
CHAPTER : II
ECOLOGICAL OBSERVATIONS OF
PTERIDOPHYTES FROM
WESTERN GHATS

II. Ecological Observations of ferns from Western Ghats :

The pteridophytes are in fact largely dependent on other plants to provided them with the conditions of shelter and support which they need. A number of descriptions of forest types are available for Western Ghats. Some are more open and some more shady and within these the conditions available for pteridophytes vary. The physical conditions such as humidity, temperature and light are variable in different types of forests.

The whole pteridophytic flora of Western Ghats has been placed under the following types on account of their ecological preferences :

1. Ephemeral annuals : These are the plants included under Xerophytes. The Xerophytes in general are classified as (a) drought avoiding, (b) drought escaping, (c) drought enduring and (d) drought resisting. Ephemeral annuals are the plants escaping drought conditions. These plants have very short growing and reproductive phase which consists of few week only. At the onset of the brief rainy season these plant start germination, then quickly grow to maturity, produce sori and shed the spores as the soil start drying out. They can withstand strong atmospheric drought but not soil drought.

Their principal morphologic adaptation are their small size, and large fronds in relation to roots. Their chief physiologic adaptation is an ability to complete their life cycle in a very short period.

In the Western Ghats the following pteridophytes are the ephemeral annuals :

1. Adiantum lunulatum,
2. Cheilanthes tenuifolia,
3. Athyrium hohenackerianum,
4. Athyrium falcatum,
5. Aleuritopteris sps.
6. Selaginella sps.
7. Ophioglossum sps.

These pteridophytes appear just after the beginning of the rainy season and disappear after monsoon.

2. Trophophytes : There are some regions where damp climate alternates with dry climate. Consequently the vegetation show alternate hydrophytic and xerophytic characters accordingly. Such plants ecologically are known as trophophytes. Most trophophytes during dry climatic conditions shed their leaves thus reducing very much the transpiring organ. On the return of hydrophytic condition during the outbreak of monsoon, plants become adorned with dense masses of green foliage. So periodic foliation and defoliation are characteristic of trophophytes.

In Western Ghats following are the examples of tropophilous ferns.

Cyathea gigantea

Ceratopteris thalictroides

Marsilea major

Cyathea latebrosa

Microlepia speluncae

3. Epiphytes : Epiphytes include plants which take shelter and grow on other plants, but never absorb or take food from them. Of all the ecologic classes of plants, these are the most directly dependent on precipitation for their water supply and unless rains or heavy dew falls at frequent intervals they must be able to endure drought. Their nutrient supply is derived in part from rainwater which always contains some dissolved substances, in part from accumulated wind borne particles and in part from the decaying bark surface of supporting plants. The epiphytes are most abundant where drought is never protracted. In warmwet climate they include wide variety of vascular plants, especially, ferns.

The epiphytes show remarkable gradation from low-level epiphytes confined to the lower trunks of the trees to xerophytes that demand bright light but can endure occasional desiccation of the tree-top habitat i.e. high-level epiphytes. As far as pteridophytes are considered the low level epiphytes

are essentially delicate ferns found only in moist or shady conditions. Some of them are found both on rocks or trees but most seems to be specialised to either one or the other substratum. Hymenophyllaceae are largely found in this class.

These low-level epiphytes are also called as Protoepiphytes. These are abundant near a stream in a forest where high constant humidity occurs. Some of them have the power of curling up when dried and remaining so for a time, without harm, but others can not withstand this. The examples of such protoepiphytes in Western Ghats are -

Araistegia pulchra

Pyrrosia adnascence

Pleopeltis nudum

Hymenophyllum polyanthes

Lycopodium hamiltonia

Psilotum triquertum

These proto-epiphytes are generally found on the bases of tall trees upto to 5 m. from the ground.

The high level epiphytes grow on the branches of the crowns of tallest trees in the forest. They have developed variety of methods of protection against drought. They may be divided into various groups according to their method of protection against drought.

a) Nest epiphytes : These ferns have capacious habit and the fronds hold accumulating mass between their bases, where the leaves gradually rot, the roots of the fern penetrating among them. In this way gigantic masses of roots and humus are developed over long periods of years. The sps. of Asplenium fall under this group of epiphytes.

b) Bracket forming epiphytes : These ferns collect humus in their short sessile bracket leaves or in some cases the enlarged bases of ordinary leaves. The Drynaria group are the chief representative of this type.

The High level epiphytes usually grow in initial stages on trees but later on develop some device to absorb moisture from the atmosphere. They are hence called as Hemiepiphytes.

