Pteridological Research ISSN: 2319 - 1910 (Print)

Ecological Diversity of Pteridophytes in Puliyarai forest, Southern Western Ghats, Tirunelveli District, Tamil nadu

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Received: 13 March 2019 / Accepted: 11April 2019/ Published Online:15 June, 2019
http://www.gtrpcompany.com/jpr.htm

Citation: Maridass M, Raju G. Ecological Diversity of Pteridophytes in Puliyarai forest, Southern Western Ghats, Tirunelveli District, Tamil nadu . Pteridological Research,2019, 8(1):1-4.

Abstract

The aim of this paper was to explore the ferns and fern allies and ecological diversity of Puliyarai forest, Southern Western Ghats, Tirunelveli District, Tamil nadu. An intensive field study of ferns and fern-allies of Puliyarai forest, Southern Western Ghats, Tirunelveli District, Tamil nadu during in the year 2017-2018. The exploration study, ecological diversity, importance value index, frequency, density and abundance were determined. The results of a total of 15 species of pteridophytes belonging to 14 genera and 11 families have been observed. The conclusion of the present study observed that pteridophyte species were well grown in the raining season.

Keywords: Pteridophytes, Puliyarai, Southern Western Ghats Tamil Nadu.

1 INTRODUCTION

Ferns are the most diverse group and the oldest lineage of vascular plants and the second most species after angiosperms with approximately 12,000 species [1]. In India with a highly variable climate has a rich pteridophyte diversity. The Western Ghats is one of the great phyto-geographical importance which constitutes one of the 34 global biodiversity hotspots, on account of exceptional levels of plant endemism because of its diversified topography and varied climatic conditions [1]. Currently, a large number of pteridophytes species are extinction mainly due to the reasonfor fragmentation, degradation and habitat destruction, commercial collection, pathogens, predators and invasive species, climate change and pollution. Indiscriminate collection medicinal purposes and excessive cutting down of forest. So, there is an urgent need for the conservation of pteridophytes which are important for their academic, medical and ornamental values. There are no biodiversity studies conducted in this forest range of Puliyarai hills, Southern Western Ghats, Tirunelveli district. In the present study documentation is attempted related to pteridophyte species that distributed along Puliyarai hills of Tirunelveli district.

2. MATERIALS AND METHODS

The field survey of fern and fern allies were conducted in the during the growing seasons of June 2017 and January 2018. A photograph of each species was taken properly. The collected species of pteridophytes were identified with the help of The Ferns of Southern India [2] and Pteridophyte Flora of the Western Ghats – South India [3]. Importance value index, frequency, density and abundance was determined as per Curtis and McIntosh [4]. The relative abundance of different species were calculated following the simpson's index of Diversity (D) $D = \Sigma n(n - 1)/ N(N-1)$ where N = the total number of organisms of all species and n= the total number of organisms of a particular species.

