were recorded using G.P.S (Geographical positioning system).

In all the quadrats, the ferns species within reach were recorded. After the samplings, specimens were subsequently identified with the help of taxonomic flora (Piggott 1988) voucher specimens were deposited in Forest Herbarium Jos (FHJ)

Method of Data Collection
Data was collected with the aid of field note book and inventory sheets.
Source of Data
Data required were sourced through primary and secondary sources. The primary sources were through inventory of ferns species within the sampled area. The secondary source was through the use of relevant literature and journals on the subject matter.
Statistical Tools and Data Analyses
Percentage composition was computed in Microsoft-excel 2016 and calculated using the following formulas
Species cumulative richness $= \sum (n_{P1}, n_{P2}, n_{P3} \ldots n_{P20})$
Where n_p is the number of species encountered in each plot

$$\% \text{ composition in each plot} = \Sigma \frac{\% \text{ species in each three replicate}}{3}$$

$$\text{Overall } \% \text{ species composition} = \Sigma \frac{\% \text{ composition of each species across plot}}{\text{Number of plot species occur}}$$

III. RESULTS

A total of 20 plots were established across the study area. A Total number of 9 fern species identified with one unidentified (table 1). Four species were found to occur in the study area and at the course of the field work six incidental species where found which were not recorded in the plot established.

Table 1: Species identified in the study area

Species	Family	Incidental species	Family
Adiantum lunulatum Burm. F.	Adiantaceae	*Pellaea dura(Willd) Hook*	Pteridaceae
Aleuritopteris farinosa(Forssk) Fee	Pteridaceae	*Dryopteris spp.Adans*	Dryopteridaceae
Anemia sessilis(Jeanp) C. Chr.	Anemiaceae	*Dryopteris kirkii (Hook) Alston*	Pteridaceae
Nephrolepis undulata(Afzel.ex.Sw.) J. Sm.	Nephrolepidaceae	*Onychium spp. Kaulf*	Pteridaceae
		Adiantum patens Willd	Adiantaceae
		Unknown	

Species cumulative curve reveal there was no much species diversity as the species richness did not increase with increase in plot number (fig 2)
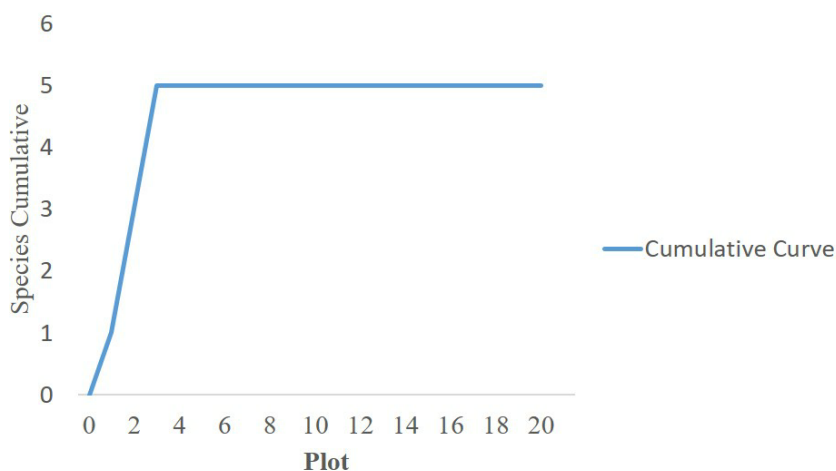

Figure 2: Cumulative curve of species richness across the plot sampled

Table 2: The overall Percentage (%) composition vary among species as identified across plot (fig 2)

