


CHECKLIST OF PTERIDOPHYTES IN RIVERS STATE UNIVERSITY, RIVERS STATE, NIGERIA

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ABSTRACT

*Pteridophytes are a group of primitive vascular plants; the adult phase is the sporophyte phase. It shows differentiation into adventitious roots, stems and leaves. Pteridophytes include Ferns, horsetails, and lycophytes (clubmosses, spikemosses, and quillworts). This study aimed to provide a checklist of Pteridophytes found in Rivers State University, Rivers State, Nigeria. Different species of Pteridophyte samples were sited and freshly collected around the metropolis of Rivers State University. They were taken to the Department of Plant Science and Biotechnology Laboratory in polythene bags with tags, and were identified and authenticated by Dr. M.G. Ajuru, a Plant Taxonomist of the Department. The checklist conducted showed that Ten (10) species of Pteridophytes were found distributed into eight (8) genera and five (5) families. The most abundant family was the Polypodiaceae (4), followed by Nephrolepiaceae (2), Pteridaceae (2), Tectariaceae (1) and Lycopodiaceae (1). The most frequent species recorded was *P. superbum* (22), followed by *M. mauritiana* (20), *P. scolopendria* (11), *N. biserrata* (10), *N. exaltata* (6), *P. calomelanos* (6), *A. orientalis* (4), *P. vittata* (4), *P. bifurcatum* (3), *L. clavatum*. In conclusion, most of the Pteridophytes found were in the Polypodiaceae family, followed by Pteridiaceae, Nephrolepiaceae, Tectariaceae. Lycopodiaceae families. They were majorly seen growing on trees including the club mosses, only a few species grew on rocks and the soil.*

Keywords: Checklist, Ferns, Pteridophytes, Rivers State, University

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INTRODUCTION

Pteridophytes are vascular plants that disperse spores. They do not produce flowers or seeds and are sometimes called Cryptogams, which means their way of reproduction is not exposed. Their life cycle involves alternation of generation, that is, free-living gametophyte alternates with sporophyte phases which are independent at maturity. The sporophyte body is well differentiated into true adventitious roots, stems and leaves. The stem may be underground or aerial. The leaves can either be microphylls or megaphylls [1]. Pteridophytes include Ferns, Horsetails, and Lycophytes such as Clubmosses, Spikemosses, and Quillworts. Pteridophytes, as vascular plants, produce spores and undergo alternation of generations (with separate gametophyte and sporophyte generations that exist as free-living plants) [2].

Worldwide, Pteridophytes are abundant in the tropics, and Nigeria is a clear example of such areas with diverse groups [3]. Few studies have been conducted to document the diversity, phenology, distribution and ecology of pteridophytes flora in Africa [4-9]. Fern species richness, growth and evolutionary processes are determined by climate change [10], soil conditions, anthropogenic activities [11]; (forest lands encroachment, industrialization, over-exploitation of natural resources, unplanned developmental activities, urbanization and fire) [12-14]. Conversely, anthropogenic disturbances such as fire increase the distribution of toxic weeds [15] and spore germination of *P. caudatum* [16].

Pteridophytes diversity evaluation is very limited in Nigeria, despite several ecological survey carried out by [17]. Previous works mostly reported baseline information on diversity, distribution and sporulation phenology and ethnobotanical uses of Pteridophytes around the South-West Zones of Nigeria [17,18]; with no data record on distribution or diversity of Pteridophytes around the South Zone (Rivers State) of Nigeria. An ethnobotanical study on some Pteridophytes of Southern Nigeria was carried out by [17] aimed at documenting the indigenous utilization of Pteridophytes by the people of Southern Nigeria. A total of 36 species belonging to 22 families were identified. Also, the results showed little or no documentation of ethnobotanical studies of Pteridophytes and as such, the study was carried out to breach the gap. A research carried out by [19], on Occurrence and distribution of Pteridophytes in parts of Lagos and Osun States, Nigeria, was aimed at documenting the Pteridophytic flora and habit in Lagos and Osun States. A total of 16 species of Ferns, belonging to 11 genera and 9 families were recorded. The variation of Ferns between the two states was attributed to anthropogenic and climatic conditions.

