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Diversity and Distribution of Pteridophytic flora of Punyagiri hill, Vizianagaram District, Andhra Pradesh, India

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Abstract

The present paper deals with the diversity and distribution of Pteridophytic flora in Punyagiri hill. It is located 18^0 06' 70",18^0 06' 68",latitudes and 83^0 06' 72",83^0 06' 40" longitudes , 55 km away from Visakhapatnam. Quadrate method was adopted to calculate the IVI. Sampling was carried out with 0.5x0.5m^2 quadrate; fifteen quadrate samples were taken in three seasons. A total no of 13 species belonging to 10 genera and 9 families were recorded. Maximum relative density was reported for *Selaginella involvense* (10.6) and *Pteris vittata* (8.4). Minimum relative density and relative frequency were reported in the species *Nephrolepis cordifolia*(5.5) and *Pteris pellucida* (6.3). The maximum IVI was reported in *Selaginella involvens* (30.2) fallowed by *Pteris vittata* (26.2), *Adiantum lunulatum*(25.4), *Pleopeltis pallida* (24.5) and minimum in *Nephrolepis cordifolia* (18.6). It is concluded that the population of Pteridophytes in this region is heterogeneous.

Key Words: Diversity, Pteridophytes, Punyagiri hill,Andhra Pradesh, India

Introduction

Pteridophytes are known as botanical snakes and the oldest group of plants but advanced flora among the cryptogams due to presence of vascular structures and heterosporus nature. These groups of plants are always interesting to botanists as well as layman for the nature of habitat and morphology. They are widely distributed in tropical and temperate zones at higher altitudes; they prefer to grow in moist, shade habitats. In India flora of Pteridophytes are distributed in the Himalaya, Eastern Ghats and Western Ghats. Several authors have reported and studied the distribution and ethno botanical importance of Ferns [1-4]. In the present study an attempt had been made to study the distribution and species density of Pteridophytic flora of Punyagiri hill near Visakhapatnam of Andhra Pradesh.

Material and Methods

Punyagiri located 18^0 06' 70",18^0 06' 68",latitudes and 83^0 06' 72",83^0 06' 40" longitudes, 55 km away from Visakhapatnam, hill is occupied by the abundant growth of bryophytes, pteridophytes along with angiospermic flora , several perennial streams are supporting the flora of this region. High humidity, low temperature favours the luxuriant growth of pteridophytes of this region. Environmental parameters such as Temperature, and Humidity were measured by the thermometer and hygrometer respectively and data on rainfall was collected from cyclone warning centre, Visakhapatnam. Sampling was carried out with 0.5x0.5m quadrate, quadrates was placed and count the number of plant species present in each quadrates. Fifteen quadrate samples were taken in three seasons.

The phytosociological attributes: abundance, density and frequency and their relative values and Importance Value Index (IVI) were calculated the following principles of [5-7].

$$\text{Frequency (\%)} = \frac{\text{Total number of quadrates in which the species occur}}{\text{Total number of quadrates studied}} \times 100$$

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of quadrates studied}}$$

$$\text{Abundance} = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of quadrates in which the species occurred}}$$

$$\text{Relative frequency} = \frac{\text{Frequency of individuals of a species}}{\text{Total frequency of all species}} \times 100$$

$$\text{Relative density} = \frac{\text{Density of individu als of a species}}{\text{Total density of all species}} \times 100$$

$$\text{Relative abundance} = \frac{\text{Abundance of individuals of a species}}{\text{Total abundance of all species}} \times 100$$

Importance Value Index = Relative density + Relative frequency + Relative abundance

Based on [8] the frequency classes of pteridophytes were determined. There are 5 frequency classes, i.e. 'A' class with the species of frequency ranging from 1-20%; 'B' class 21-40%; 'C' class 41-60%; 'D' class 61-80% and 'E' class 81-100%. Further the pteridophytes frequency patterns were compared with the normal frequency pattern of Raunkiaer (A>B>C>=D<E). Based on the frequency pattern of the community, the homogeneity and heterogeneity of the vegetation. If the values are high with respect to B, C and D,

then the community is said to be heterogeneous where as higher values of E indicates the homogeneous nature.

