CHAPTER : VII

SUMMARY

S U M M A R Y

The pteridophytic flora of Western Ghats can be divided into different types based on their ecological preferences. The collections made in Sindhudurg district include following types.

I) Ephemeral annuals :

Selaginella deliculata Alston.

Adiantum lunulatum Burm.

II) Heliophytic perennials :

a) Thicket forming - Gleichenia dichotoma Wild.

b) Scattered heliophyte - Blechnum orientale Linn.

III) Sciophytes :

Bolbitis presliana (Fee) Ching.

Angiopteris evecta Hoff.

IV) Epiphytes :

a) Low level epiphytes -

Pyrrosia adnascence Ching.

Pleopeltis linearis Moore.

b) High-level epiphytes :

Microsorium membranaceum Ching.

Drynaria quercifolia Sm.

V) Hygrophytes : Cyclosorus parasiticus (L.) Farewell.

VI) Chasmophytes : Actiniopteris dichotoma Kuhn.

VII) Halophytes : Acrostichum aureum (L.)

VIII) Hydrophytes : Ceratopteris thallictroides (L.) Brong.
Salvinia sps.

The anatomical study of the pinnae, the chief photosynthetic organ of the pteridophytes, show following adaptations to the habitat in which the respective genera are growing :

Ephemeral Annuals :

The pinnae of Selaginella deliculata and Adiantum lunulatum, the ephemeral annuals, show following adaptations.

Upper epidermis - functioning both in photosynthesis and protection of pinna surface.

Mesophyll - of armed parenchyma for easy translocation of photosynthetic products.

Lower epidermis in Adiantum lunulatum papillate causing rapid evaporation and protecting excess wetting of pinnae surfaces.

Heliophytes :

Gleichenia dichotoma and Blechnum orientale have following anatomical adaptation.

Upper epidermis smooth and shining thus preventing certain proportion of the incident light from penetrating

into the leaf by means of reflection. Mesophyll well differentiated into palisade and spongy tissue. Palisade cells flanged thus providing larger internal surface for display of chloroplasts and hence the photosynthetic activity is increased.

Spongy cells are armed, loosely arranged enclosing large air spaces for better conveyance of photosynthetic products and ventilation.

Lower epidermis - The papillose epidermal cell store water and keep the surface cool.

Sciophytes :

Bolbitis presliana and Angiopteris evecta have following anatomical pecularities.

Upper epidermis - The outer walls of epidermal cells thick and lateral walls also thick for mechanical reasons, and are provided with numerous circular pits for movement of water between adjacent cells.

Mesophylls - No differentiation into spongy and palisade layers. Entire mesophyll photosynthetic and functioning in conveyance of photosynthetic products to vascular tissue.

Epiphytes :

Low level epiphytes - Pleopeltis linearis and Pyrrosia adnascence show following anatomical adaptations.

Upper epidermis with thick cuticle thus reducing water loss through transpiration. Lateral walls provided with pit connection to facilitate inter-change of water between adjacent cells.

Hypodermis - P.adnascence pinnae have hypodermal layer of larger, empty cells functioning as water storage tissue.

Mesophylls - Well developed giving much thickness to the lamina. It is differentiated into palisade and spongy tissue. Palisade is 2-4 layered thus well developed in response to better illumination to sunlight. Spongy tissue with large intercellular spaces for better ventilation.

Lower - epidermis : P.adnascence has stellate hairs causing reduction of transpiratory activity and hence diminishes the risk of descication.

High level epiphytes :

Microsorium membranaceum and Drynaria quercifolia show following anatomical adaptations.

The pinnae lamina is thin in texture for direct absorption of moisture from atmosphere.

Upper epidermis - Outer walls thickened to check transpiration. Some cells enlarged to store water.

Mesophyll - Due to well exposure to sunlight differentiated into palisade and spongy tissue. Spongy cells also photosynthetic.

Hygrophytes :

Cyclosorus parasiticus show following anatomical adaptations.

Upper epidermis - Cells with thin cuticle. The plants grow in much shaded, moist areas hence epidermal cells become photosynthetic. The outer wall concave for better reception of available light.

Mesophyll - Due to weaker light not differentiated into palisade and spongy tissue. The cells have large intercellular spaces for increased transpiratory activity in abundance of moisture in surrounding atmosphere. For better translocation of photosynthetic products plasmodesmata are well developed.

Lower epidermis - Papillose cells cause rapid evaporation of water thus avoiding excess wetting of pinnae surface.

Chasmophytes :

Actiniopteris dichotoma has following anatomical adaptation. Root system well developed.

Upper epidermis - The cells thick walled with cutinised outer walls thus reducing transpiration.

Hypodermis - Consists of 2-3 layers of sclerenchyma thus reducing the transpiration. The pit connections well developed facilitating interchange of water between adjacent cells.

Mesophyll - well differentiated into palisade and spongy tissue because the plants are well exposed to sunlight. These cells with reduced intercellular space help in reducing the loss of water due to transpiration.

Lower epidermis - posses uniseriate, multicellular and hairs with glandular tips also controlling transpiration to some extent.

Halophytes :

Acrostichum aureum has following anatomical adaptation.

The plants are exposed to full sunlight and hence have pinnae with smooth and shining upper surfaces to protect against excessive insolation. It prevents a certain proportion of the incident light from penetrating into the leaf.

The thick outer walls of the epidermis also prevents excessive transpiration.

The upper and the lower hypodermal layer formed of larger non-chlorophyllous cells also serve as water storing tissue.

Mesophyll - Well developed and differentiated into palisade and spongy tissue. Spongy tissue with large air spaces functions as ventilating tissue.

Hydrophytes :

Ceratopteris thallictroides has following anatomical adaptation :

It is a rooted, submerged hydrophyte. As the pinnae are surrounded by a medium deficient in oxygen, they develop masses of secondary air storage tissue - aerenchyma. The cuticle is reduced and the volume of the spongy mesophyll increased.

The reproductive pinnae as they are exposed to atmosphere have reduced lamina with a cuticle for controlling water loss through transpiration.

Photosynthesis under submerged conditions has to face problem of the absorption of a suitable dissolved carbon source and weak source of light due to restricted and differential penetration of light into water. Hence pinnae as well as rachis both are photosynthetic. The lamina is thin with reduced cuticularisation and increased distribution of chloroplasts. The epidermal cells are also photosynthetic.

Salvinia a free floating hydrophyte lack the roots completely. The submerged finely dissected pinna performs the function of roots. The simple hairs present on the ventral surface of leaf are also probably absorptive in function.

The lamina, to withstand the horizontal tearing strains imposed by wind and waves, is entire.

To escape excessive wetting the upper surface of lamina bear water repellent hairs.

The mesophyll due to weaker sunlight is homogenous without differentiation into palisade and spongy layer. Large air spaces are divided into small compartment by parenchymatous diaphragms. These diaphragms counteract the fragility of the pinna tissue.