[20], worked on the systematic revision of *Pteris* L. in tropical Africa and the ecology of ferns and Lycophytes in lowland tropical rainforests and discovered that the occurrence of Ferns in different sites was a good indicator of ecological condition in the tropical vegetation. [21], carried out a research on Pteridophytes collected in Northern Nigeria and Northern Cameroon. It was a comparative study aimed at collecting, identifying and documenting the Ferns in these areas. [22], researched on medicinal Pteridophytes where they focused on and documented information on the ethnopharmacological, phytochemical and clinical features of the Pteridophytes.

[23], carried out a survey of ornamental ferns and their morphology and uses for environmental protection, improvement and management. Data generated from this study was well documented. Also, [24-26], evaluated the nutrient content of *Nephrolepis bisserata*, chemical composition of a tropical fern, *Ceratopteris cornuta* in Nigeria, and reproductive potentials of a tropical fern, *Cyclosorus afer* respectively, and information on these different ferns were well documented.

[27], research was on the survey of the use of ornamental plants for environmental management in Southwestern Nigeria and documented some common ferns that are highly used for ornamental purposes. [28], working together aimed at documenting information on the taxonomic diversity of ferns of two recreational forests in Kedah, Malaysia. It was a checklist of ferns of the forests in Kedah, Malaysia. [29], carried out a research on the comparative epidermal anatomical studies in six species of the genus *Nephrolepis* in Nigeria. Data generated from this study was employed in delineating these six species for taxonomic purposes

This research work is focused on the creation of checklist of Pteridophytes found in Rivers State University, Nkpolu, Port Harcourt, Rivers State. Hence, the first to evaluate the frequency distribution, diversity and habitat of Pteridophytes found in the South-South region of Nigeria.

MATERIALS AND METHOD

Study Area

The study area of this research is the Rivers State University of Science and Technology campus within Port Harcourt metropolis; Port Harcourt Local Government area in Rivers State, Nigeria. It lies on the South-South of the Niger Delta within Latitudes $4^{\circ} 31' - 4^{\circ} 40'N$ and Longitudes $70^{\circ} - 7^{\circ}10'E$ (Fig. 1). Different species of Pteridophyte samples were sited and freshly collected around the metropolis of Rivers State University. They were taken to the Department of Plant Science and Biotechnology Laboratory in polythene bags with tags, and were identified and authenticated by Dr. M.G. Ajuru, a Plant Taxonomist of the Department. The plant species used for the study were collected between the months of April-July, 2022. Data collection of samples was done in sub-sections of Rivers State University vicinity based on some criteria, which includes: Date of collection, Location, Botanical name, Family, Common name, Habitat, Growth form, Host Plants, Number of ferns on Host Plants and Accession number.