Results and Discussion

Data on Environmental parameters such as air temperature, humidity and rainfall was collected from the study site during monsoon, postmonsoon and premonsoon seasons. Table-1 shows the data above parameters. Temperature of the study area ranges from 24.5 to 31.2^{0}C, maximum temperature was recorded in June 2010 and minimum temperature in December month (Table-1) Humidity of the atmosphere various from 69 % to 92 % with maximum humidity is July and minimum in December 2010. Maximum rain fall was recorded in August month (182.0mm) no rainfall was recorded in December, February, March and April months. Rainfall data was collected in the cyclone warning centre, Visakhapatnam. They are many running streams on the hill which provided wet, cool environment during all the seasons of the year. Table -2 shows the total number of plots.

In the punyagiri hill 13 species have been recorded in the present study and they are belongs to 10 genera and 9 families. Species composition of different plant population was shown in (Table-3). Maximum relative density was reported for *Selaginella involvense* (10.643) and *Pteris vittata* (8.4322). Minimum relative density and relative frequency were reported in the species *Nephrolepis cordifolia* (5.5432) and *Pteris pellucida* (6.383). The maximum IVI was reported in *Selaginella involvens* (30.2089) fallowed by *Pteris vittata* (26.2555), *Adiantum lunulatum*(25.4103), *Pleopeltis pallida* (24.5498) and minimum in *Nephrolepis cordifolia* (18.6584) Quadrate studies records that species like *Adiantum caudatum, Adiantum lunulatum, Hemionitis arifolia, Pleopeltis pallida, Pteris pellucida, Pteris vittata*, *Selaginella involvense Marselia quadrifolia*, *Ophioglossum pedunculossum* and *Nephrolepis cordifolia* are recorded in more number of times and dominates the some regions of the hill slopes. According to Raunkiaer (1934), the frequency class D is greater than A, B and C then the community is said to be heterogeneous.

Distribution of pteridophytic flora is controlled by the environmental factors such as temperature, rainfall and humidity. And deep ravines, continuous running streams, water channels thick evergreen forests are determine the canopy of this beautiful vegetation. Species distribution at different heights of hill slope varied based on their withstanding capacity to those conditions. Few genera such as *Adiantum, Heminonitis, Pteris, Selaginella* distributed in higher and lower elevations, while some genera restricted to lower elevations and their abundance is minimum in the present study. These studies agrees with earlier studies of Maarten and Gomez, [9] at pteridophytes of Chirripo National Park, Costa Rica, and [10] at pteridophytes in Mount Pangasugan.

Enumeration

Adiantum caudatum: Linn., Mant. 308. 1771. Family: Adiantaceae.

A small fern with spreading leaves and a marked walking habit . The rhizome is 0.5 cm thick short. The leaves spread on all sides and are in two close spirals on the rhizome. The sporongia are small and the annulus is generally 14- 16 cells long. Spores are deep brown and granulated.

Adiantum lunulatum: Burm., Fl. Ind 235. Syn: *Adiantum philippense*. Linn., sp. Pl. Family: Adiantaceae

Stipes 10-15 cm long; bronish, hairy; polished; Fronds 15-25 cm long. Often rooting at the tip; pinnate stalked, 1-1.5 cm long, slightly lobed; sori linear.

Blechnum orientale: Linn., Sp. Pl. Family: Blechenaceae.

Caudex erect stout at the extremity and as well as the short stipites clothed with long falcate subulate glossy scales, fronds 24-120 cms long, ovate. lanceolate, pinnae numerous approximate horizontal, straight or decurved 15-24 cms.

Hemionitis arifolia (Burm.) Moore in Ind. Syn: *Aspidium arifolium* Berm. F., *Hemionitis cordata* (Roxb.) Bedd Family: Adiantaceae.