Fern species	% Composition
Adiantum lunulatum Burm. F.	*10.33*
Aleuritopteris farinose(Forssk) Fee	*1*
Anemia sessils(Jeanp) C. Chr.	*46.33*
Nephrolepis undulate(Afzel.ex.Sw) J. Sm.	*36.76*
Incidental species	*5.58*
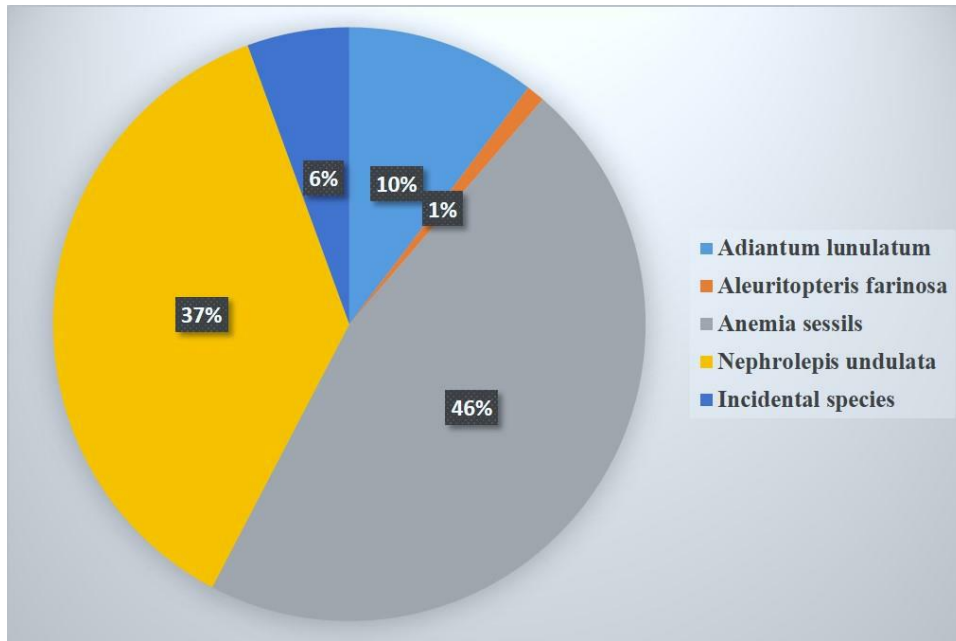
Figure 2: Percentage composition of fern species in the study area.
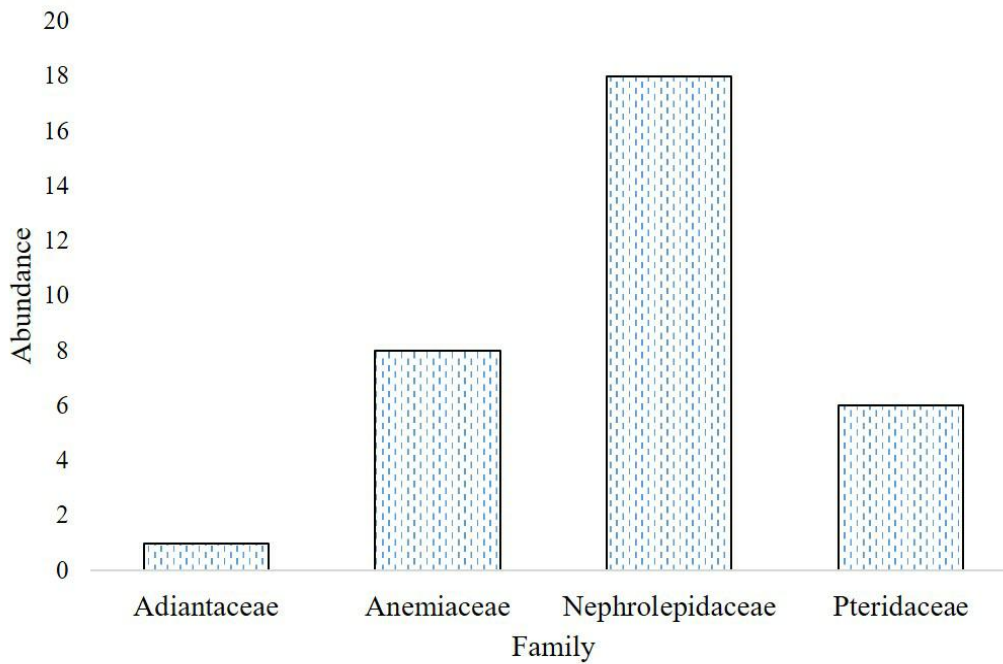
The most abundant family

V. DISCUSSION

A total number of nine (9) ferns species identified and one (1) unidentified making a total of ten (10) species, belonging to four (4) families. Out from the species list, seven (7) incidental species were not recorded in the sampled plot while four (4) species were found to occur in the plot established: these, given the rise to the number of species found in the study. Species cumulative curve reveal there was not much species diversity as the species richness did not increase with increase in plot numbers. It is evident from this study that the study site has a few number of fern species. Similar studies were carried out in some university campuses in Nigeria, a tropical country have recorded far less number of ferns species (Akinsoji et al., 2016; 2018; Oloyede et al; 2014). More so, an inventory of ferns carried out in some natural and man-made forests in Johor and Singapore documented not more than eighteen (18) fern species in each forest (Yusuf et al; 2003). The less-distributed forest is richer in ferns than more-distributed forest and urbanized area. This is similar to Corebett, Bannister, Bell and Richards (2002) who observed lesser number of the species.

The percentage composition of fern species revealed (Fig. 2), Anemia sessils and Nephrolepis undulate had the highest percentage composition of 45% and 37%, while Adiantum lunulatum had 10.33 and the least is the incidental species with 5.58% respectively.

VI. CONCLUSION AND RECOMMENDATION

Conclusion

Shere-hills is extremely a disturbed ecosystem. It is obvious that rate of anthropogenic activities over the years has reduced the diversity and richness of ferns as a result a total number of six (6) genera were encounted belonging to four (4) families.

