



RESEARCH ARTICLE

PTERIDOPHYTE DIVERSITY IN MUDIGERE TALUK, CENTRAL WESTERN GHATS, KARNATAKA, SOUTH INDIA

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ABSTRACT

Twenty six species of Pteridophytes belonging to seventeen families were documented with distribution study was carried out in the forest of Mudigere taluk located in Chikmagalur district of Central Western Ghats. *Selaginella monospora* Spring. was observed as higher importance value index followed by *Adiantum philipense* L., *Pteris biaurita* L., *Adiantum concinnum* Humb. & Bonpl. ex Wild. and *Tectaria paradoxa* (Fee) Sledge. The Shannon's diversity index value (H^1) and Simpson's diversity (D) values for pteridophytic species in study area showed high diversity and species richness.

INTRODUCTION

India has a rich and diversified wealth of pteridophytic flora due to its varied topographic climatic condition and its geographical positions. Many comprehensive pteridophytic survey have already been done in India by Beddome (1883, 1892) to Fraser Jenkins (2010) with filled the gap in our knowledge relating to the pteridology. Dixit (1984) has reported 1050 species and Chandra *et al.*, (2008) put the number of pteridophytic species at 1150 from Indian region. Recently Fraser Jenkins (2010) revised pteridophytic numbers to be 1000 species in India including pteridophytes of Arunachal Pradesh (Fraser-Jenkins & Benniamin, 2010). Khullar (1994, 2000) listed 360 species of pteridophytes from Western Himalaya with 399 pteridophytes given by Fraser-Jenkins (2010). Western Ghats supported 349 species out of 1100 to 1200 species of fern and fern allies in India (Manickam & Irudayaraj, 1992). In Central Western Ghats, Karnataka region also richest pteridophytic diversity including Chikmagalur district (Sukumaran *et al.*, 2008, 2009; Deepa *et al.*, 2011 ; Nataraja *et al.*, 2011). The present study was under taken for no information relating to the distribution of different taxa of pteridophytes in forest of Mudigere taluk region.

MATERIALS AND METHODS

The study area lies between 13° 08' to 13° 53' N latitude and between 75° 04' to 76° 21' E longitude. The altitude is 915 meters above m.s.l. and the rain fall exceeds 2500 mm. It encompasses area of 115 km² of which 15% covers in forest area which is around 30,604 hectare. A survey of Pteridophytes in study area conducted during the period of 2009 to 2011. A total of 23 transects each measuring 50x2 were laid in forest of Mudigere region. Terrestrial, epiphytic, lithophytic, and hydrophytic forms of Pteridophytes were recorded. In case of epiphytic form present on large tree considered as one colony and free floating hydrophytic form present in water sources also considered as one. Diagnostic features of all the specimens were studied and relevant field notes were made on fresh plant materials. Identification of specimens were made by referring to available literature and Pteridophyte floras (Beddome, 1863, 1865, 1883; Clarke 1880, 1961; Blatter *et al.*, 1922; Tryon & Tryon, 1982; Bir, 1987; Khullar, 1994, 2000; Verma 2005 & 2008; Dixit, 1984; Chandra, 2008). Authentications of the species were done with the help of Prof. S P Khullar and Mr. C R Fraser-Jenkins. All the collected specimens were properly processed and the herbariums have been deposited in the department of Applied Botany, Kuvempu University, and Shankaraghatta. For nomenclature, Fraser-Jenkins (2008) has been followed.

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Statistical analysis

Data on various pteridophytic characters in different transect were collected and analyzed through statistical methods (Shukla, 2001; Tuomisto 2000; Deepa et al., 2012). Density is an expression of the numerical strength of a pteridophytic species where the total number of individuals of each species in all the transects is divided by the total number of transects studied. Frequency refers to the degree of dispersion of individual pteridophytic species in an area and usually expressed in terms of percentage occurrence. It was studied by sampling the study area at several places at random and recorded the name of the species that occurred in each sampling units. Abundance is the study of the number of individuals of different species in the community per unit area. By transects method, samplings are made at random at several places and the number of individuals of each species was summed up for all the transects divided by the total number of transects in which the species occurred. Relative density is the study of numerical strength of a species in relation to the total number of individuals of all the species.

