



# Taxonomic enumeration of Pteridophytic flora of Badsaitilla Reserved Forest of Sribhumi district, Assam, India

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**Abstract:** The present study was undertaken to identify, document and taxonomically enumerates the pteridophytic flora of Badsaitilla Reserved Forest located in the Sribhumi district of Assam, North-east India. Extensive field surveys were carried out across different seasons to record the diversity and distribution of pteridophyte species in the study area. Specimens were collected from various habitats including forest floors, rocky substrates, moist shaded slopes, tree trunks, and aquatic environments. A comprehensive taxonomic documentation of Pteridophytic flora has been prepared based on systematic field collections, critical examination of specimens, and consultation of relevant floras, manuals, published literature, and academic thesis. The study recorded a total of 35 species of pteridophytes belonging to 26 genera and 21 families from the forest. Analysis of the life-form spectrum indicates that terrestrial species constitute the dominant group, representing about 64% (27 species) of the total taxa. This dominance reflects the availability of diverse microhabitats within the forest ecosystem that favour terrestrial fern growth. Epiphytic species account for approximately 12% (5 species), indicating the presence of suitable host trees and favourable microclimatic conditions within the forest. In addition, five lithophytic species (12%) and a few other fern taxa were also documented, further indicating the habitat heterogeneity of Badsaitilla Reserved Forest. The occurrence of a considerable number of species highlights the ecological richness of the forest and its significance as a potential reservoir of pteridophytic diversity. A comparative assessment of the 21 recorded families shows that Pteridaceae and Polypodiaceae are the most dominant families in the area. The findings of this study provide baseline data on the pteridophytic flora of the region and underline the importance of further detailed investigations and conservation initiatives to safeguard this valuable component of forest biodiversity.

**Key words:** Pteridophytes, Taxonomic enumeration, Conservation status, Fern diversity, Sribhumi district, Assam.

## I. INTRODUCTION

Pteridophytes are vascular plants that reproduce through spores and do not produce flowers or seeds. This group mainly includes ferns and their allies. In the evolutionary history of plants, pteridophytes occupy an important intermediate position between bryophytes and seed-producing plants. During ancient geological periods, especially around 280–230 million years ago, these plants were widely distributed and formed a significant part of the Earth's vegetation (Kokate, 2021). They flourished extensively during the Carboniferous period of the Palaeozoic era, which is often regarded as the “Age of Pteridophytes”. Fossil records indicate that vast forests dominated by giant pteridophytes contributed significantly to the formation of present-day coal deposits.

Scientifically, pteridophytes are classified into four major groups: Psilotatae, Lycopodiatae (club mosses or lycophytes), Equisetatae (horsetails), and Filicatae (ferns). Later classifications recognize five groups when Isoetinae is also considered as a separate group (Liu, 2016). Pteridophytes represent a highly diverse group of plants across the world. Globally, more than 12,000 species of ferns and nearly 1,000 species of fern allies have been documented. India, with its tropical climate, varied ecological conditions, and wide range of habitats, provides a favorable environment for the growth of these plants. As a result, the country supports a significant diversity of pteridophytes, with approximately 1,200 species of ferns and their allies reported from different regions of India (Manickam & Rajkumar, 1999).

Early, Indian pteridophytes can be traced in classical Sanskrit texts, particularly those linked with Ayurvedic medicinal traditions, where several fern species were recognized for their therapeutic properties. (Phukan & Choudhury, 2022). A conservative estimate suggests that India harbours around 500 species of ferns and approximately 100 species of fern allies, which have been documented from various ecological regions of the country. These groups of pteridophytic plants occur in diverse habitats ranging from tropical forests to mountainous areas, reflecting the rich biodiversity and favourable climatic conditions present across different parts of India (Rawat & Satyanarayana, 2015). According to Dixit (Dixit, 1984) the pteridophytic flora of India comprises 67 families, 191 genera and more than 1000 species. According to (Chandra, 2005), the Indian region supports a rich diversity of ferns, comprising approximately 34 families, 144 genera, and more than 1100 species. Among these, nearly 235 species are regarded as endemic to

India. Subsequent revisions of the checklist of endemic and threatened pteridophytes in the country have identified a number of species that fall under different conservation categories, such as endemic, critically endangered, near threatened, and rare taxa.

