Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (First Year)

Subject: Botany

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Paper Title: Biodiversity I (Microbes, Algae, Fungi and Bryophytes.

Unit 2: Algae

Module Name: Morphology of *Sargassum*

Module No: 28

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Notes

Division : Phaeophyta

- The plants belonging to Phaeophyceae are commonly known as brown algae.
- The colour of the algae varies from olive green to golden yellow to brown.
- The brown colour is due to the abundance of xanthophyll pigment, the fucoxanthin.
- Other photosynthetic pigments are chlorophyll flavo-xanthin a chlorophyll c, carotene, B carotene and other xanthophylls (like lutein, neoxanthin, neofucoxanthin).
- Pyrenoids are absent. Reserve photosynthetic pro ducts are generally Laminarin and mannitol, rarely fats.
- Cells possess small vesicles of an acidic fluid called fucosan vesicles or physodes.
- Cell wall consists of two layers, inner layer consist of cellulose while outer layer consist of pectic substances. These are generally algin (calcium salt of alginic acid) and fuicodin.
- The larger forms of Phaeophyta are called kelps.

Class : Phaeophyceae (Characters same as the division).

Sub Class : Cyclosporae

- Alternation of generation is not present.
- Dominant vegetative plant is diploid (Sporophyte).
- Reduction division occurs at the time of formation of gametes)

Order : Fucales

- Sporophyte is internally differentiated.
- Externally the sporophyte is differentiated into fronds, stipe and holdfast.
- Minute sterile cavities, present on the surface of sporophyte are known as Cryptoblasts.

Family: Sargassaceae

- Meiospores act as gametes hence gametophyte is completely absent.
- The motile reproductive unit (zoospore) has two different types of flagella.The posterior flagellum is of whiplash type while anterior flagellum is of the tinsel type (Heterokont).
- Thallus is sometimes heterotrichous.

MORPHOLOGY OF *SARGASSUM*
(Spanish Sargasso Sea weed/Gulf weed)

SYSTEMATIC POSITION

Division : **Phaeophyta**
Class : **Phaeophyceae**
Sub-Class : **Cyclospora**
Order: **Fucales.**
Family : **Sargassaceae.**
Genus: ***Sargassum.***

OCCURRENCE

- *Sargassum* is commonly known as "gulf weed".
- It is a marine plant occuring in tropical, sub-tropical and temperate seas.
- Some species are attached to the rocks present in inter tidal pools, while others are in deep sea. They are found in abundance, as large, floating masses in Sargasso Sea near West Indies.
- Majority of the species are epilithic (lithophyte) except for the species present in Sargasso Sea, which are free floating.
- In India they are found in abundance along east and west coasts.

EXTERNAL MORPHOLOGY

- Thallus of *Sargassum* is branched, flattened resembling a bush.
- It has great resemblance with seed plants as its body is composed of stem-like stipe and leaf-like frond.
- The thallus is composed of three parts namely holdfast, main axis and laterals.

HOLDFAST

- Holdfast it is also known as attaching disc. It is an irregular, multicellular, basal

system helping the plant in attachment.
- Holdfast is absent in species found in Sargasso Sea as they are free floating.

MAIN AXIS

- Main axis also known as stipe, in short, flattened or cylindrical.
- The main axis, bears a number of branches of unlimited growth (long laterals) which in turn bears branches of limited growth (short lateral). On the axes of long laterals are found the short lateral whose growth is definite.
- The short lateral may terminate either a receptacle, air bladder or sterile laterals.

RECEPTACLES

- They are fertile branches arising in groups.
- Sex organs are present in special cavities called conceptacles.
- The receptacles are cylindrical or flattened.
- The shape is finger like or fusiform, with spinous or dentate margin.

AIR BLADDERS

- Air bladders are also known as vesicles or pneumatocyst.
- They are filled with air, and may occur singly or in groups.
- They are found in axil of a leaf (short lateral).
- They are modified secondary lateral of short laterals.
- The shape of the air bladder varies. It may be spherical, obovate or ellipsoidal.
- Air bladders are generally stalked. The tip of the bladder is either smooth or mucronate, or often modified into leaf-like expansion .
- The air in the bladder contains oxygen, carbon dioxide and nitrogen and is respiratory in function. The vesicles help unattached species in floating and attached species in keeping them upright.

STERILE LATERALS

- These are commonly known as leaves or Phylloclades.
- They are stalked or petiolate with variable shape.
- It may be linear, ovate, oblong or spindle shaped. Margin may be entire, dentate or serrate.
- The midrib, continuation of the petiole, is present.
- The leaves and vesicle possess, conceptacle like, but sterile cavities known as cryptoblast. They open outside by stomata like opening called cryptoblamata or cryptostomata. Hair like paraphyses are present in cryptoblast.

INTERNAL STRUCTURE OF THALLUS

- The thallus is differentiated into outermost meristoderm, middle cortex and inner medulla.
- The meristoderm (epidermis) is formed of compactly arranged columnar cells without any air spaces. They are rich in chromoplast and hence known as palisade layer. Mucilage is present on the outer side. The functions of meristem are photosynthesis and formation of new cells towards the innerside.
- Cortex consists of few to several layers, of thick walled cells. Often the outermost layer of cortex is like mesoderm and is known as hypodermis. Cortex stores food materials.
- Central portion of the thallus, is medulla, formed of narrow elongated cells. Medulla cells are thick walled except in the centre region where they are thin wall cells.
- Scalariform thickenings are present on the cell walls of medulla cells. Functions of medulla are food conduction and mechanical support.