The degree of dispersion of individual species in an area in relation to the number of all the species occurred considered as Relative frequency. Importance Value Index is used to determine the overall importance of each species in the community structure. In calculating this index, the percentage values of the relative frequency, relative density and relative dominance are summed up together and this value is designated as the Importance Value Index or IVI of the species. Based on the data of the occurrence of the species in the transects by Shannon's diversity index (H^1) was calculated which is represented by formula $(H^1) = -\sum \pi_i \ln \pi_i$, where $\pi_i = (n_i/N)$. Simpson's diversity index was calculated by formula $(D) = \sum [n_i(n_i-1)/N(N-1)]$, Where, 'n_i' is the Number of individuals of the ith species and 'N' represented as total number of individuals.

RESULTS AND DISCUSSION

A total of 788 individuals recorded from 23 transects in study area. They are 26 species and 22 genera belonging to 17 families are arranged alphabetically in Table 1. The Pteridophytes of various habitats such as terrestrial, epiphytes, lithophytes and hydrophytes found in this region. The majority of species recorded as terrestrial (21), followed by epiphytic (3), lithophytic (2) and aquatic (2). The populations from different localities are found to be distributed by various means at study region (Fig.1). The genus *Adiantum* commonly occurring as terrestrial habitat and has three species in this study area. *Adiantum philipense* L. (20.13) densely populated in study area followed by *Selaginella monospora* Spring. (19.91), *Adiantum concinnum* Humbl. & Bonpl. ex Wild. (15.39), *Tectaria paradoxa* (Fee) Sledge (12.35), *Pteris biaurita* L. (11.96), *Aleuritopteris anceps* (Blanf.) Panigrahi (8.26), *Adiantum capillus-veneris* L. (7.35), *Pteridium revolutum* (Blume) Nakai (7.30), *Blechnum orientale* L. (5.17), *Dicranopteris linearis* (Burm.f.) Underw. (5.13), *Odontosoria tenuifolia* (Lam.) J. Sm. (4.30), *Marselia minuta* L. (4.6), while lowest for *Angiopteris helferiana* C.Presl (0.13) and one more interesting climbing fern was *Lygodium flexuosum* (L.) Sw. (0.13). *A. anceps* reported here was lesser known fern from the W. and C. Himalaya (Khullar 1976). *Parahemionitis cordata* (Hook. & Grev.) Fraser-Jenk. (38.0), aquatic fern *M. minuta* (32.6), *A. concinnum* (27.23), *A. philippense* (25.72), *A. capillus-veneris* (24.14) and *S. monospora* Spring. (24.10) found to be more abundant pteridophytic species in study area. While *Azolla pinnata* subsp. asiatica R.M.K. Saunders & K. Fowler (2.24), *A. helferiana* (3.0), *L. flexuosum* (3.0), *Drynaria quercifolia* (L.) J. Sm (4.0) and *Lepisorus nudus* (Hook.) Ching (4.0) were recorded as less abundance. The maximum frequency found in *S. monospora* (0.82) followed by *P. biaurita* (0.78), *A. philippense* (0.78), *T. paradoxa* (0.73), while *L. flexuosum* (0.04), *Lycopodiella cernua* (L.) Pic.Serm.