Significant contributions to Indian pteridology have been made by several researchers. Among them, Prof. S. S. Bir made remarkable contributions through extensive floristic, monographic and revisionary studies on Indian pteridophytes and is widely regarded as the “Father of Indian Pteridology” (Bir, 1994). The overall vascular flora of India comprises nearly 15,000 species, among which ferns and fern allies contribute about five percent of the total diversity (Bir & Satija, 1985). Later on the several floristic studies on pteridophytes have been carried out from different parts of India. Notable works include the Pteridophytic Flora of Darjeeling and Sikkim Himalayas by (Bir & Mehra, 2008), Ferns and Fern Allies of Meghalaya (Rao & Baishya, 1982), Ferns and Fern Allies of Arunachal Pradesh (Panigrahi & Singh, 2005) and The Ferns of Nagaland (*Herbarium Studies and Their Role in Germplasm Collecting, Conservation and Use*, 2024). These studies have significantly contributed to the understanding of regional pteridophytic diversity in the Eastern Himalayas and North-East India.

In Assam, studies on pteridophytic flora have been conducted by several workers. (Borthakur et al., 2001) published “An Illustrated Manual of Ferns of Assam” which recorded a considerable number of species from the state, Forty new additions to the angiospermic flora of Assam, India (Barbhuiya, 2014), A Checklist of Hydrophytic Pteridophytes of Assam, India (Borah & Barukial, 2021) and Diversity Of Pteridophytes In Nazira Subdivision Of Sivasagar District, Assam, N. E. India (Das & Nath, 2012).

The taxonomic study of pteridophytic flora in the Barak valley has been conducted by several researchers over the years. These studies have significantly contributed to the understanding of the diversity, distribution, and classification of pteridophytes in the region. Several botanists and plant taxonomists have carried out limited explorations in different forest areas such as inner line forests including Assam- Mizoram- Tripura and Bangladesh. The studies were conducted such as A review of the ferns of Barak valley, Assam, India by (Dey et al., 2011), Fern Flora of Barak Valley, Assam by (Nath & Bhattacharya, 2016),

Despite previous investigations, the forest areas still lack comprehensive taxonomic documentation of pteridophytic flora, including ferns and their allied groups. Several forest areas, particularly reserved forests such as inner line forests, have not yet been systematically explored for their pteridophytic diversity. Badsaitilla Reserved Forest of Sribhumi district is one the forest where the forest represents an ecologically significant forest area characterized by humid climatic conditions, dense vegetation and diverse microhabitats which are favourable for the growth of pteridophytes.

Therefore, the present study aims to conduct a taxonomic enumeration and documentation of the pteridophytic flora of Badsaitilla Reserved Forest. This study provides a baseline data on pteridophytic diversity, distribution and ecological characteristics of pteridophytes in the region, which will contribute to future floristic research and will contribute to biodiversity assessment and also conservation planning in the Barak valley as well as in the North-east India.

### III. Materials and Methods

#### 3.1. Study area

Badsaitilla Reserved Forest is a low-altitude tropical forest dominated by dipterocarp vegetation, located under the Lowairpoa Forest Range of the Sribhumi Forest Division in Assam, North-East India. The forest is situated near Dosdewa village at approximately 24.35°N latitude and 92.35°E longitude. Geographically, the reserved forest forms part of the ecologically rich Barak valley region, which is known for its high biodiversity and diverse forest ecosystems (Rejoice & Ismavel, 2015).