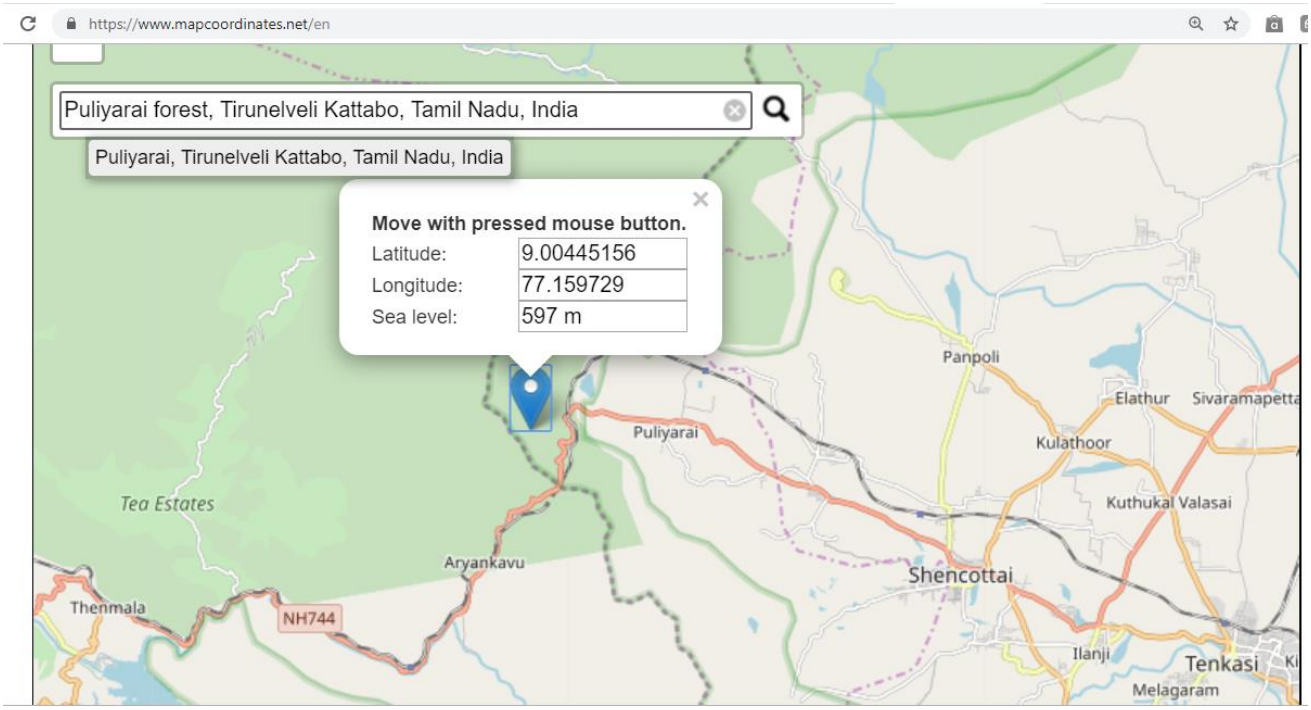

Fig.1: Study area and distribution of pteridophytes

3. RESULTS AND DISCUSSION

In the present study was conducted in the Puliyarai forest, Southern Western Ghats region, Tirunelveli District period from 2017-2018. A total of 15 species of pteridophytes belonging to 14 genera and 11 families have been observed. The maximum number of species in Pteridaceae family was observed. The significance result of beta and alpha diversity index of pteridophyte species was compared with six quadrats in the Puliyarai forest (Table-3 and 4). The Shannon's diversity index value (H1) 2.33 and Simpson's diversity (D)=0.889 was observed by 3 quadrate values for a high diversity of pteridophytes in the Puliyarai forest (Table-2 and 3). Previous studies on the Shannon's diversity index value (H1) 5.54 and Simpson's diversity (D) =2.66 values for pteridophytic species in Mudigere Taluk, Central Western Ghats, Karnataka, South India [5]. The pteridophytes diversity of Western Ghats regions was reviewed by Maridass and Raju [6]. Madhusoodanan (1991) who reported that several rare and endangered ferns of the Western Ghats [7]. Manickam (1995) studied on 44 rare and endangered species in the Western Ghats region of South India [2]. The pteridophytes are moisture and shade loving plants that depend upon the microclimatic conditions of the region for their successful survival. High water availability usually stimulates pteridophyte growth and controls the diversity of favorable habitats [8-11]. Hence necessary measures have to be taken for the protection and conservation of this highly vulnerable plant group [12]. The *ex-situ* approaches are considered to be important tools for pteridophyte conservation as they aid in increasing their survival chances [13]. The use of ex situ conservation techniques, with special focus on endangered plants, has increased since its consideration in the Conservation on Biological Diversity (UNEP, 1992) and in the Global Strategy for Plant Conservation (UNEP, 2002). The conclusion of the present study was observed that a preliminary survey of pteridophytes and also may be a helpful tool for further study on the conservation aspects of RET species of pteridophytes.

Table-1: Identification of pteridophytes

Sl.No.	Species	Family	Current Status
1.	*Actinopteris radiata* L.	Pteridaceae	Common
2.	*Adiantum lunulatum* Burm	Pteridaceae	Common
3.	*Adiantum capillus* - veneris L.	Pteridaceae	Common
4.	*Pteris biaurita* L.	Pteridaceae	Common
5.	*Ceratopteris thalictroides* (L) Brongn	Parkeriaceae	Common
6.	*Christella dentata* (Forssk.) L.,	Thelypteridaceae	Common
7.	*Diplazium esculentum* (Retz.) Sw.,	Thelypteridaceae	Common
8.	*Helminthostachys zeylanica* (L.) Hook.,	Ophioglossaceae	Rare