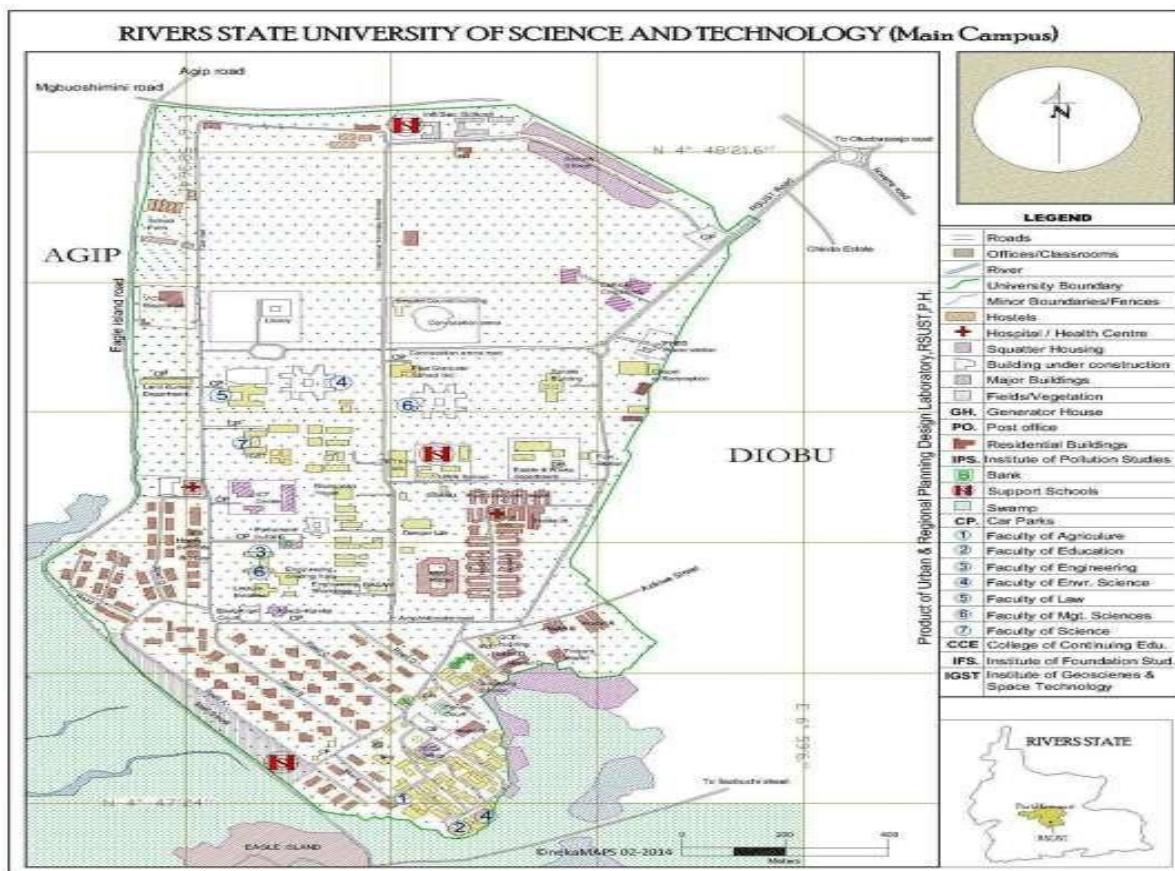


Fig. 1. The Map of RSUST showing the sampling stations
 Source: Urban & Regional Planning Dept. Rivers State University

RESULTS AND DISCUSSION

Checklist of Pteridophytes in Rivers State University

The list of pteridophytes present in the Rivers State University is summarized in Tables 1-3 and Plate 1 below:

There were Ten (10) species of Pteridophytes in RSU, distributed into eight (8) genera and five (5) Families (Tables 1 and Table 2). The most abundant family was Polypodiaceae (4), followed by Nephrolepidiaceae (2), Pteridiaceae (2), Tectariaceae and Lycopodiaceae (1). The growth form recorded were mostly epiphytes and non-epiphytes, though the species *N. biserrata* appeared as epiphyte and Non-epiphyte. The habitat was mostly terrestrial. The highest host plant for the epiphytic ferns was *Elaeis guineensis*, followed by *Tetraclinis articulata*, *Casuarina equisetifolia*, *Terminalia mantaly*, *Jarcaranda mimosifolia*, *Cocos nucifera*, *Gmelina aborea*, *Mangifera indica*, *Artocarpus altilis* (Table 1). The highest occurrence of the Pteridophyte frequency distribution (Table 4), was recorded for *P. superbum* (22), followed by *M. mauritiana* (20), *P. scolopendria* (11), *N. biserrata*(10), *N. exaltata*(6), *P. calomelanos* (6), *A. orientalis* (4), *P. vittata* (4), *P. bifurcatum* (3) and *L. clavatum* (1) (Table 1).