The hydrology of the region is influenced by major rivers such as the Kushiyara and Longai, which flow through the Sribhumi district. These rivers play a crucial role in maintaining the ecological balance of the region and also support irrigation, agriculture, and the livelihoods of local communities. The forest and its surrounding areas are inhabited by major communities such as Muslim and Bengali and along with different tribes including the Hmar, Chorei, Ranglong, Reang, Garo, Khasi, Meitei, Chakma, Bishnupriya Manipuri and Barman. These maintain a close relationship with the forest ecosystem and depend on forest resources for their traditional livelihood practices, cultural activities, and medicinal uses.

The forest area is increasingly recognized as an important biodiversity hotspot within the Barak valley. Several faunal studies conducted in this region have highlighted its ecological significance, particularly with respect to avifaunal diversity and insect populations. The dense forest, humid climate, and diverse microhabitats provide suitable conditions for the growth and survival of a wide range of plant and animal species, including pteridophytes.

#### 3.2. Methods

Extensive field surveys were carried out during different seasons to record the diversity and distribution of pteridophytes in the study area. Plant specimens were collected from various habitats such as forest floors, moist shaded slopes, rocky crevices, stream banks, marshy areas and tree trunks. The standard field and herbarium techniques were followed during the collection, processing, and preparation of specimens as described by (Jain & Rao, 1977). As far as possible, specimens were collected in their mature stage from their natural habitats to ensure accurate identification. During field collection, important morphological characteristics were carefully recorded in a field notebook. These included habit, habitat, size, colour and shape of fronds, type of pinnation, arrangement of sori, presence of scales and hairs, and the nature of the rhizome.

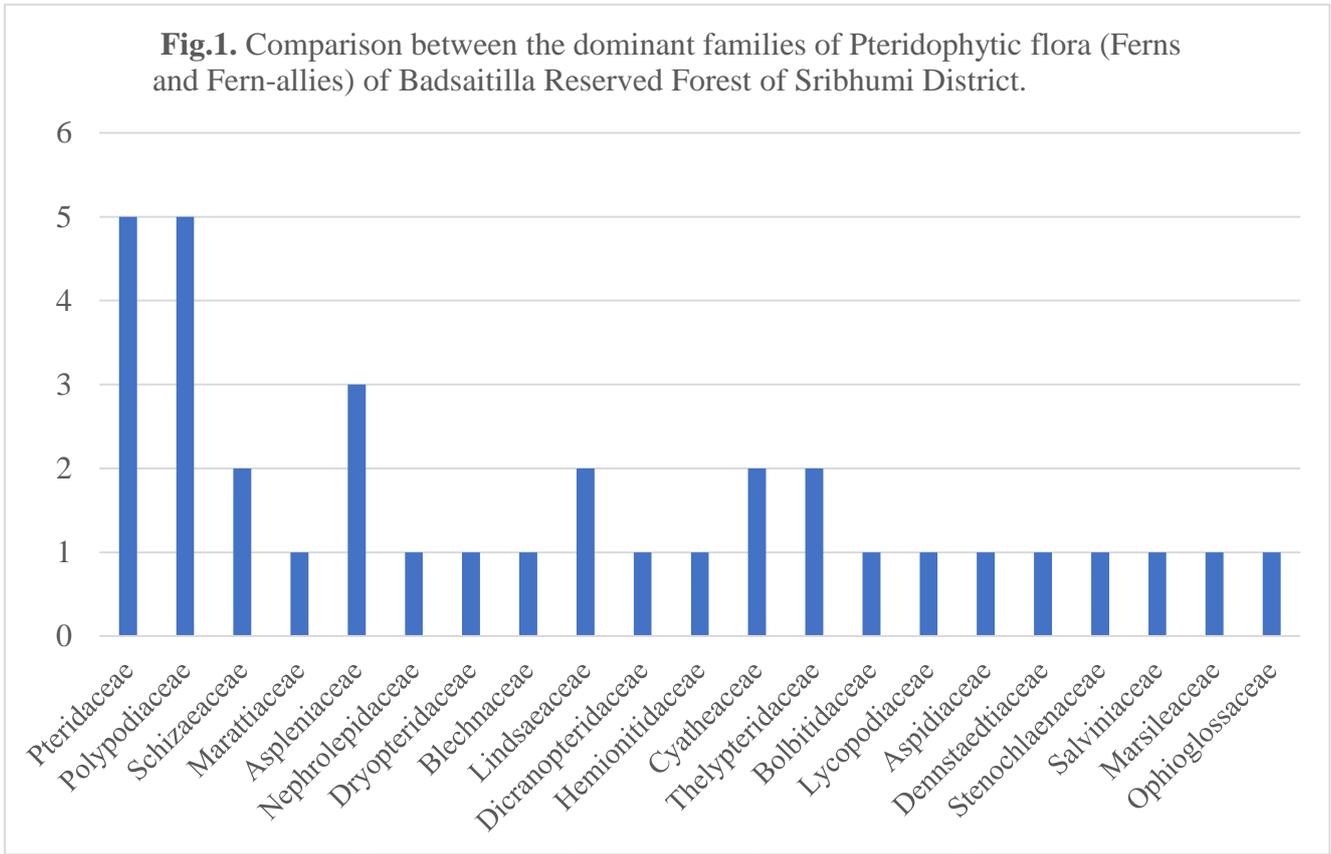
The recorded species were categorized based on their habitat types such as terrestrial, epiphytic, lithophytic or aquatic. Morphological characteristics including frond structure, rhizome type, sporangia arrangement and reproductive structures were examined for accurate identification. In most cases, entire plants were collected along with rhizomes for proper taxonomic study. However, in large-sized ferns such as *Angiopteris evecta* and *Cyathea* species, the rhizomes are massive and difficult to collect;

