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**DISTRIBUTION AND SPECIES ABUNDANCE OF PTERIDOPHYTIC FLORA OF  
G.MADUGULA MANDAL, VISAKHAPATNAM DISTRICT, ANDHRA PRADESH,  
INDIA**

**NARASIMHA RAO GM<sup>1\*</sup> AND LOHITASYUDU K<sup>2</sup>**

**1:** Department of Botany, Andhra University, Visakhapatnam

**2:** Social Forestry Division, Vana Vihar Complex, Visakhapatnam

**Corresponding Author: E mail: gmnrao\_algae@hotmail.com**

**ABSTRACT**

Pteridophytes are first vascular land plants on the earth and distributed in different geographical regions of the world. The present paper deals with the composition and distribution of Pteridophytes in G.Madugula Mandal of the Visakhapatnam District. Quadrature method was used to collect the numerical data on density and abundance of plant populations in the hilly terrains of the study sites. A total twenty samplings were made to analyze the data. Maximum density was reported for the species *Selaginella involvens* and minimum density was recorded for the species *Cyathea gigantea*.

**Keywords: Pteridophytes, Composition, Density, G. Madugula, India**

**INTRODUCTION**

Pteridophytes are beautiful ornamental flora occurs in the temperate & sub tropics of the Globe. They prefers to grow along the running streams, waterfalls of cool zones where air temperature is below 25° C. Tropical ever green forest offers shelter for

the Pteridophytes as epiphytes on trunks and branches of the wild plants. In India luxuriant Pteridophytes flora reported from Himalayas and Northern parts of the country. Several authors [1-4] have studied the pteridophytic flora and its medicinal properties. The

distribution and quantitative study of Pteridophytes of Punyagiri hill near Vizianagaram of Easternghats was studied in deatail [5]. In the present investigation studies were made on quantitative analysis on pteridophytic flora of G. Madugula Mandal of Visakhapatnam District.

**STUDY SITES AND METHODS**

G. Madugula Mandal of Visakhapatnam is located latitudes 18° 10’ and longitudes 87° 79’ above the ground the level. Thick evergreen forest and low air temperature and abundant humidity in this region harbor the

growth of beautiful Orchids and lower groups of plant kingdom. On the hills, numerous Perennial water streams favor the growth of pteridophytic flora in this region. 0.5X 0.5M quadrates were used for collection of numerical data. Quadrates were placed randomly and count the number of plant species present in each quadrates. A total of twenty quadrates samples were taken for estimation of numerical analysis. The phytosociological attributes such as abundance, density and frequency and their relative values were calculated by the following principles of some authors[6, 7].

$$\text{Frequency (\%)} = \frac{\text{Total No. of quadrates in which the species occur}}{\text{Total No. of quadrates studied}} \times 100$$

$$\text{Density} = \frac{\text{Total No. of individuals of a species in all quadrates}}{\text{Total No. of quadrates studied}}$$

$$\text{Abundance} = \frac{\text{Total No. of individuals of a species in all quadrates}}{\text{Total No. of quadrates in which the species occurred}}$$

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

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

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

## RESULTS AND DISCUSSION

Information on climatic parameters of the study sites was gathered from meteorological centre, Visakhapatnam. Data on the environmental features reveals that presence of low temperature and high humidity during the most of the months in a year with cool, moist and shady atmosphere in this region. Maximum number of species of Pteridophytes were reported in these regions where presence of perennial running streams and cool and shady conditions. **Table 1** shows the total number of plants present in the study sites. In G. Madugula Mandal 14 Pteridophytic species have been recorded and they are belongs to 10 genera and 9 families. Species

composition, density and abundance of the different plant species were presented in the **Table 2**. Maximum frequency was reported for the species *Selaginella involvens* (88%) and minimum frequency value was reported for the species *Cyathea gigantea* (46%), species such as *Adiantum caudatum*, *Hemonitis arifolia*, *Pteris pellucid* are having higher frequency values than the remaining plants (**Table 3**). Maximum relative density was reported for the species *Selaginella involvens* (11.9) and *Hemonitis arifolia* (11.8) and minimum relative density values were recorded for the species *Cyathea gigantea* (6.8) and *Ophioglossum pendunculossu*m (8.6).