9.	*Lygodium flexuosum* (Linn.) Sw.,	Schizaeceae	Common
10.	*Marsilea minuta* L.	Marsileaceae	Common
11.	*Nephrolepis biserrata* (Sw.) Schott	Nephrolepidaceae	Common
12.	*Stenochlaena palustris* (Burm.f.)	Blechnaceae	Common
13.	*Drynaria quercifolia* (L.) J. Sm.	Polypodiaceae	Common
14.	*Cyathea nilgirensis* Holttum	Cyatheaceae	Rare
15.	*Selaginella bryopteris* L.	Selaginellaceae	Common

Table-2: Beta diversity of pteridophytes in Puliyarai regions

Beta diversity

Summary | Pairwise comparisons

Whittaker

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
Plot 1	0	0.12	0.076923	0.16667	0.12	0.25
Plot 2	0.12	0	0.04	0.043478	0.083333	0.13043
Plot 3	0.076923	0.04	0	0.083333	0.04	0.16667
Plot 4	0.16667	0.043478	0.083333	0	0.13043	0.18182
Plot 5	0.12	0.083333	0.04	0.13043	0	0.13043
Plot 6	0.25	0.13043	0.16667	0.18182	0.13043	0

Table-3: Alpha diversity of pteridophytes in Puliyarai regions

Alpha diversity indices

Numbers | Plot

	Plot 1	Lower	Upper	Plot 2	Lower	Upper	Plot 3	Lower	Upper	Plot 4	Lower	Upper
Taxa_S	13	12	13	12	12	12	13	13	13	11	11	11
Individuals	82	82	82	81	81	81	74	74	74	62	62	62
Dominance_D	0.1553	0.1258	0.2055	0.1434	0.116	0.1943	0.1143	0.1008	0.1508	0.1093	0.1035	0.1493
Simpson_1-D	0.8447	0.7942	0.8742	0.8566	0.8057	0.8837	0.8857	0.8492	0.8992	0.8907	0.8507	0.8965
Shannon_H	2.131	1.942	2.267	2.188	1.997	2.294	2.333	2.152	2.409	2.294	2.108	2.324
Evenness_e^H/S	0.6481	0.5463	0.745	0.7429	0.6141	0.8262	0.793	0.6616	0.8558	0.9011	0.7487	0.9291
Brillouin	1.911	1.738	2.036	1.969	1.792	2.068	2.079	1.914	2.148	2.033	1.864	2.06
Menhinick	1.436	1.325	1.436	1.333	1.333	1.333	1.511	1.511	1.511	1.397	1.397	1.397
Margalef	2.723	2.496	2.723	2.503	2.503	2.503	2.788	2.788	2.788	2.423	2.423	2.423
Equitability_J	0.8309	0.7635	0.8848	0.8804	0.8038	0.9232	0.9096	0.8389	0.9393	0.9566	0.8793	0.9693
Fisher_alpha	4.351	3.872	4.351	3.893	3.893	3.893	4.57	4.57	4.57	3.886	3.886	3.886
Berger-Parker	0.2805	0.2073	0.378	0.284	0.1975	0.3704	0.1757	0.1486	0.2703	0.1774	0.1452	0.2742
Chao-1	14	12.33	23	12	12	15	13	13	16	11	11	12

Plot 5	Lower	Upper	Plot 6	Lower	Upper
12	12	12	11	11	11
79	79	79	56	56	56
0.1428	0.1207	0.1844	0.1237	0.1097	0.1684
0.8572	0.8156	0.8793	0.8763	0.8316	0.8903
2.147	1.986	2.261	2.218	2.032	2.292
0.7134	0.607	0.7997	0.835	0.6939	0.8991
1.93	1.779	2.034	1.945	1.778	2.011
1.35	1.35	1.35	1.47	1.47	1.47
2.517	2.517	2.517	2.484	2.484	2.484
0.8641	0.7991	0.91	0.9248	0.8476	0.9557
3.938	3.938	3.938	4.095	4.095	4.095
0.2405	0.1772	0.3418	0.2143	0.1607	0.3214
12.33	12	18	11	11	14

4 ACKNOWLEDGEMENTS

This research has been supported by University Grants Commission, New Delhi for financial assistance.

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