therefore, representative parts including fronds and fertile portions bearing sori were collected. In such cases, additional observations such as approximate size of the trunk, fronds, and characteristics of the rhizome were recorded in the field. For fern allies, diagnostic morphological characters such as leaf colour, stem structure, habit, habitat, and size were noted carefully during collection. Collected specimens were properly pressed, dried, and mounted on herbarium sheets following standard herbarium procedures. Some specimens were also preserved in 4% formaldehyde solution for further detailed studies.

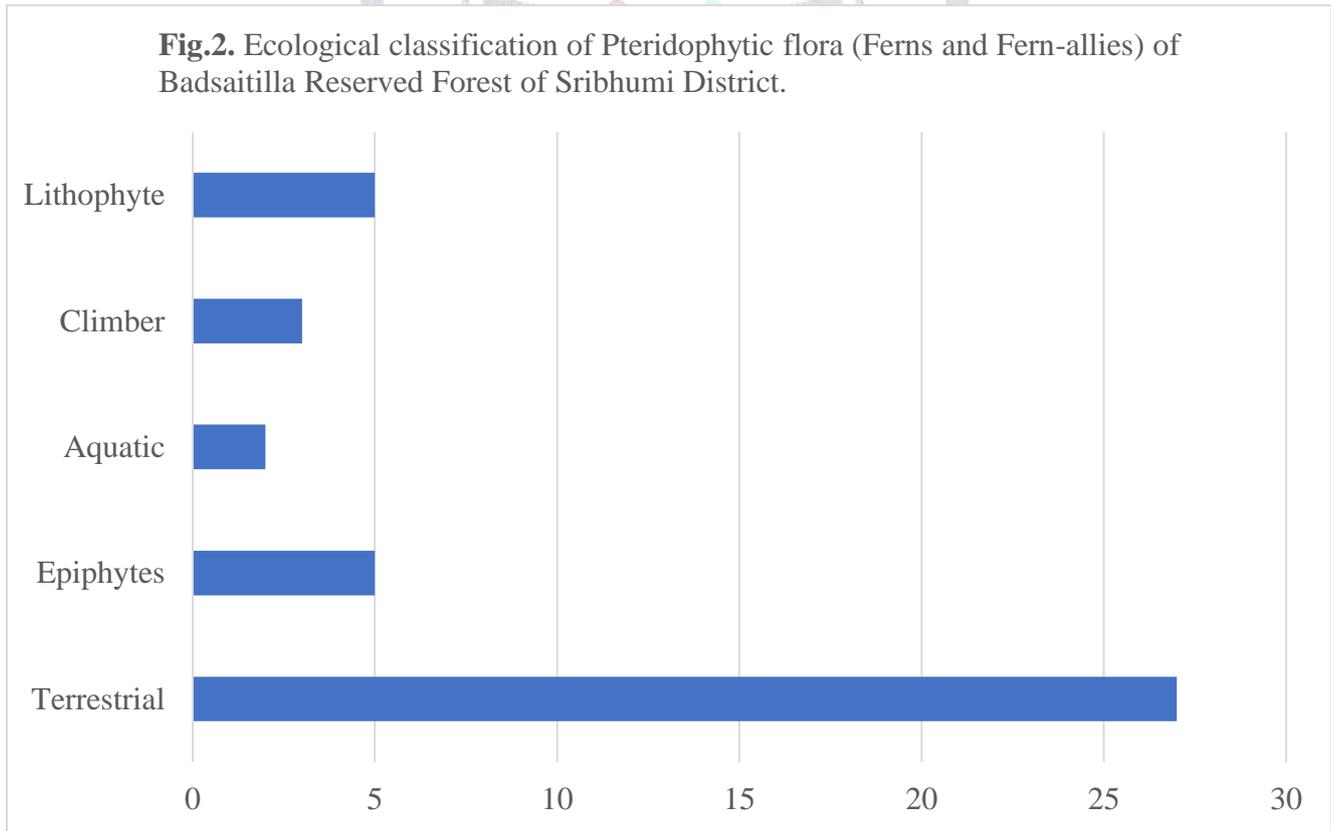
All relevant field data including Botanical name, family, locality if, and habitat were recorded and also included on the herbarium sheets. The prepared specimens, on which the present study is based, have been deposited in the PDUAM Botanical Herbarium (PDUAMBHE), Eraligool, Sribhumi for future reference and scientific study.

