Chapter-8

ECOLOGY OF THE PTERIDOPHYTES
OF CENTRAL INDIA
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As compared to phanerogams, the pteridophytes do not form dominant vegetation anywhere; except in tropical, subtropical and montane forest with abundance. Their density of population, diversity and abundance of the taxa directly depends on the suitable ecological condition of the area. The successfully completion of life cycle of any taxa without any hindrance, the ecological conditions like availability of water in soil, relative humidity, moisture, forest type coupled with climatic condition and altitudinal variations of the particular region play a vital role for their survival. The availability of soil water and atmospheric humidity are the primary factors for controlling the ecological distribution of pteridophytes. Temperature range, exposure of wind, soil pH, drainage of soil and annual distribution of rain are the secondary factors for their ecological distribution.

In Central India, there are many regions, where the favorable ecological conditions are full fill for the luxuriant growth pteridophytes. Majority of the pteridophytes of Madhya Pradesh and Chhattisgarh regions are restricted to hilly humid and wet places near stream and gorges and away from direct expose of scorching rays of the sun. However, some of the species are adapted to comparatively harsh environs, but typical xerophytes are not much in diversity. Some species are known for their specific ecological conditions. A majority of the species survives only under specific conditions and possesses a narrow range of adaptation. It is interesting to note that the growth of epiphytic species in Central India is very poor.
Some ferns and fern-allies are widespread and others have restricted ranges. Most, however have rather continuous areas of distribution in one part or another part. These distributions are determined by the dispersability of the spore and ability of the plant to establish themselves and thrive over the year, although the ability of fern spores to be carried by wind on animals to new region is one of the ecological factor.

On the basis of their growth pattern, habit and habitat the pteridophytes of Central India (Madhya Pradesh and Chhattishgarh) may be broadly classified into following ecological categories.

(1) **EPHYTIC PTERIDOPHYTES:** The epiphytic fern usually grows on the trunk, barks and branches of trees occurring in moist-shady evergreen forests. In Central India it has been observed that they usually grow on exposed stem of *Mangifera Indica*, *Shorea robusta* and *Ficus* spp. especially during rainy season. They do not grow on conifers bark. Except few species *viz.* *Nephrlepis cordifolia* (L.) Presl, *Lepisorus nudus* (Hook.) Ching, *Drynaria quercifolia* (L.) J. Smith, *Pyrrosia adnascens* (Sw.) Ching etc. there is a total absence of epiphytic fern vegetation in Central India in spite of the fact that annual rainfall is 250 cm. It seems that Sal forests dominating the region do not provide congenial conditions for epiphytic growth. They can survive through rhizome in dry or unfavorable season.

(2) **TERRESTRIAL PTERIDOPHYTES:** These pteridophytes are found mostly in moist shady places, along the road sides, rivers, streams and nalas, where much humus soil is available for their congenial growth. The common species *viz.* *Pteris biauita* L., *P. cretica* L., *Proeuphrum nudatum* (Roxb.) Holtt., *Pseudocyclosorus falcibohus* (Hook.) Ching, *Diplazium esculentum* (Retz.) Sw., *Egenolfia appendiculata*,
Ampelopteris prolifer (Retz.) Copel., Tectaria coadunata (Wall. ex Hook. et Grev.) C. Chr., Christella dentate (Forssk.) Brown. et Jermy, C. parasitica (L.) Le'v. etc are found in the edge of the forest along secondary forests.

Some species viz. Tectaria coadunata (Wall. ex Hook. et Grev.) C. Chr., Pteridium aquilinum (L.) Kuhn, Sphenomeris chinensis (L.) Maxon etc grow along the margin of the forest. However, Blechnum orientale L., Palhinhaea cernua (L.) Franco. et Vasc. in Vasc. et Franco., Dryopteris cochleata (Buch.-Ham. ex D. Don) C. Chr., D. sparsa (Buch.-Ham. ex D. Don) O. Ktze., Selaginella repanda (Desv. ex Poir.) Spring etc are grown commonly on hill slope, moist road cutting and similar such situation.

Along exposed hilly slopes, moist road cutting and similar situations are commonly comes across gregarious growth of Dicranopteris linearis (Burm.) Underrew.

Several species of shade loving tree ferns like Alsophila gigantea Wall. ex Hook., A. balakhrishnanii (Dixit et Tripathi) Dixit and other species viz. Angeopteris evecta (Forst.) Hoffm., Athyrium filix-femina (L.) Roth etc occur in shady alluvial solid around falls or along the river, nala banks.

Pteris vittata L. grows in plains along the nalas and bank of stagnant water bodies in exposed places.

At higher altitude (950 m to 12,00m) the some species grow more luxuriantly. The higher altitude ferns Microlepia strigosa (Thunb.) Presl, Asplenium unilaterale Lamk., A. obscurum Bl., Pteris cretica L. etc grow in moist shady places.

The Equisetum diffusum D. Don and E. ramossissimum Desf. subsp. debile (Roxb. ex Vauch.) Hauke grow on sandy soil near water stream in ravines between 600- 900 m altitude.

(3) CLIMBING PERIDOPHYTES: These ferns are climb on trees and shrubs with the help of their rachis. For example two species
viz., Lygodium flexuosum (L.) Sw. and L. microphyllum (Cav.) R.Br. climber on adjacent bushes at about 1,000 m altitude.