Microsorium membranaceum, Drynaria quercifolia Sm. and Leptochilus decurrens var. axillaris represent the hemiepiphytes in Western Ghats.

4. Chasmophytes : Chasmophytes are plants that grow on rocks with fissures and crevices filled with earth, dust and other detritus. They may have creeping rhizomes which are firmly attached to rocks on stream banks, the roots reaching down into the crevices of rocks, or they may have short erect rhizomes usually growing in crevices of rocks.

Actiniopteris dichotoma is the only obligatory chasmophyte recorded from area round about Kolhapur District.

5. Psammophytes : Psammophytes are the plants confined to sandy habitat. In Pteridophytes these Psammophytes generally occur on stream banks where the soil is sandy.

Ampelopteris prolifera is found exclusively on sandy river banks. Diplazium esculentum and Nephrolepis exaltata grow as facultative psammophytes.

Based on their relative requirements of sunlight or shade the plants are classified as heliophytes and Sciophytes.

6. Heliophytic perennials : These are the plants adapted to full sunlight. They may have long creeping rhizome or short, erect rhizome. Accordingly they are classified into three types (i) those with creeping, deeply situated underground rhizome, (ii) those with superficially running rhizome and (iii) with short, erect rhizome.

Pteridium aquilinum is the only fern in our collection that is found forming dominant vegetation on some of the exposed hilly areas in Western Ghats. It has horizontally creeping, deeply situated underground rhizome. It reproduces vegetatively mainly when the rhizome comes out to the surface and thus cover large open areas on the hill-slopes and forest border. It is not suitable to the soil which is hard enough so that the rhizome can not penetrate it. Pteridium when gets established can withstand even the burning of the soil as it has deeply situated rhizomes. It is especially characteristic of areas which are subject to periodical clearing.

In the places where the soil is hard and compact the

ferns like Gleichenia dichotoma with subteranean rhizome are found forming thickets. It is surface rooting plant and if conditions are moist enough for the prothallial development they soon become established. It forms thickets in open hot areas. They are usually found in limestone or calcareous soil deposits.

The third group of heliophytes form scattered patches of vegetation in open, wet areas. They are scattered heliophytes and are characterised by short, erect rhizome. Blechnum orientale, Pteris quadriaurita, P.pellucida are such scattered heliophytes. All these sps. prefer slopy ground for their luxurient growth.

7. Sciophytes : These are the plants growing best at lower light intensities. As far as pteridophytes are considered, the sciophytes grow in dense shade of forest trees in humid places. Due to heavy accumulation of debris marsh condition, the soil is rich in humus contents and is of black colour. Angiopteris evecta, Tectaria macrodanta, Bolbits pressliana, Egenolfia appendiculata are the examples of sciophytic ferns.

8. Hygrophytes : Certain ferns are very sensitive to dry air and found only in habitats where the humidity is always high. They are found growing along or within the stream water. The filmy ferns (Hymenophyllaceae) provide good examples of such hygrophytes. In addition Osmunda regalis,

Lygodium microphyllum, Cyclosorus parasiticus are the examples of hygrotic ferns.

9. Halophytes : Halophytes are plants which grow and thrive in soil where certain amount of soluble salts mainly NaCl is present besides magnesium sulphate and mg chloride are also present. A typical halophytic formation is represented by mangrove forests bordering the seas, deltas and estuaries. All halophytes are very similar to xerophytes regarding structures and adaptations as salt in soil makes it physiologically dry.

Most characteristic fern of the mangrove is Acrostichum aureum. This fern usually grow in brackish water but not as a member of the mangroves which grow in deep saline waters.

10. Hydrophytes : Hydrophytes are plants which grow in water or soil covered with water. With regard to their relation to aquatic environment hydrophytes may be submerged, floating amphibious or marsh plants.

The pteridophytes like Ceratopteris thalictroides, Equisetum debile, Isoetes coromandelina and sps. of Marsilea remain submerged during rainy season but usually their leafy half remains outside the water level. These plants are adopted to grow in shallow water. Their underground parts remain under water and other aerial parts are exposed to air. Thus the plants of this group are adapted to live partly in water and partly on substratum i.e. amphibious plants.

The ferns like Azolla pinnata and Salvinia natans form what is known as plankton vegetation. They are free floating plants. Azolla pinnata is provided with roots but Salvinia natans is entirely root less. In this case, the three leaves have whorled arrangement and one of them is submerged much divided and functions like root.

Thus the different fern sps. fall under ten ecological types with respect of their habitat.