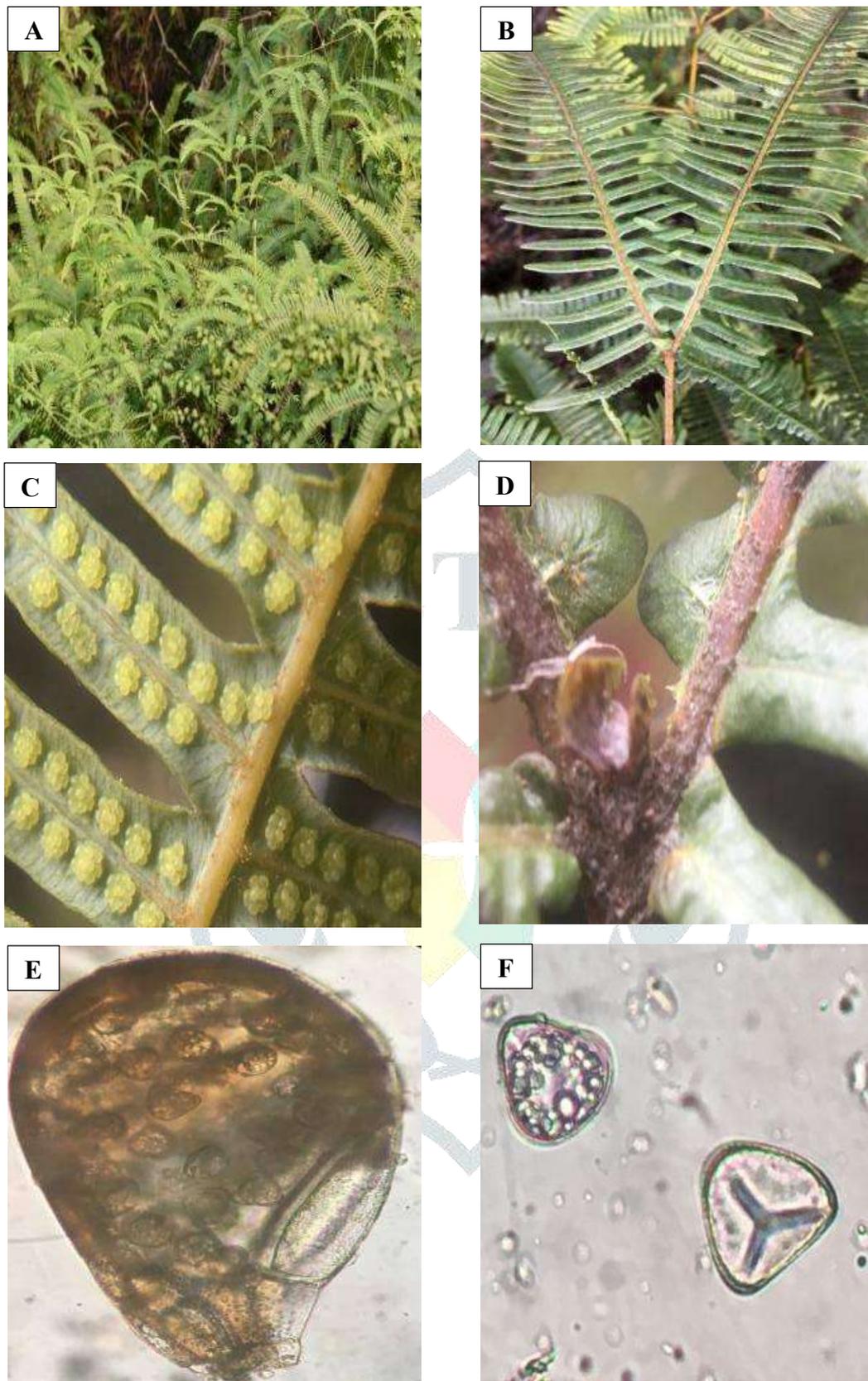


**Fig.1.** Comparison between the dominant families of Pteridophytic flora (Ferns and Fern-allies) of Badsaitilla Reserved Forest of Sribhumi District.



**Fig.2.** Ecological classification of Pteridophytic flora (Ferns and Fern-allies) of Badsaitilla Reserved Forest of Sribhumi District.





**Fig.3.** *Dicranopteris linearis* (Burm.f.) Underw. **A.** Habitat; **B.** Frond with forking midrib or rachis; **C.** Fiddle head between two rachis; **D.** Mature sori; **E.** Sporangium; **F.** Spores.

**Table.1.** List of the Pteridophytes occurring in Badsaitilla Reserved Forest Under Sribhumi Forest Division with their family. [English (Eng); Assamese (Assm); Reang (Rng); Not Cited (NC); Not Evaluated (NE); Least Concern (LC); Vulnerable (VU); Endangered (EN); Critically Endangered (CR)]

