

Diversity of seedless vascular plants of USTM Campus, Baridua, Ri-Bhoi, Meghalaya : A Preliminary Survey

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ABSTRACT

The present study was undertaken to access the diversity of seedless vascular plants of USTM Campus, Baridua, Ri-Bhoi, Meghalaya. A total of 19 seedless vascular plants has been documented from the study. Sixteen seedless vascular plants could be identified up to species level and 3 up to genus level. The specimens were distributed under 3 classes, 11 families, and 16 genera. Polypodiopsida was the most dominant taxa with 7 families and the family Pteridiaceae was the most dominant family with 6 species. Thirteen species were found growing on soil and/or rocks, 3 species were epiphytic, two species were cultivated (ornamental) and *Ophioglossum* sp. was found growing under shady moist soil condition. To add to the novelty to this study, all the species were screened for their potential biological activities from the standard literatures. Out of the total 19 species, 14 species were reported to have potential biological activities. Most of the species were reported to exhibit anti-inflammatory, antimicrobial and antioxidant properties. Species including *Acrostichum aureum*, *Adiantum capillus-veneris* and *Cheilanthes tenuifolia* were found to possess multiple potential biological activities.

Keywords: Biological Activity, Diversity, Polypodiopsida, Pteridiaceae

Introduction

Seedless vascular plants comprise of ferns and fern-allies and are also generally called pteridophytes. Globally, there are over 12000 known species and 305 genera of seedless vascular plants with over 1080 species and 191 genera reported from various biogeographical regions of India [1, 2]. These group of plants are classified into three broad groups:

lithophytes, epiphytes, and terrestrial, based on their habitat [3]. The study of seedless vascular plants is important because their distribution, presence and absence reflect microhabitat characteristics including soil type, soil fertility, atmospheric temperature, light intensity, precipitation, and humidity, playing a major role as ecological indicator and ecosystem function [4, 5]. Studies on diversity of seedless vascular plants have

been increasingly coming under focus because of their effective role as ecological indicator including the ozone layer, playing a key indicator in the face of climate change [6]. In addition to their ecological roles, their potential as a source of natural pharmacological ingredients has made this group of plants as an emerging candidate in sustainable pharmaceutical industry [7–9].

University of Science and Technology Meghalaya (USTM) is an accredited "A" Grade university and is one of the largest premier private institutes of Northeast India. The campus, spreading over 300 acres, is located on the lush green hill top of Baridua, Ri–Bhoi District, Meghalaya. The campus experiences humid tropical summer and cool winter climate and falls under the biodiversity rich–tropical moist deciduous forest of Ri–Bhoi District. Dominating trees found in the campus include *Azadiracta indica*, *Delonix regia*, *Ficus benjamica*, *Quercus* species, *Saraca asoca*, in addition to a number of aesthetic exotic plants including *Araucaria heterophylla*, *Cycas revoluta* and *Roystonea regia*. The campus harbours vast diversity of indigenous terrestrial flora and fauna, and numerous ornamental plants species. Natural and constructed water bodies such as ponds, lacks, aquariums and streams in the campus support additional aquatic flora and fauna.

In spite of the rich biodiversity, studies on seedless vascular plants in Ri–Bhoi District in particular, and Meghalaya as a whole, remained scanty. Singh *et al.* [10, 11] documented a total of 113 fern and fern–allies from Nokrek Biosphere Reserve, West Garo Hills district of Meghalaya. A recent study showed that Ri–Bhoi harbours a vast diversity of medicinal vascular plants [12]. However, floral diversity of Ri–Bhoi district remains to be explored to a huge extend. Studies on seedless vascular plants from the region have not been reported till date to the best of our knowledge. The present preliminary study aims to explore the diversity of seedless vascular fern within the lush green biodiversity–rich USTM campus.

Materials and Method

Periodic survey and samplings were carried out during October 2024 to April 2025, within USTM campus (Figure 1) on monthly basis. Random opportunistic sampling method was followed in order to document every occurring seedless vascular plants from the campus. The collected samples were rinsed gently and fumigated with 4% formaldehyde for overnight in order to get rid of unwanted microbial contaminations. The samples were dried properly and herbariums were prepared following the method of Jain and Rao [13]. The prepared herbariums were deposited in the Herbarium of the Department of Botany, USTM. Identification of the sampled plants were done through consultation of available literatures, digital database of various state floras of India, Botanical Survey of India, India Flora online, and seedless vascular plants taxonomic experts from the Indian Fern Society. Updated botanical names and taxonomic status were done through the Royal Botanical Garden, Kew database <https://powo.science.kew.org> (Plants of the World Online; last accesses: June 2026). All the sampled seedless vascular plants were screened for their biological activities form the standard literatures, which added novelty to the present study.

