SALIENT FEATURES & ECONOMIC IMPORTANCE OF BRYOPHYTES

PAPER-I
Group-B

TDC Part-I(Hons.)
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Introduction:

Bryophytes, which occupy a position between thallophytes and pteridophytes, are commonly regarded as 'amphibians of the plant kingdom'. They are supposed to have migrated from aquatic to terrestrial habitats and so require sufficient water or moisture for their successful existence and life activities. They are more or less cosmopolitan in distribution. They play an important role in plant succession.

Salient Features of Bryophytes:

(i) Bryophytes are the simplest group of land plants relatively poorly adapted to terrestrial mode of life.

(ii) They remain predominantly confined to damp shady places.

(iii) They are terrestrial non-vascular plants, still requiring moist environment to complete their life cycle.

(iv) Plant body is a thallus not differentiated into root, stem and leaves; however, in advanced forms it is differentiated into stem-like axis and leaves.

(v) True roots being absent, the thallus or the leafy shoot remains attached to the substratum by means of unicellular rhizoids developed from the ventral surface of the thallus or from the basal portion of the leafy shoot. These rhizoids also perform absorptive functions.

(vi) The thallus is a haploid gametophyte which reproduces sexually by means of gametes. Sexual reproduction is oogamous. Gametophyte may reproduce vegetatively also.

(vii) Sex organs (antheridia and archegonia)

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are always multicellular structures surrounded by a jacket layer of sterile cells.

(viii) Sex organs may be homothallic or heterothallic.

(ix) Antheridia produce many antherozoids (or gametes) while the archegonia form a single egg/ovum/oosphere.

(x) Water droplets are required for the movement of antherozoids to effect fertilization.

(xi) The zygote produces the sporophyte (or sporogonium) which represents a short diploid phase in the life cycle.

(xii) The sporophyte reproduces asexually by means of spores. With the formation of spores, haploid generation again begins.

(xiii) There is a well defined alternation of generations in the life cycle of bryophytes.

(xiv) Gametophyte is the dominant independent generation with autophytic mode of nutrition due to the presence of chlorophyll.

(xv) Sporophytic phase is never a completely independent entity and depends on the gametophyte, partially at least, for its nourishment. It remains physically attached to the gametophyte.

(xvi) Thus there is a distinct alternation of generations.

(xvii) Fossil records of bryophytes are scanty. The oldest authentic liverwort from the Upper Carboniferous period in England is Hepaticites kidstoni (Walton, 1925). Some other prominent fossil genera include Marchantites, Metzeriites, Muscites, etc.

Economic Importance of Bryophytes:

Economic importance of bryophytes may be discussed precisely under the following heads:

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1. Ecological Importance

(i) Bryophytes are the first colonizers of bare rocks and exposed grounds. Thus they are the pioneers of terrestrial plant community.

(a) Role in Preventing Soil Erosion & Soil Formation:

(ii) They usually grow densely and thus act as soil binders. Mosses grow in dense strands forming mats or carpets over the rocks or soil surface.

Thus they can prevent soil erosion. They can hold enough falling water and reduce run-off water to a great extent.

(iii) Mosses and lichens are slow but efficient soil forming agents. Progressive death and decay of mosses help in the formation of soil.

(b) Bog Succession

(iv) Peat mosses change the banks of lakes or shallow water bodies into solid soil, which supports further colonizers to form vegetation, e.g., Sphagnum.

(c) Role as Rock Builders:

(v) Some mosses in association with some green algae, e.g., Chara, grow in water streams which contain large amounts of calcium bicarbonate. Mosses bring about decomposition of bicarbonic ions by abstracting free CO_2. The insoluble $CaCO_3$ precipitates and hardens on exposure, thus forming calcareous rock like deposits.

Thus bryophytes may be considered as rock builders.

(d) Peat Formation & Uses of Peat:

(vi) Gradual compression and carbonization of the vegetable matter in the bogs forms a dark brown substance called Peat.

Sphagnum (Peat Moss/Bog Moss) helps in peat formation. Peat is reportedly used as fuel in Ireland, Scotland and Northern Europe.

Peat is also used in the production of ethyl alcohol, ammonium sulphate, tar, ammonia, paraffin, dyes, tannins, etc.

Peat is also used to improve soil texture in horticultural practices.

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Peat is also used in surgical dressings.

2. Use as Packing Material:
(vii) Dried mosses and other bryophytes have a great water holding capacity. As such, they are used as a packing material for the shipment of flowers, vegetables, perishable fruits, bulbs, tubers, etc.

3. Use in Nursery Beds:
(viii) In view of high water absorbing and holding capacity, several mosses and other bryophytes are used in nursery beds

4. Medicinal Use:
(ix) Some bryophytes are also used medicinally for the treatment of various diseases. Some common uses include:
- Marchantia used in pulmonary tuberculosis and afflictions of liver
- Decoction of Sphagnum used in acute haemorrhage and opthalmic diseases
- Polytrichum commune used in the treatment of stones of kidney and gall bladder.
- Extract of Sphagnum leaves and of some other bryophytes used as an anti-septic in the healing of wounds

5. Used as Research Tools:
(x) Liverworts and mosses play an important role as research tools in genetics.

6. Use as Food:
(xi) Some mosses are used as food by chicks, birds, reindeer, etc.

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