Sl. No.	Botanical Name	Family	Genus	Habitat	Vernacular Name	Conservation Status
1	<i>Pteris quadriaurita</i> Retz.	Pteridaceae	<i>Pteris</i>	Terrestrial	NC	NE
2	<i>Pteris vittata</i> L.			Terrestrial or Lithophytic	NC	NE
3	<i>Pteris biaurita</i> L.			Terrestrial	NC	NE
4	<i>Pteris semipinnata</i> L.			Terrestrial	Skaiumamoidu (Rng)	NE
5	<i>Pteris linearis</i> Poir.			Terrestrial	Dilim (Assm)	NE
6	<i>Lygodium flexuosum</i> (L.) Sw.	Schizaeaceae	<i>Lygodium</i>	Climber	Kopou Dhekia (Assm)	NE
7	<i>Lygodium japonicum</i> (Thunb.) Sw.			Climber	Indrajal (Assm)	NE
8	<i>Angiopteris evecta</i> (G.Forst.) Hoffm.	Marattiaceae	<i>Angiopteris</i>	Terrestrial	Hati Dhekia (Assm)	LC
9	<i>Diplazium esculentum</i> (Retz.) Sw.	Aspleniaceae	<i>Diplazium</i>	Terrestrial	Dhekia Saag (Assm)	LC
10	<i>Asplenium falcatum</i> Lam.			Terrestrial	Sickle Fern (Eng)	NE
11	<i>Asplenium nidus</i> L.			Epiphyte	Bird's nest fern (Eng)	LC
12	<i>Nephrolepis radicans</i> (Burm.f) Kuhn.	Nephrolepidaceae	<i>Nephrolepis</i>	Climber	NC	LC
13	<i>Microsorium punctatum</i> (L.) Copel.	Polypodiaceae	<i>Microsorium</i>	Terrestrial Or Epiphyte	Kapau dhekia (Assm)	LC
14	<i>Microsorium teropus</i> (L.) Copel.			Terrestrial or Lithophyte	Java Fern (Eng)	NE
15	<i>Pyrrosia piloselloides</i> (L.) M.G.Price			Terrestrial Or Lithophyte Or Epiphyte	Bormondi (Assm)	NE
16	<i>Pyrrosia adnascens</i> (Sw.) Ching.			Epiphyte	Dragon's Scale Fern (Eng)	NE
17	<i>Drynaria quercifolia</i> (L.) J.Sm.			Epiphyte	Pankhiraj (Assm)	LC
18	<i>Dryopteris sparsa</i> (D. Don) Kuntze.	Dryopteridaceae	<i>Dryopteris</i>	Terrestrial	Wood Fern (Eng)	NE
19	<i>Blechnum orientate</i> L.	Blechnaceae	<i>Blechnum</i>	Lithophyte or Terrestrial	Chepti-dhekia (Assm)	LC
20	<i>Sphenomeris chinensis</i> (L.) Maxon	Lindsaeaceae	<i>Sphenomeris</i>	Terrestrial	NC	NE
21	<i>Lindsaea odorata</i> Roxb.			Terrestrial	Necklace Fern (Eng)	NE
22	<i>Dicranopteris linearis</i> (Burm.f.) Underw.	Dicranopteridaceae	<i>Dicranopteris</i>	Terrestrial	Bilm-tenga (Assm)	LC
23	<i>Pityrogramma calomelanos</i> (L.) Link.	Hemionitidaceae	<i>Pityrogramma</i>	Terrestrial	Silver Fern (Eng)	NE
24	<i>Cyathea gigantea</i> (Wall. ex Hook.) Holttum	Cyatheaceae	<i>Cyathea</i>	Terrestrial	Bongreng (Rng)	NE
25	<i>Cyathea henryi</i> (Bak.) Copel.			Terrestrial	Bar Gach (Assm)	NE

26	<i>Pronephrium triphyllum</i> (Sw.) Holtt.	Thelypteridaceae	<i>Pronephrium</i>	Terrestrial	Bon Dhekia (Assm)	CR
27	<i>Christella dentata</i> (Forssk.) Brownsey & Jermy		<i>Christella</i>	Terrestrial	March Fern (Eng)	NE
28	<i>Bolbitis heteroclita</i> (Presl.) Ching.	Bolbitidaceae	<i>Bolbitis</i>	Terrestrial	Asian Water Fern (Eng)	VU
29	<i>Lycopodiella cernua</i> (L.) Pic. Serm	Lycopodiaceae	<i>Lycopodiella</i>	Terrestrial or Lithophyte	Staghorn clubmoss (Eng)	LC
30	<i>Ptenitopsis fuscipes</i> (Wall. ex Bedd.) Ching.	Aspidiaceae	<i>Ptenitopsis</i>	Terrestrial	NC	NE
31	<i>Microlepia speluncae</i> (L.) T.Moore	Dennstaedtiaceae	<i>Microlepia</i>	Terrestrial	Limpleaf fern (Eng)	EN
32	<i>Stenochlaena palustris</i> (Burm.f.) Bedd.	Stenochlaenaceae	<i>Stenochlaena</i>	Terrestrial	Ranga Dhekia (Assm)	NE
33	<i>Salvinia natans</i> (L.) All	Salviniaceae	<i>Salvinia</i>	Aquatic	Pani-puni (Assm)	LC
34	<i>Marsilea minuta</i> L.	Marsileaceae	<i>Marsilea</i>	Aquatic	Tengesi Tenga (Assm)	LC
35	<i>Helminthostachys zeylanica</i> (L.) Hook.	Ophioglossaceae	<i>Helminthostachys</i>	Terrestrial	NC	NE