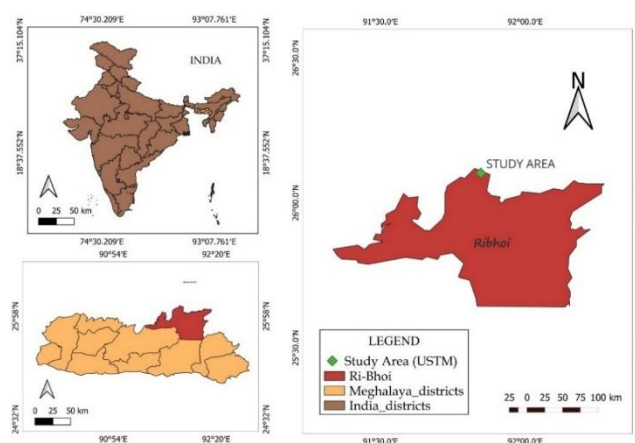


Figure 1 : Map showing Meghalaya, Ri–District and study area (USTM campus)

Results and Discussion

From the present study, a total of 19 seedless vascular plants has been documented from within USTM

campus (Table 1). Sixteen seedless vascular plants could be identified up to species level and 3 up to genus level. The specimens were distributed under 3 classes, 11 families, and 16 genera. Polypodiopsida was the most dominant taxa with 7 families (Figure 2). Pteridiaceae was the most dominant family with 6 species, followed by Polypodiaceae with 3 species. Thirteen species were found growing on soil and/or rocks, 3 species were epiphytic, two species were cultivated (ornamental) and *Ophioglossum* sp. was found growing under shady moist soil condition (Figure 3).

All the species were screened for their potential biological activities from the standard literatures, which added novelty to the present study. Out of the total 19 species, 14 species were reported to have potential biological activity (Table 2). Most of the species were reported to exhibit anti-inflammatory, antimicrobial and antioxidant properties. Species including *Acrostichum aureum*, *Adiantum capillus-veneris* and *Cheilanthes tenuifolia* were found to possess multiple potential biological activities. Field photographs of selected plants species are shown in Figure 4.

Table 1: List of seedless vascular plants identified from USTM campus

Sl. No.	Class	Family	Species	Habitat
1	Equisetopsida	Dryopteridaceae	<i>Polistichium discreatum</i> (D. Don) J. Sm.	Soil
2		Schizaeaceae	<i>Lygodium circinnatum</i> (Burm. F.) Sw.	Soil
3	Lycopodiopsida	Lycopodiaceae	<i>Lycopodium cerunum</i> L.	Soil
4		Selaginellaceae	<i>Selaginella plana</i> (Desv. Ex Poir.) Hieron.	Soil
5	Polypodiopsida	Blechnaceae	<i>Blechnopsis orientale</i> (L.) C. Presl	Soil
6		Gleicheniaceae	<i>Gleichenia dichotoma</i> (Willd.) Hook.	Soil
7		Nephrolepidaceae	<i>Nephrolepsis cordifolia</i> (L.) C. Presl	Cultivated
8			<i>Nephrolepsis</i> L. sp.	Cultivated
9		Ophioglossaceae	<i>Ophioglossum</i> L. sp.	Shady soil
10		Polypodiaceae	<i>Drynaria quercifolia</i> (L.) J. Sm.	Epiphyte
11			<i>Microsorium punctatum</i> (L.) Copel.	Epiphyte
12			<i>Pyrosia lanceolata</i> (L.) Farw.	Epiphyte
13		Pteridiaceae	<i>Acrostichum aureum</i> L.	Soil
14			<i>Adiantum capillus-veneris</i> L.	Soil; rock
15			<i>Adiantum philippines</i> L.	Soil; rock
16			<i>Cheilanthes tenuifolia</i> (Burm. F.) Sw.	Soil; rock
17			<i>Pteris vittata</i> L.	Soil; rock
18			<i>Pteris</i> sp.	Soil
19		Thelypteridaceae	<i>Christella parasitica</i> (L.) H. Lev.	Soil; rock