Table 1. Pteridophytic species in forest of Mudigere taluk, Karnataka

S.No.	Name of the species	Family	Herbarium number	Habitat
1	<i>Adiantum capillus-veneris</i> L.	Adiantaceae	KU/TT/09-DPN02	T & L
2	<i>Adiantum concinnum</i> Humbl. & Bonpl. ex Wild.	Adiantaceae	KU/NT/09-DPN23	T
3	<i>Adiantum philipense</i> L.	Adiantaceae	KU/TT/09-DPN03	T
4	<i>Aleuritopteris anceps</i> (Blanf.) Panigrahi	Pteridaceae	KU/TT/09-DPN22	T & L
5	<i>Angiopteris helferiana</i> C.Presl	Marattiaceae	KU/NT/09-DPN21	T
6	<i>Arachniodes sledgei</i> Fraser-Jenk.	Dryopteridaceae	KU/ST/11-DPN34	T
7	<i>Azolla pinnata</i> R. Br. Subsp. asiatica R.M.K Saunders & K. Fowler	Azollaceae	KU/MT/11-DPN49	H
8	<i>Blechnum orientale</i> L.	Blechnaceae	KU/ST/09-DPN06	T
9	<i>Dicranopteris linearis</i> (Burm.f.) Underw.	Gleichenaceae	KU/MT/09-DPN24	T
10	<i>Drynaria quercifolia</i> (L.) J. Sm	Polypodiaceae	KU/NT/09-DPN01	E
11	<i>Lepisorus nudus</i> (Hook.) Ching	Polypodiaceae	KU/TT/09-DPN08	E
12	<i>Lycopodiella cernua</i> (L.) Pic.Serm.	Lycopodiaceae	KU/TT/10-DPN36	T
13	<i>Lygodium flexuosum</i> (L.) Sw.	Lygodaceae	KU/MT/09-DPN13	T
14	<i>Marselia minuta</i> L.	Marsileaceae	KU/TT/10-DPN46	H
15	<i>Microsorium zippellii</i> Fraser-Jenk.	Polypodiaceae	KU/TT/09-DPN14	T
16	<i>Nephrolepis undulate</i> (Afzelius ex Sw.) J. Sm.	Oleandraceae	KU/MT/10-DPN48	T
17	<i>Odontosoria tenuifolia</i> (Lam.) J. Sm.	Lindsaeaceae	KU/TT/09-DPN18	T
18	<i>Parahemionitis cordata</i> (Hook. & Grev.) Fraser-Jenk.	Pteridaceae	KU/CT/09-DPN20	T
19	<i>Pityrogramma calomelanos</i> (L.) Link	Hemionitadaceae	KU/ST/11-DPN28	T
20	<i>Pteris biaurita</i> L.	Pteridaceae	KU/TT/09-DPN15	T
21	<i>Pteris pellucida</i> C.Presl	Pteridaceae	KU/NT/09-DPN16	T
22	<i>Pteris vittata</i> L.	Pteridaceae	KU/KT/09-DPN17	T
23	<i>Pteridium revolutum</i> (Blume) Nakai	Dennstaedtiaceae	KU/TT/09-DPN19	T
24	<i>Pyrrosia porosa</i> (Pr.) Hovenkamp	Polypodiaceae	KU/TT/10-DPN35	E
25	<i>Selaginella monospora</i> Spring.	Selaginellaceae	KU/ST/09-DPN49	T
26	<i>Tectaria paradoxa</i> (Fee) Sledge	Thelypteridaceae	KU/TT/09-DPN25	T

Note: Habitat: T= Terrestrial, E= Epiphytic, L= Lithophytic, H= Hydrophytic.