A small herb, chordate leaves, entire margin acute tip. Frequently on rock boulders along the streams.

Lygodium flexuosum (L.) SW.in. Syn: *Ophioglossum flexuosum*, Sp.Pl. Family: Schizaeaceae

Twining shrub, margin finely serrate, pinnae 3-nerved basal ones in pairs .fertile pinnaelarger than broad, sori linear.

Lygodium scandens: (L) Sw. in Schard. Journ. Syn: *Ophioglossum scandens*. L. Sp.Pl. *Lygodium microphyllum* R.Br. Prodr. Family: Schizaeaceae

A scandent shrub long twining rachis, pinnules 3-nerved, terminal rachis lanceolate, fertile pinnae deltoid scarcely longer than broad; sori in rows. Frequent along the streams.

Marsilea quadrifolia Linn., Sp.Pl. Family: Marsileaceae

A marshy herb, about 4-6 cm height, conspicuous by quadrately lobed leaves.

Nephrolepis cordifolia Linn. Prest., Tent. Syn: *Polypodium cordifolium* Linn, Sp. Pl. Family: Nephrolepidaceae

Stipes tufted, hairy, scaly, fronds up to 80cm long, pinnate sori in single row about mid way between edge and midrib; inducium firm, kidney shaped.

Ophioglossum pedunculosum; Desv. Berl. Mag. Syn: *Ophioglossun reticulatum* Quoad Bedd., Family: Ophioglassaceae.

Erect herb; tender plant grown on moist soil covered rocks.Reproductive parts produced during rainy seasons.

Pleopeltis pallida Linn , Family Polypodiaceae

It is a perennial herb, Imparipinnate fronds 25-30 cm long, grown in rocky area.

Pteris pellucida . Presl., Haenk. Variety: Stenophylla Family: Pteridaceae.

Stipes naked, fronds 30-40 cm long, egg shaped to lance shaped, pinnate, pinnae few, usually sessile. Lanceolate up to about 2cm broad, surface glossy, rachis naked.

Pteris vittata Linn. Sp. Pl. Syn: *Pteris longifolia* auct. Quoad. Family: Pteridaceae.

Rhizome creeping, stipes scaly; fronds broadly lanc-shaped in outline 30-50x 8-18 cms wide often narrowed below; pinnate with and odd pinnate at the apex, pinnae numerous on each side sessile rachis naked .

Selaginella involvense: (SW.) Sw.in. Bull. Syn: *Lycopodium involvense.* Sw., syn. Fil. 182. No Family: Selaginellaceae.

A small creeping lightgreen plants, sprout well during rainy season.

Table-1 Environmental characteristics during January-December-2010

S.No	Seasons	Humidity 4Pm	Monthly Rainfall	Temperature °C
1	January	72 %	100 mm	24.8
2	February	71 %	0 mm	25.6
3	March	78 %	0 mm	27.0
4	April	76 %	0 mm	29.0
5	May	78 %	105mm	30.0
6	June	90 %	96 mm	31.2
7	July	92 %	174 mm	29.5
8	August	74 %	182 mm	28.0
9	September	75 %	96.0mm	26.1
10	October	71 %	102.0mm	25.2
11	November	70 %	232.0mm	24.8
12	December	69 %	24.0mm	24.5

Table-2 : Total no of species

S.No	Name of the Plant	Family
1	*Adiantum caudatum* Linn	Adiantaceae
2	*Adiantum lunulatum* Burm	Adiantaceae
3	*Blechnum orientale* Linn	Blechnaceae
4	*Hemionitis arifolia* (Burm.)	Adiantaceae
5	*Lygodium flexiosum* Linn	Schizaceae
6	*Lygodium scandens* Linn	Schizaceae
7	*Marselia quadrifolia* Linn	Marseliaceae
8	Nephrolepis cordifolia Linn	Nephrolepidaceae
9	*Ophioglossum pedunculossum* Desv. Berl	Ophioglossaceae
10	*Pleopeltis pallida* Linn	Polypodiaceae
11	*Pteris pellucida* Presl	Pteridaceae
12	*Pteris vittata* Linn	Pteridaceae
13	*Selaginella involvense* Sw.in Bull	Selaginellaceae