(4) LITHOPHYTIC PTERIDOPHYTES: These pteridophytes usually occur in rock crevices and among rock boulders along water channels in moist or exposed places. They usually grow as epiphytic ferns. They can be grouped into two following categories:

a. Spices growing on exposed rocks, rock-crevices and old brick walls. These species shows xerophytic characters and may retain their original shape and colour in favorable condition like in rainy season viz. Psilotum nudum (L.) P. Beauv., Selaginella broteris (L.) Baker, S. involvens (Sw.) Spring, Cheilanthes tenufolia (Burm.) Sw., C. farinosa Forsk.) Kaulf., Athirum falcatum Bedd., Pteris vittata L.etc.


(5) HYDROPHYTES AND HUMID PTERIDOPHYTES: The hydrophytes ferns and fern allies grow alone the bank of stream, waterfall, rivers in paddy field with stagnant water and ponds especially on calcareous soils and sandy soil. Species like Isoetes coromendelina L., I. mahadevensis Srivastava et Shukla, I. panchananii var. panchananii
Pant et Srivastava and I. panchanani Pant et Srivastava var. pachmarhiensis Srivastava, Srivastava et Shukla grow among the grasses along the bank of ponds on and in paddy fields and Equisetum diffusum, Equisetum diffusum D. Don, E. ramosissimum Desf. subsp. debile (Roxb. ex Vauch.) Hauke, Ceratopteris thalictrodies (L.) Brongn and Christella dentata (Forssk.) Brown. et Jermy, C. parasitica (L.) Le'v., Pronephrium nudatum (Roxb.) Holtt. grow in large colony in moist shady places etc. Water fern like Salvinia natans (L.) All. (cultivated), Marsilia minuta L., M. quadrifolia L. and Azolla pinnata R. Br. grow in stagnant water bodies and ponds.

(6) ADAPTATION OF SPECIFIC ECOLOGICAL NICHEs: In Central India many species of pteridophytes are adapted to specific ecological conditions, with the result that they occupy specific ecological niches, some of which at least are characteristic.

- Selaginella briopteris (L.) Baker grows on heavy rock boulders forming thick, green carpet during the rainy season. Leaves curl up in unfavorable whether viz. dry season, but retain original colour and shape if dipped upside down in water for some time.
- The delicate fleshy fern Ophioglossum gramineum Willd., O. nudicaule L. f. var. nudicaule etc. grow on the laterite gravelly soil in exposed hill tops among the grass and other vascular plants.
- Osmunda hugeliana Presl, the higher altitude fern (900-950 m) grow luxuriantly at the bank flowing water in rock crevices only in exposed places. In rainy season the colonies of O. regalis L. get regularly submerged in the swirling current, losing nearly their foliage.
- Actiniopteris radiata (Sw.) Link is a fern of lower altitudes, which inhabits as lithophytes in harsh environs. Lamina dry up during
the dry weather but retains original shape and colour if rhizome
dipped up in the water for some time.

- The *Hemionitis arifolia* (Burm.) Moore is sub-xerophytic and low
  altitude fern, rooting on granite rich rock boulders in steep terrain,
  like road cutting, outcropping etc. Fronds curl up, rolling over the
  upper surface during the dry season and in this condition is
  protected by a dense indumentum of dermal appendages.

- *Cheilanthes farinosa* (Forsk.) Kaulf. is restricted to altitudes above
  600 m and also somewhat sub-xerophytic, which inhabits on
  granite rock boulders in harsh environs. Fronds curl up, rolling
  over the upper surface during the dry season and in this condition
  is protected by a silvery farina on the lower surface of lamina. *C.
  tenuifolia* (Burm.) Sw. on the other hand grows in the impoverished
  soil in crevices of weathered laterite outcroppings on hilly slopes at
  lower altitudes (500 m-600 m).

- Some species of *Adiantum* L. also exhibit preference for a habitat,
  which tends to be xerophytic *viz.* *A. philippense* L. with its erect
  delicate fronds, similarly is often restricted to steep substrata. It is
  common on sides of wall paved with laterite or dug in laterite beds
  on unplastered laterite walls, crevices on vertical sides of laterite
  outcroppings etc in plains and up to the altitude of 800m. The
  fronds are lost during the dry and winter weather and are come up
  immediately again during and after the rainy season. However,
  they extend also to less harsh environs and may then bear frond
  throughout the year in such localities with the perennial water
  supply.

- *Alsophila spinulosa* (Wall. ex Hook.) Tryon, *A. balakrishnanii* (Dixit
  et Tripathi) Dixit, *A. gigantea* Wall. ex Hook. are restricted to
  altitudes above 850 m in the Central India and prefers
  comparatively drier terrain but well shaped and moist even during
the summer. It generally colonises sloped forest floor supplied by perennial stream ant waterways, sometimes where water trickles down even during summer.

- *Diplazium esculantum* (Retz.) Sw. is lowland sun loving fern, growing in exposed localities near the streams, rivers and waterways where the soil is semi-marsh. Plants are submerged during the rainy season. It can adapt to exposed conditions, through extending up to 800 m.

- *Egenolfia appendiculata* (Will.) J. Sm. grows on semi-exposed boulders on the flood basin as well as farther up to the slopes on the riverbanks in dense shady forests.

- *Blechnum orientale* L. prefers to grow in partially shaded and steep slopes on open ground, exposed to sun and wind, often colonizing earth cutting but spreading also to level ground nearby.