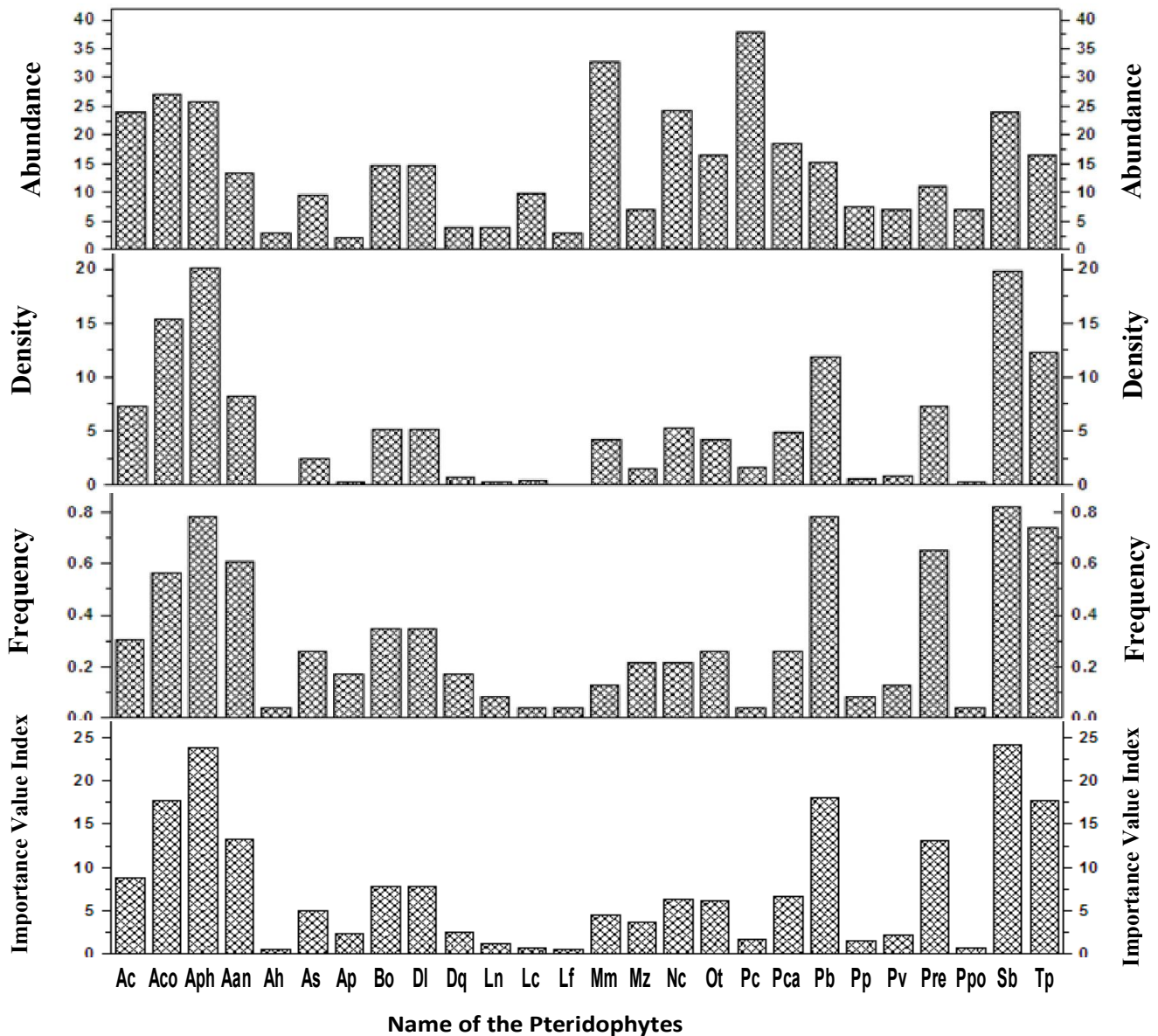


Fig.1. Pteridophytic species diversity with their composition in forest of Mudigere taluk, Karnataka, Central Western Ghats, South India

Note:Ac: *Adiantum caudatum* L., Aco: *Adiantum concinnum* Humb. & Bonpl. ex Wild. Aph: *Adiantum philippense* L., Aan: *Aleuritopteris anceps* (Blanf) Panigrahi, Ah: *Angiopteris helferiana* C.Presl, As: *Arachniodes sledgei* Fraser-Jenk., Ap: *Azolla pinnata* R. Br., Bo: *Blechnum orientale* L., DI: *Dicranopteris linearis* (Burm.f.) Underw., Dq: *Drynaria quercifolia* (L.) J. Sm., Ln: *Lepisorus nudus* (Hook.) Ching, Lc: *Lycopodiella cernua* (L.) Pic.Serm., Lf: *Lygodium flexuosum* (L.) Sw., Mm: *Marselia minuta* L., Mz: *Microsorium zippellii* Fraser-Jenk., Nc: *Nephrolepis cordifolia* (L.) C.Presl., Ot: *Odontosoria tenuifolia* (Lam.) J.Sm., Pc: *Parahemionitis cordata* (Hook. & Grev.) Fraser-Jenk., Pca: *Pityrogramma calomelanos* (L) Link, Pb: *Pteris biaurita* L., Pp: *Pteris pellucida* C.Presl, Pv: *Pteris vittata* L., Pre: *Pteridium revolutum* (Blume) Nakai, Ppo: *Pyrrosia porosa* (Pr.) Hovenkamp, Sb: *Selaginella monospora* Spring., Tp: *Tectaria paradoxa* (Fee) Sledge.

(0.04), *Pyrrosia porosa* (Pr.) Hovenkamp (0.04) were observed as low frequency. *Parahemionitis cordata* (Hook. & Grev.) Fraser-Jenk. was observed as low frequency (0.04) with high abundant growth and endangered due to anthropocentric activities (Sen *et al.*, 2011). *S. monospora* was reported by 458 individuals with higher importance value index of 24.20 and followed by *A. philippense* (23.82), *P. biaurita* (18.03), *A. concinnum* (17.80), *T. polymorpha* (17.78). The Shannon's diversity index value (H^1) 5.54 and Simpson's diversity (D) = 2.66 values for pteridophytic species in study area. It is concluded that a total of 26 taxa were found in forest of Mudigere Taluk, evidencing pteridophyte richness in the area. Pteridaceae stands the dominant family of the study area with

five species followed by Polyodiaceae with four species, Adiantaceae represented by three species and 14 families with a single species each. *Adiantum* and *Pteris* are largest genera with a maximum number of 3 species each. The existing deforestation and habitat fragmentation would pose serious threat to growth of wild pteridophytic species. Henceforth documentation and distribution studies of pteridophytic diversity needs to be given top priority to help conservation resources and preservation of the disappearing of species.

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