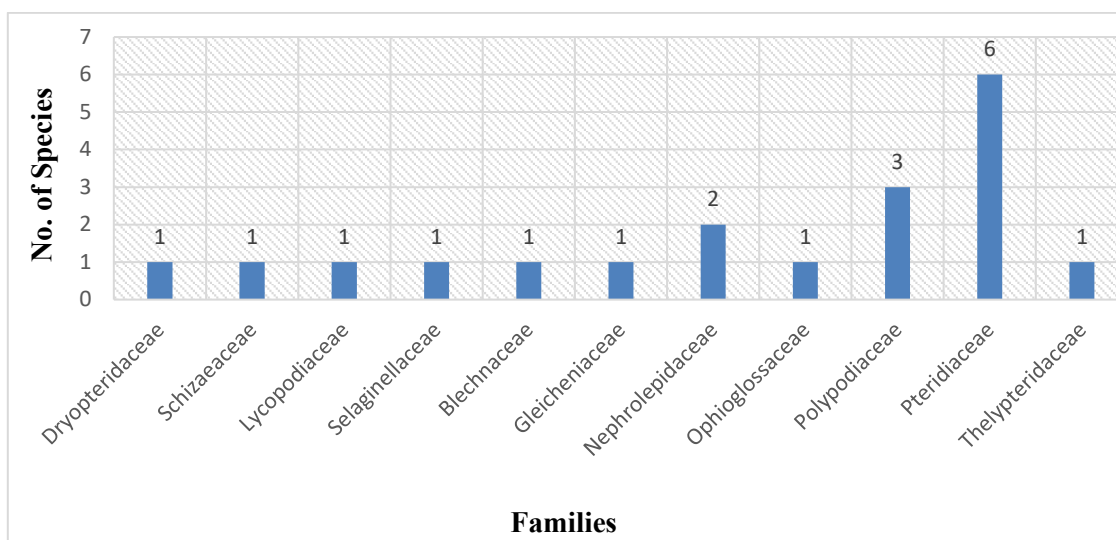


Figure 2 : Graph showing the number of seedless vascular plant species and their families.

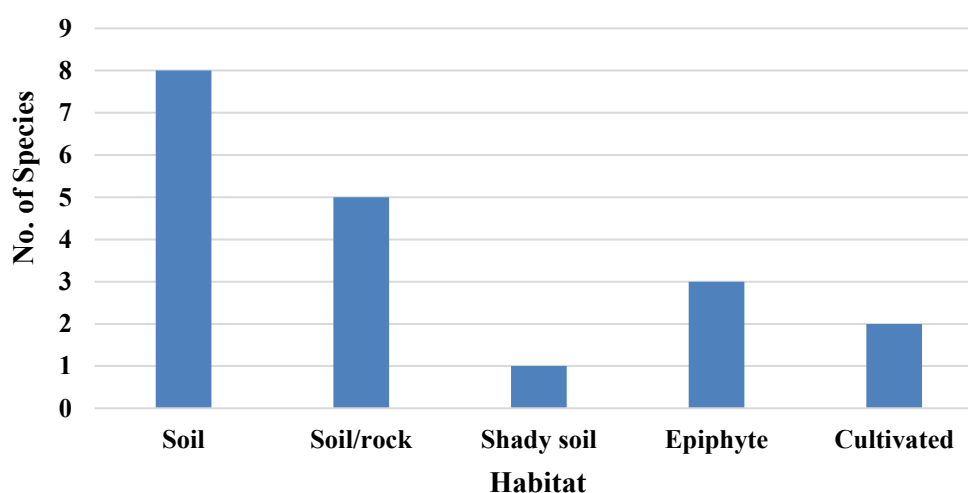
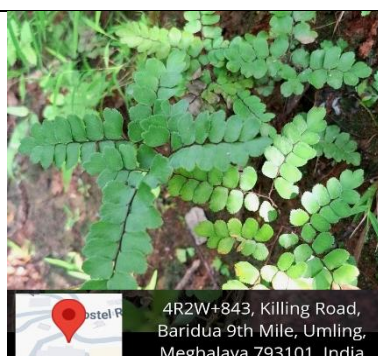
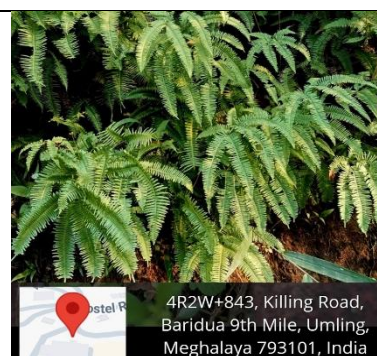
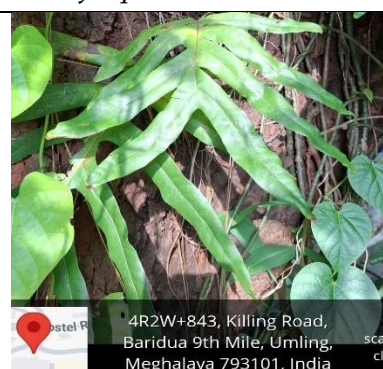
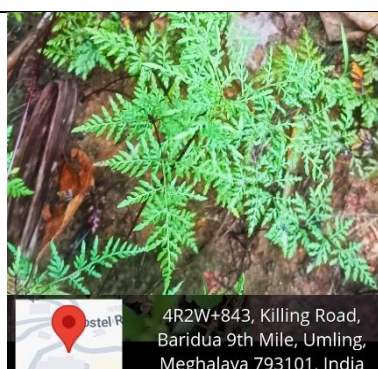
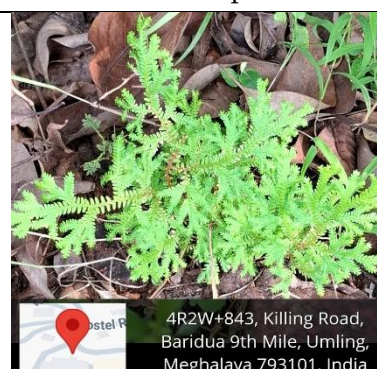


