

# SARGASSUM

## Classification

Algae

Phaeophyceae

Fucales

Sargassaceae

Sargassum

## History and distribution

1. Altogether 150 species are found in tropical, sub-tropical and temperate countries of both hemisphere are found.
2. All forms are marine, ranging from mid littoral to sub littoral zones.
3. In Atlantic ocean, west of Africa, *S. natans*, *S. muticum* and *S. hystrix* are much weedy and form area commonly known as Sargasso sea.
4. Common Indian species are *S. plagiophyllum*, *S. carpophyllum*.

## Morphology

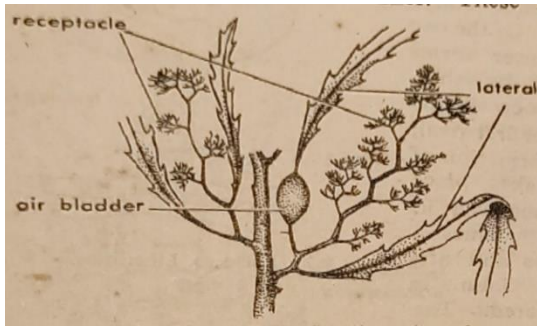
1. Plants are perennial, monopodially much branched up to 7.0 meters height.
2. Radially long branched primary laterals are found. Branchlets of laterals give leafy short laterals with serrate margins and midribs.
3. Axil of leafy laterals have
  - i. Solitary, spherical air bladders on separate short stalk.
  - ii. Sterile conceptacles known as cryptoblast, bearing unbranched hairs only.
  - iii. Elongate finger like fertile conceptacles aggregated on the upper region of the branchlet known as receptacles.
  - iv. Additional intermediate cylindrical axes.

## Apical growth

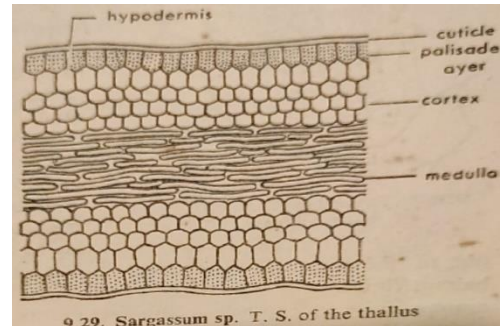
The thallus grows apically by 3-sided single apical cell.

## Thallus structure

1. Main axis and branches have tissue differentiation like *Fucus*. However, unlike to *Fucus*, there is little or no medullary material (free floating forms) and when present, it is not gelatinized.



Habit sketch of Sargassum



V.S. Thallus of Sargassum

2. It is basically differentiated into three layers- peripheral, cortical and medulla. However, cortex may have outermost one layer, differentiated into hypodermis.
3. Peripheral one layer is photosynthetic and meristematic and is made of palisade without intercellular spaces, and with many chromatophores and fucosan vesicles.

It is covered with mucilaginous cuticle.

4. Pigments present in chromatophores are chlorophyll a, c,  $\beta$ -carotene, fucoxanthin and few others.
5. Cortex is multilayered, made of polygonal, thick walled cells. Reserve food as mannitol and laminarin and others are stored in cortex.

### Reproduction

1. There are two types of reproduction, vegetative and sexual. There is no asexual reproduction.
2. Vegetative reproduction is by fragmentation. Best examples are *S. natans* and *S. fluitans*, because both have pelagic mode of habitation and are sterile forms.
3. Plants are mostly dioecious but rarely monoecious like *S. longifolium*.

### Conceptacles

1. Sexual reproduction is of oogamous type, in which the sex organs, antheridium and oogonium are found in fertile fleshy conceptacles.
2. Antheridial and oogonial conceptacles are borne on separate receptacles. over receptacle may vary.
3. Wall of the conceptacles are multilayered. Cells of innermost layer are flattened and have chromatophores.

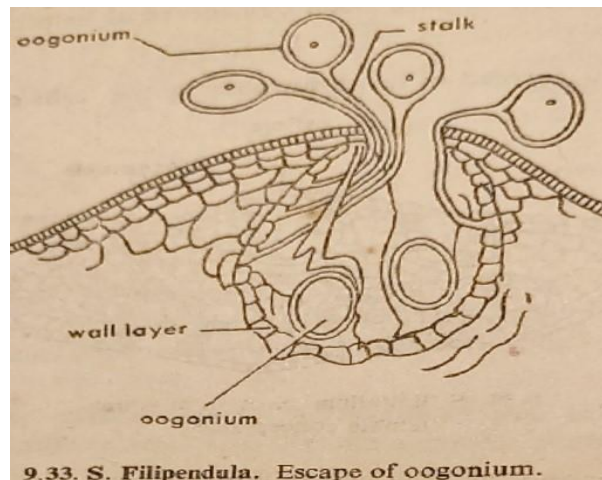
4. Inner layer of the wall gives multicellular paraphysis with oblique septa and the sex organs. Paraphyses protrude from the ostiole of the conceptacle.

### **Antheridium**

1. Cells of the inner layer of the conceptacle give fertile branched paraphyses on which antheridia are found.
2. Antheridia are round, oval, double layered. Each antheridium produces 64 antherozoids after meiotic division.
3. Antherozoids are pear shaped and biflagellate. Flagella originate sub terminally. Flagella are unequal, the larger one posteriorly down.
4. At the time of liberation of antherozoids, outer wall of the antheridium breaks and all antherozoids under inner wall of antheridium come out through ostiole.
5. Further inner wall also dissolves in sea water and antherozoids swim in water.

### **Oogonium**

1. Oogonial initials are also formed by many cells of inner layer of female conceptacle. These initials divide transversely to form small stalk cell and large oogonium itself.
2. Each round or spherical oogonium is triple layered, outer exochite, middle mesochite and inner endochite.
3. The diploid nucleus of oogonium divides meiotically and altogether 8 haploid nuclei are formed.
4. Further, oogonium may form either single ovum in a single oogonium, or sometimes 8 ova are formed in one oogonium. In this case 7 ova abort and only one goes to fertilize.
5. After maturation, the oogonia come out of the ostiole, still attached with the conceptacle inner wall through a mucilaginous stalk.



9.33. *S. Filipendula*. Escape of oogonium.  
Liberation of oogonia

### Fertilization

1. Fertilization takes place at this stage and condition. The attachment of ovum with conceptacle remains intact till the first transverse division of the zygote.
2. Of the two cells formed by zygote, lower cell makes attaching organ. Upper cell functions as apical cell and develops into adult plant.

### Life cycle

The adult plant in habit form is diploid i.e. sporophyte. The first cell of haploid gametophytic stage is the antherozoid and ovum. This stage ends with fertilization and sporophytic stage again starts.

So, in the life cycle, there is one cell stage of gametophyte. Here, only the cytological alternation of generation is found.