Table 1. Source of Collection of Plant Materials Used for the Study

S/N	Plant Samples	Collection/Accession Number	Date of Collection	Location of Collection
1	<i>Nephrolepis biserrata</i>	RSUpb078	24-04, 17-05, 24-05, 23-06, 06-07	(RCC, BLF, FSCP, CL, PED, ME, EF, RMF, RCA, RDSQ).
2	<i>Nephrolepis exaltata</i>	RSUpb079	24-04, 17-05, 24-05, 23-06, 06-07	(RCC, PED, EFE, RCA, RCSQ, FSCP). (RMG, RCC, RRA, RC, FS, OHHF, OFGH, RBG, RLG, FH, BLF, FSC, BL1
3	<i>Platynerium superbum</i>	RSUpb080	24-04, 09-05, 17-05, 24-05, 23-06, 27-06, 06-07, 07-07	BBD, PED, BER, EF, FECF, RCA, RCSQ, RSSR, RDLCF).
4	<i>Platynerium bifurcatum</i>	RSUpb081	24-04, 23-06, 27-06	(EF, FSCP, RSC). (RMG, RCC, RRA, RC, FS, OHHF, RBG, RLG, RFB, BLF, MLF
5	<i>Microgramma mauritiana</i>	RSUpb082	24-04, 09-05, 17-05, 24-05, 23-06, 27-06, 06-07, 07-07	EF, ECP, RMF, RCA, FSC, RSC, RBSQ, RSSR, PGH). (RCC, ORCC, RRA, RC, OHHF
6	<i>Phymatosorus scolopendria</i>	RSUpb083	24-04, 09-05, 17-05, 23-06, 06-07	RBG, RLG, FSF, RCA, RESQ, EF).
7	<i>Arthropteris orientalis</i>	RSUpb084	17-05, 19-05	(BBD, BPGH, HB). (HEBBC, RBSQ, PGH, RMF
8	<i>Pityrogramma calomelanos</i>	RSUpb085	19-05, 06-07	RDLCF, FSCP). (BNDDCH, RGSQ, RAF
9	<i>Pteris vittata</i>	RSUpb086	24-05, 06-07	RCA).
10	<i>Lycopodium Clavatum</i>	RSUpb087	10-07	RBG.

RSU catholic Church – (RCC), Opposite RSU catholic Church – (ORCC), RSU Main Gate – (RMG), RSU Roundabout – (RRA), RSU Filling Station – (RFS), Chapel of Redemption – (RCR), Opposite Hostel H Field – (OHHF), RSU Back Gate – (RBG), RSU Love Garden – (RLG), RSU Fidelity Bank – (RFB), Biology Lab Field – (BLF), Med. Lab. Field – (MLF), Engineering Faculty – (EF), Engineering Carpark – (ECP), RSU

Mushroom Farm – (RMF), RSU Convocation Arena (RCA), Faculty of Science Carpark – (FSCP), RSU Staff Club – (RSC), Road B (Staff Quarters) – (RBSQ), RSU Staff School Road – (RSSR), PG Hostel – (PGH), Behind PG Hostel – (BPGH), Hostel E Basket Ball Court – (HEBBC), Behind NDDC Hostel – (BNDDCH), Road G (Staff Quarters) – (RGSQ), Petroleum Engineering – (PE), Road C (Staff Quarters) – (RCSQ), RSU Agric Farm (RAF), Hostel B (HB).