Table-3 Diversity and Distribution

S.No	Name of the Species	TNO	TNI	F%	F.C	D	A	R.F	R.D	R.A	IVI
1	*Adiantum caudatum*	12	74	80	D	4.9333	6.1666	8.5106	8.204	7.4283	24.1429
2	*Adiantum lunulatum*	12	80	80	D	5.3333	6.6666	8.5106	8.8691	8.0306	25.4103
3	*Blechnum orientale*	11	66	73.3333	D	4.4	6	7.8014	7.3171	7.2276	22.3461
4	*Hemionitis arifolia*	12	67	80	D	4.4667	5.5833	8.5106	7.428	6.7257	22.6643
5	*Lygodium flexuosum*	10	72	66.6667	D	4.8	6	7.0922	7.9823	7.2276	22.3021
6	*Lygodium scandens*	10	62	66.6667	D	4.1333	6.2	7.0922	6.8736	7.4685	21.4343
7	*Marsilia quadrifolia*	10	66	66.6667	D	4.4	6.6	7.0922	7.3171	7.9504	22.3597
8	*Nephrolepiscordifolia*	10	50	66.6667	D	3.3333	5	7.0922	5.5432	6.023	18.6584
9	*Ophioglossum pedunculossum*	9	53	60	C	3.5333	5.8888	6.383	5.8758	7.0937	19.3525
10	*Pleopeltis pallida*	11	76	73.3333	D	5.0667	6.909	7.8014	8.4258	8.3226	24.5498
11	*Pteris pellucida*	8	56	53.3333	C	3.7333	7	5.6738	6.2084	8.4322	20.3144
12	*Pteris vittata*	12	84	80	D	5.6	7	8.5106	9.3127	8.4322	26.2555
13	*Selaginella involvense*	14	96	93.3333	E	6.4	8	9.9291	10.643	9.6368	30.2089
		141	902	940		60.1332	83.0143	99.9999	100.0001	99.9992	299.9992

TNO =Total number of occurrence TNI =Total number of individuals F%= Frequency
D= Density A= Abundance RF= Relative Frequency
RD= Relative Density RA= Relative Abundance IVI= Important Value Index
FC= Frequency Clas

References

[1] Khullar, S.P., Y.P.S., Pangtey; S.S. Samant; R.S. Rawal; P. Singh. 1991. Ferns of Nainital Bisen Singh Mahendra Pal Singh, Dehradun.

[2] Khullar, S.P.1994&2000. An Illustrated Fern Flora of the West Himalaya Vol.I&II. Dehradun.

[3] Dixit, R.D. 1975. Ferns much- neglected group of medicinal plants I. J Res. Ind. Med 10:74- 90.

[4] Pande and Pande P.C.1991. An Illustrated Fern Flora of Kumaun Himalaya Vol. I&II. Bisen Singh Mahendra Pal Singh, Dehradun.

[5] Curtis, J.T., R.P. McIntosh. 1950. The interrelations of certain analytic and synthetic phyto- sociological characters, *Ecology,* Vol.31: 434-455.
[6] Misra, R.1968. Ecology Work Book. Oxford and IBH Publishing Co New Delhi, India.244- 245.
[7] Muller, D. and H. Ellenberg.1974. Aims and Methods of Vegetation Ecology. John Wiley and Sons, New York.
[8] Raunkiaer, C.1934.The Life forms of Plants and Statistical Plant Geography.Clarendon Press, Oxford.
[9] Mareen, K., and P. L. D. Gomez. 1992. Bresesia 37: 67-77.
[10] Beatriz, S., B. Lita and M. Banoc. 1994. Annals of Tropical Research. Vol XVI. 1-8.