Recommendation

Effort should therefore be made in restricting anthropogenic activities in Shere-hills and therefore, Government should maintain a greener environment by conserving the natural tree species within the Shere-hills. These trees will not only serve as shade, but also serve as habitat for birds and epiphytic ferns.

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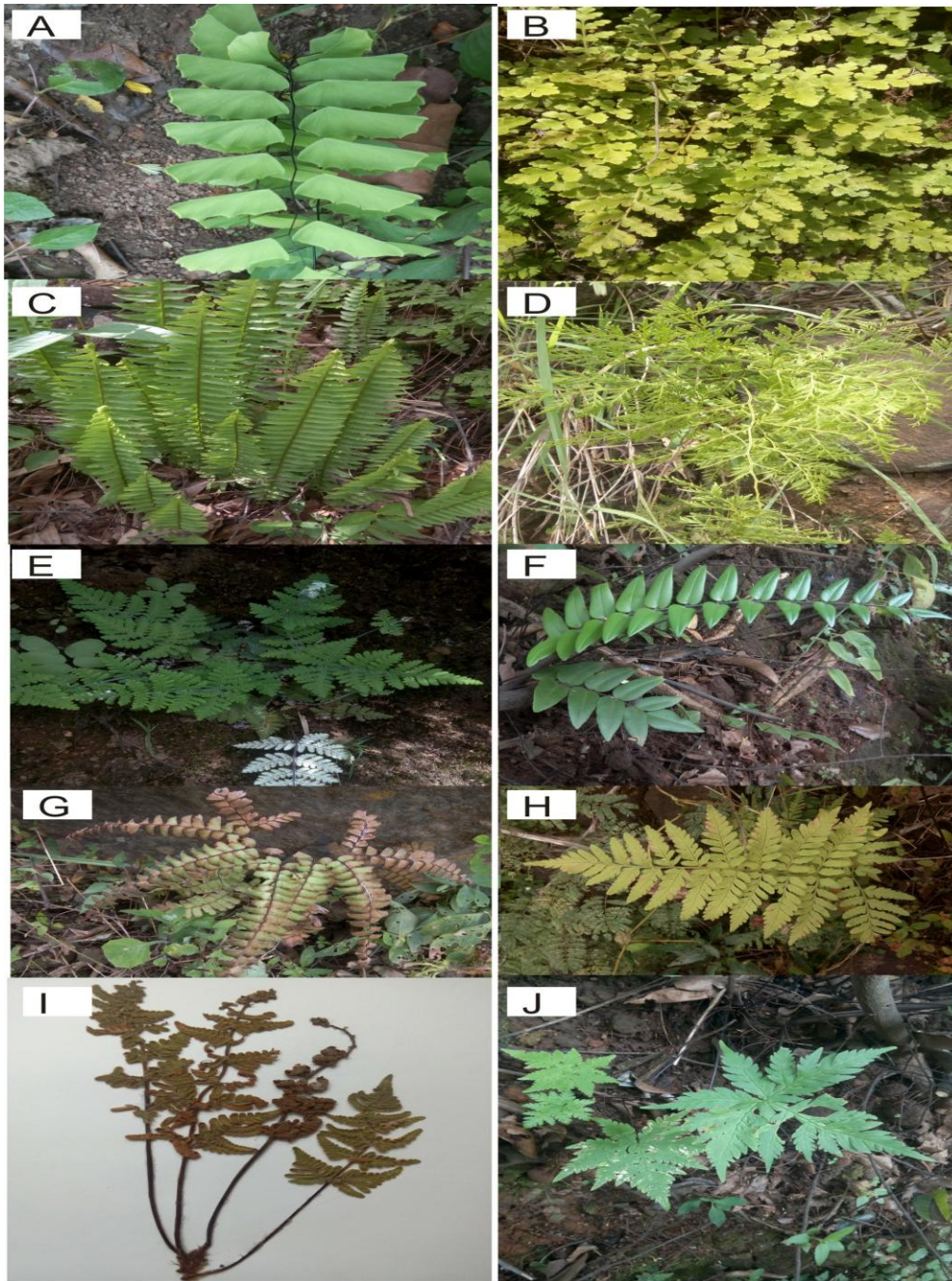
Gross morphology of Ferns:
A. *Adiantum lunulatum Burm. F.* **B.** *Anemia sessilis(Jeanp) C. Chr.* **C.** *Nephrolepis undulate(Afzel.ex.Sw.) J. Sm* **D.** *Onychium spp. Kaulf* **E.** *Aleuritopteris farinose(Forssk) Fee* **F.** *Pellaea dura(Willd) Hook* **G.** *Adiantum patens* **H.** *Dryopteris spp. Adans*
J. *Dryopteris kirkii(Hook) Alstonb* **I.** *Unknown specie*s