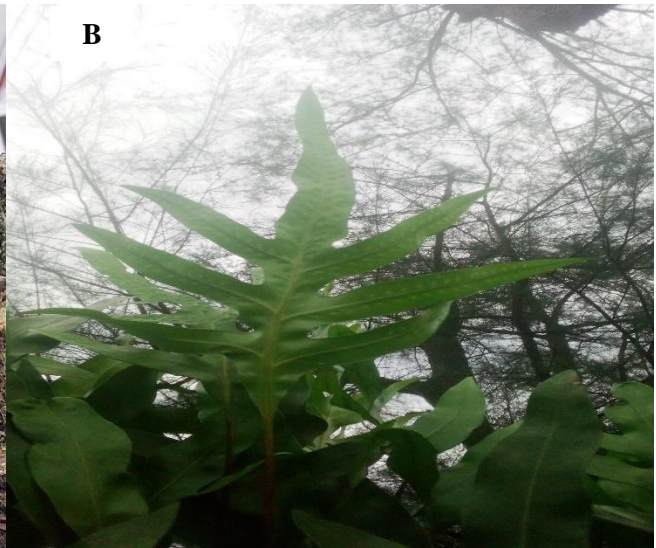






Fig.2. (A-J). Different Pteridophytes in their Natural Habitat Growing
A- *M. mauritiana*, B- *P. scolopendria*, C- *P. bifurcatum*, D- *N. exaltata*, E- *P. calomelanos*, F- *P. vittata*,
G- *L. clavatum*, H- *N. biserrata*, I- *A. orientalis*, J- *P. superbum*.

Table 2. Checklist of Pteridophytes Present in Rivers State University

S/No	Botanical Name	Common Name	Family	Growth Form/Habit	Habitat	Host Plants	No. of Ferns
1	<i>Nephrolepis biserrata</i>	Giant Sword Fern	Nephrolepidiaceae	Epiphytes/ Non-Epiphytes	Terrestria 1	<i>Elaeisguineensis</i> , <i>C. nucifera</i> , In soil	2
2	<i>Nephrolepis exaltata</i>	Sword Fern	Nephrolepidiaceae	Epiphytes	Terrestria 1	<i>E. guineensis</i> , In soil <i>E. guineensis</i> , <i>T. mantaly</i> , <i>A. boonei</i> , <i>Jacaranda mimosifolia</i> , <i>Gmelina aborea</i> , <i>Mangifera indica</i> , <i>C. nucifera</i>	2
3	<i>Platyserium superbum</i>	Staghorn Fern	Polypodiaceae	Epiphytes	Terrestria 1	<i>E. guineensis</i> , <i>Causirina. equisetifolia</i> , <i>Tetraclinis articulata</i> , <i>Terminalia mantaly</i> , <i>J. mimosifolia</i>	3
4	<i>Platyserumbifurcatum</i>	Elkhorn Fern	Polypodiaceae	Epiphytes	Terrestria 1	<i>Artocarpusaltilis</i> , <i>E. guineensis</i> , <i>C. equisetifolia</i> , <i>T. articulata</i> , <i>T. mantaly</i> , <i>Jacaranda, G. aborea</i> , <i>M. indica</i>	2
5	<i>Microgramma mauritiana</i>	Snake Fern	Polypodiaceae	Epiphytes	Terrestria 1	<i>E. guineensis</i> , <i>C. equisetifolia</i> , <i>T. articulata</i>	2
6	<i>Phymatosorus scolopendria</i>	Monarch Fern	Polypodiaceae	Epiphytes	Terrestria 1	<i>T. articulata</i>	2
7	<i>Arthropteris orientalis</i>	Msasa Fern	Tectariaceae	Non-Epiphytes	Terrestria 1	In soil	1
8	<i>Pityrogramma calomelanos</i>	Silverback Fern	Pteridaceae	Non-Epiphytes	Terrestria 1	In soil	1
9	<i>Pteris vittata</i>	Chinese Brake	Pteridaceae	Non-Epiphytes	Terrestria 1	In soil	1
10	<i>Lycopodium clavatum</i>	Club moss	Lycopodiaceae	Epiphytes	Terrestria 1	<i>T. articulata</i>	2

Table 3. Number of Families, Genera and Species of Ferns in Rivers State University