Figure 3: Graph showing the number of seedless vascular plant species and their habitat.

Table 2 : List of seedless vascular plants reported to have biological activity

Sl. No.	Plant	Biological activity	Reference
1	<i>Acrostichum aureum</i>	Antimicrobial, antiviral, analgesic, antioxidant, anti-inflammatory, anticancer, anti-fertility	[8]
2	<i>Adiantum capillus-veneris</i>	Antimicrobial, antioxidant, anti-inflammatory, antidiabetic	[9]
3	<i>A. Philippines</i>	Antioxidant; Thrombolytic	[14]
4	<i>Blechnopsis orientale</i>	Anticancer, antibacterial, antioxidant	[15, 16]
5	<i>Cheilanthes tenuifolia</i>	Antimicrobial, antioxidant, anti-inflammatory, anticancer, Thrombolytic	[17, 18]
6	<i>Christella parasitica</i>	Antimicrobial; bio-pesticidal;	[19, 20]

		autoinflammatory	
7	<i>Drynaria quercifolia</i>	Anti-inflammatory, anti-rheumatoid, analgesic	[7, 21, 22]
8	<i>Lycopodium cernuum</i>	Hypoglycaemic, reduction of blood pressure	[23, 24]
9	<i>Lygodium circinnatum</i>	Antioxidant	[25]
10	<i>Microsorium punctatum</i>	Anti-inflammatory	[26]
11	<i>Nephrolepis cordifolia</i>	Hepatoprotective, antimicrobial	[27]
12	<i>Pteris vittata</i>	Antibacterial, antioxidant	[28]
13	<i>Pyrosia lanceolata</i>	Antioxidant	[29]
14	<i>Selaginella plana</i>	Antimicrobial	[30, 31]

*Adiantum philippines**Adiantum capillus-veneris**Gleichenia dichotoma**Lycopodium cernuum**Pteris vittata**Pteris sp.**Drynaria quercifolia**Cheilanthes tenuifolia**Selaginella plana***Figure 4:** Photographs of selected seedless vascular plants from USTM campus.

CONCLUSION

USTM campus harbours various seedless vascular plant species. Seedless vascular plants remained as one of the most overlooked group of plants. We strongly recommend further in-depth explorations within and outside the campus, and Ri-Bhoi District. This will give a clear understanding on the present status of seedless vascular plants in the region. Future research on the diversity and functional ecological roles of seedless vascular plant is expected to enhance our understanding on their functional role in regional ecosystem.

Conflict of Interest: The authors have no conflict of interest to declare.

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