#### IV. Results and Discussion

The present floristic survey recorded a total of 35 species of pteridophytes belonging to 26 genera and 21 families from Badsaitilla Reserved Forest of Sribhumi district, Assam (Fig.1.). The diversity of species observed in the area reflects the favourable ecological and climatic conditions that support the growth and distribution of pteridophytic flora. Among the recorded taxa, the majority of species were terrestrial 64% (27 species) in nature and were commonly found on moist forest floors and shaded slopes. Epiphytic species 12% (5 species) were also recorded growing on tree trunks and branches, particularly in areas with dense canopy cover and high humidity. A few lithophytic 12% (5 species) were observed growing on rocky substrates and crevices, while aquatic species were found near streams of the hilly areas and waterlogged habitats (Fig.2.).

Family-wise analysis indicated that Pteridaceae and Popyodiaceae was the most dominant family represented in the study area, followed by Aspleniaceae, Lindsaeaceae and Cyatheaceae. The dominance of these families is consistent with earlier studies conducted in various regions of North-east India where similar ecological conditions prevail.

Several species such as *Cyathea gigantea* (Wall. ex Hook.) Holttum, *Pteris vittata* L. and *Diplazium esculentum* (Retz.) Sw. and *Pteris quadriaurita* Retz. were observed to be widely distributed across different habitats within the forest. These species exhibit remarkable ecological adaptability and are commonly encountered in tropical forest ecosystems. The presence of epiphytic ferns such as *Drynaria quercifolia* (L.) J.Sm. and *Pyrrosia piloselloides* (L.) M.G.Price species indicates the availability of suitable host trees and stable microclimatic conditions. Similarly, aquatic species like *Marsilea minuta* L. and *Salvinia natans* (L.) All were found in marshy and wet habitats, highlighting the habitat heterogeneity of the reserve forest.

The pteridophytic diversity recorded in the present study is comparable with earlier studies conducted in other parts of Assam and the North-east region. However, some species observed during the survey were not previously reported from nearby regions, suggesting the ecological uniqueness of Badsaitilla Reserved Forest such as *Bolbitis heteroclita* (Presl.) Ching. The rich diversity of pteridophytes in the study area also reflects the diverse types of the forest ecosystem. These plants play an important ecological role in maintaining soil stability, nutrient cycling, and providing microhabitats for various organisms. The findings of the present study emphasize the importance of Badsaitilla Reserved Forest as a potential reservoir of pteridophytic diversity. Conservation and sustainable management of this forest ecosystem are therefore essential to preserve its botanical wealth and ecological balance.

#### IV. Conclusion

The study documented a considerable diversity of pteridophytes representing several genera and families. The dominance of terrestrial species along with the presence of epiphytic and aquatic forms reflects the diverse ecological conditions of the study area. The findings highlight the ecological significance of the reserve forest as a suitable habitat for pteridophytes and underline the importance of further systematic studies to explore the hidden diversity of this plant group. Conservation measures and continued floristic exploration are necessary to protect and document the pteridophytic wealth of the region.

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## VII. Conflict of Interest

There is no conflict of Interest

## VIII. Sources of Funding

No external sources of funding

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