S/No	Family	Number of Genus	Number of Species	Number of Host Plant
1	Nephrolepidiaceae	1	2	3
2	Polypodiaceae	3	4	12
3	Tectariaceae	1	1	1
4	Pteridaceae	2	2	1
5	Lycopodiaceae	1	1	1
Total	5	8	10	18

Table 4. Location and Frequency of Ferns in Rivers State University

S/No	Species	No. of Location
1	<i>N. biserrata</i>	10
2	<i>N. exaltata</i>	6
3	<i>P. superbum</i>	22
4	<i>P. bifurcatum</i>	3
5	<i>M. mauritiana</i>	20
6	<i>P. scolopendria</i>	11
7	<i>A. orientalis</i>	3
8	<i>P. calomelanos</i>	6
9	<i>P. vittata</i>	4
10.	<i>L. calvatum</i>	1

The significance of plant checklist has been described by [28], as a way of allowing interested groups to identify a particular plant by the same name in all places and avoid confusion and misinterpretation. It also aids communication between tourist and the local people on the diversity of the area and creates an avenue for non-botanists to scientifically identify local plants. By combining local plant identification

with taxonomic expertise, various plants and vegetation related projects could be conducted more cost effectively and comprehensively.

From the Checklist of Pteridophytes found in Rivers State University, it was discovered that there were Ten (10) species of Pteridophytes were found; distributed into eight (8) genera and five (5) Families (Tables 1-2). The most abundant family was Polypodiaceae family with three(3) genera and four(4) species, followed by Pteridiaceae: two(2) genera and two (2) species, Nephrolepidiaceae one(1) genus and two(2) species, Tectariaceae and Lycopodiaceae both had one(1) genus and species respectively; this results conforms to the work carried out by [23,25], which says that polypodiaceae family were the most abundant amongst other families found in the tropical zones. . Most of the pteridophytes recorded were mostly epiphytes as they were mainly found on trees conforming to the work done by [24], and non-epiphytes (plants that found on soil, water or rocks), though the species *N. biserrata* appeared as epiphyte and Non-epiphyte.

The habitat was mostly terrestrial. The highest host plant for the epiphytic ferns was *Elaeis guineensis* agreeing to the work done by [25], followed by *Tetraclinis articulata*, *Casuarina equisetifolia*, *Terminalia mantaly*, *Jarcaranda mimosifolia*, *Cocos nucifera*, *Gmelina aborea*, *Magnifera indica*, *Artocarpus altilis* (Table 1). The highest occurrence of the Pteridophytes frequency distribution (Table 4) was recorded for *P. superbum* twenty-two(22), followed by *M. mauritiana* twenty (20), *P. scolopendria* eleven (11), *N. biserrata* ten (10), *N. exaltata* six (6), *P. calomelanos* six (6), *A. orientalis* four (4), *P. vittata* four (4), *P. bifurcatum* three(3), *L. clavatum* one (1) (Table 3).

CONCLUSION

This present study has shown that most of the Pteridophytes found around the metropolis of Rivers State University were mainly in the polypodiaceae, followed by Pteridiaceae, Nephrolepidiaceae, Tectariaceae and Lycopodiaceae families. These Pteridophytes including the club mosses exhibited epiphytic characteristics as most of them were seen growing on trees especially on *E.guineensis*, followed by *T. articulata*, *C. equisetifolia*, *T. mantaly*, *J. mimosifolia*, *C. nucifera*, *G. aborea*, *M. indica*, *A.altilis*; only a few were seen growing on rocks or soil.

From this research, it can be seen that most of this Pteridophytes documented are epiphytes and invariably depend on different tree hosts for accommodation and protection but, there is incessant falling down of trees in the study area due to urbanization, industrialization and various anthropogenic activities, therefore, it is recommended that the University management should establish a law to stop this incessant destruction of the habitats of the Ferns to avoid the disappearance of these ferns, which might lead to endangerment and subsequent extinction.

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