**Table 1: Pteridophytic Flora of the G. Madugula Mandal of Visakhapatnam**

S. No	Name of the plant species	Family
1.	<i>Adiantum caudatum</i> Linn	Adiantaceae
2.	<i>Adiantum lunulatum</i> Burnn	Adiantaceae
3.	<i>Blechnum orientale</i> Linn	Blechnaceae
4.	<i>Cyathea gigantea</i> (Wall.ex Hook)Holttum	Cyatheaceae
5.	<i>Hemionitis arifolia</i> (Burnn.)	Adiantaceae
6.	<i>Lygodium flexiosim</i> Linn	Schizaceae
7.	<i>Lygodium scandens</i> Linn	Schizaceae
8.	<i>Nephrolepsis cordifolia</i> Linn	Nephrolepidaceae
9.	<i>Ophioglossum pendunculossu</i> m Desv. Berl	Ophioglossaceae
10.	<i>Pleopletis pallida</i> Linn	Polypodiaceae
11.	<i>Pleopletis macrocarpa</i> (Bory ex wild.) Kaulf	Polypodiaceae
12.	<i>Pteris pellucid</i> Presl	Pteridaceae
13.	<i>Pteris vittata</i> Linn	Pteridaceae
14.	<i>Selaginella involvens</i> Sw. in Bull	Selaginellaceae

Table 2: Quantitative Information on the Pteridophytic Species of G. Madugula

S. No	Name of the species	F (%)	D	A	RF	RD	RA
1.	<i>Adiantum caudatum</i> Linn	84	5.2	5.8	11.8	12.1	11.4
2.	<i>Adiantum lunulatum</i> Burnn	77	4.8	5.2	10.2	11.5	10.1
3.	<i>Blechnum orientale</i> Linn	64	4.1	4.9	9.5	9.8	9.7
4.	<i>Cyathea gigantea</i> (Wall.ex Hook)Holttum	46	2.8	3.2	5.8	6.4	6.8
5.	<i>Hemionitis arifolia</i> (Burnn.)	82	5.1	5.9	11.4	11.6	11.8
6.	<i>Lygodium flexiosim</i> Linn	66	4.3	5.4	8.5	9.4	10.2
7.	<i>Lygodium scandens</i> Linn	62	4.1	5.2	7.9	8.9	9.4
8.	<i>Nephrolepis cordifolia</i> Linn	60	3.8	4.6	6.8	7.6	9.2
9.	<i>Ophioglossum pendunculossu</i> m Desv. Berl	54	3.2	4.4	6.2	6.8	8.6666
10.	<i>Pleopletis pallida</i> Linn	76	4.8	5.2	10.4	11.6	10.2
11.	<i>Pleopletis macrocarpa</i> (Bory ex wild.) Kaulf	52	3.2	4.2	6.1	6.7	8.8
12.	<i>Pteris pellucid</i> Presl	78	5.6	6.8	10.8	11.8	11.6
13.	<i>Pteris vittata</i> Linn	72	5.2	5.6	10.6	11.21	10.2
14.	<i>Selaginella involvense</i> Sw. in Bull	88	6.4	7.2	12.2	12.8	11.9

F (%) = Frequency, D= Density, A= Abundance, RF= Relative Frequency, Rd= Relative Density, RA= Relative Abundance

Species such as *Cyathea gigantea* is only tree fern which was entered in the Red data book and these plants are distributed along the running streams. In general flora of Pteridophytes grows in the cool and moist regions but *Cyathea* species grows only along the banks of the streams where continuous water source is available. Species like *Pleopletis macrocarpa* is an epiphyte which prefers to grow on the trunks of the wild mango plants only. Quadrant study on these populations reveals that some species are dominants on the slopes and terrains of the forest. Composition and density of the Pteridophytes is controlled by the climatic

features such as temperature, rainfall and humidity. Genera such as *Adiantum*, *Hemionitis* and *Selaginella* distributed in higher and lower elevations on the hill slopes based on their capacity to survival and withstanding in those conditions, while some genera limited to lower elevations and their density are minimum. These observations are agrees with investigations of earlier authors in different geographical regions of the globe [5, 8].

#### 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 sporangia 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: Blechnaceae.

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

***Cyathea gigantea*** (wall.ex Hook) Holttum. Family : Cyatheaceae

It grows in moist open areas at an altitude of 600-1000m. The trunk of this species is erect and may be as tall as 5M tall or more. Fronds are bi or tripinnate and usually 2-3 m long. Sori are round and indusia are absent.

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

A small herb, cordate 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 pinnae larger 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.

***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 pedunculatum***; Desv. Berl. Mag. Syn: *Ophioglossum reticulatum* Quoad Bedd., Family: Ophioglossaceae.

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.

***Pleopeltis macrocarpa*** (Bory ex wild.) Kaulf. Family : Poly podiaceae Epiphyte or rupicolous within the forest. Rhizome 0.9 to 1.6 mm diameter, bicoloured. Fronds 8-15 cm long, blade lanceolate.

***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 lancshaped 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.

## CONCLUSION

Pteridophytes are the most beautiful ornamental flora, but neglected by the scientific community in our country especially in Andhra Pradesh. Several authors studied the distributional patterns of pteridophytes in different geographical regions of the world. In the present investigation preliminary data was collected on density and abundance of different pteridophytes of the G. Madugula region. A total of 14 species were collected and identified. Distribution of this flora in relation to climatic and environmental features was established. Further studies on ethno botanical and pharmaceutical aspects of pteridophytes of this region will be helpful to find out the medicinal importance and its utility towards the humanity.

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