Subject- Botany

- **Production of Courseware – Content for UG course**

Paper – Plant Life and Utilization- I

Module- Lichen

Chapter -3

Lichen

Plant Life and Utilization –I

Paper -I, Sem- I

FYBSc

By

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Learning Objectives

3.1: Introduction

3.2: General Characters

3.3: Nature of Association, forms- Crustose, Foliose and Fruticose.

3.4: Utilization of lichens.

Summary

3.1: Introduction

- A lichen is a composite organism that emerges from algae or cynobacteria living among the filaments (hyphae) of the fungi in a mutually beneficial symbiotic relationship.
- Fungal component is called as Mycobiont.
- Algal component is called as Phycobioant.
- Mycobiont are from Ascomycetes or Basidiomycetes .
- Phycobiont are green (chlorophyta) or Blue-green (Cyanophyta) algae.
- Lichen is symbiotic association in between algae and fungi where algal partner prepare food by photosynthesis feed both symbionts while fungal partner protect alga by retaining water and provide minrals.
- There are 13,000 species of Lichen distributed all over the world and 2223 species are found in India.

3.2: General Characters

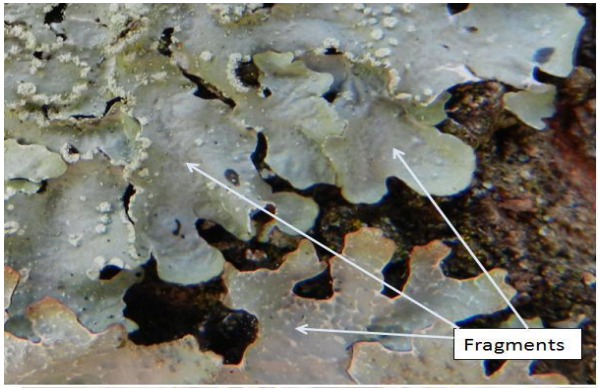
- A Lichen is an intimate association of a fungus and an algae in which both the organism intertwine to form a single thallus.
- Mycobiont from Ascomycetes are called Ascolichen and if it is from Basidiomycetes it is called as Basidiolichen.
- Lichen are widely distributed on every convenient and in varied habitat.
- Lichen are found growing on the leaves, the bark of tree, on decaying wood, on rock and on soil.
- Lichen can survive in extremes of heat, cold and drought.
- Lichen are of many different forms and colours. They are commonly form thin thalli.
- Morphologically lichen are classified into three types, crustose lichen, Foliose lichen and Fructiose lichen.

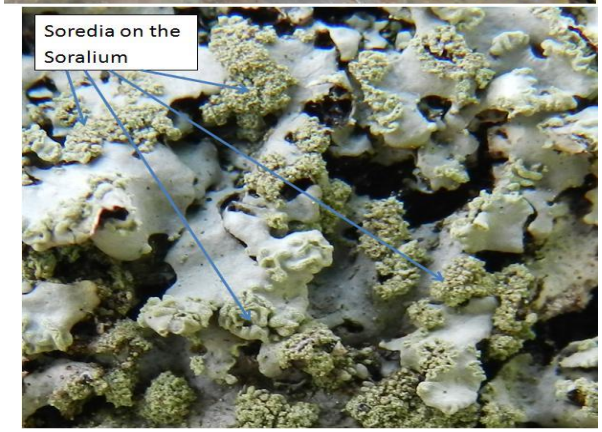
- Lichen reproduce by Vegetative , asexual, sexual method
- Vegetative reproduction takes place by fragmentation and by producing some special reproductive structure like Sordia and Isidia
- Asexual reproduction takes place by producing conidia in pycnidia.
- Only Fungal partner reproduce sexually. In Ascolichen fruiting bodies are called Apothecia and Perithecia which produce asci and ascospore are produced in asci.
- In Basidiolichens, basidiospore are produced on basidia.
- Common examples are *Parmelia,Usnea,Graphis.*

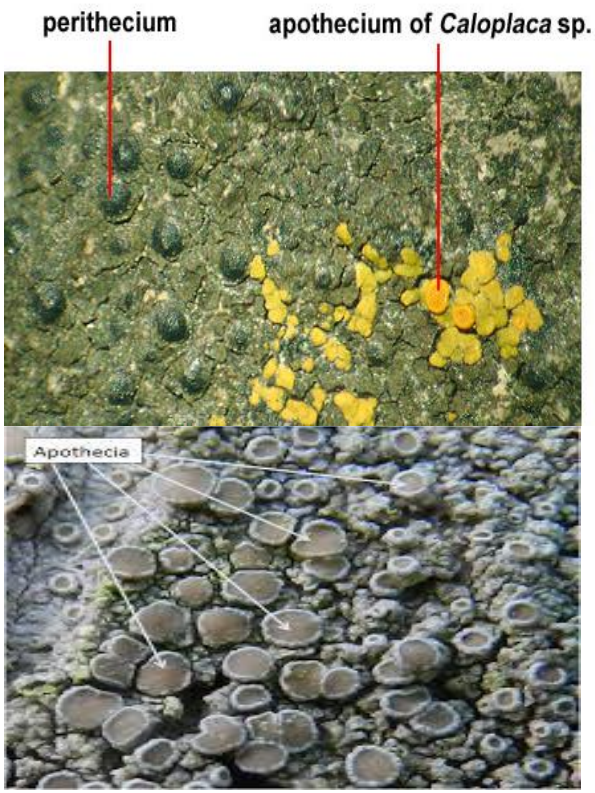
Reproduction of Lichen

VEGETATIVE MEANS: Occurs via fragmentation and specialized structures like isidia and soredia

SEXUAL MEANS: Occurs via fungal spores like ascospores and basidiospores







3.3: Nature of Association

- In Lichen nature of association in between algae and fungi is not clear.
- According to Lichenologist relation in between algae and fungi in lichen may be parasitic, symbiotic and helotic (master and slave)
- **Parasitic Association:**
  - Schwendener (1867) held that the lichen was a fungus parasitic on algae.
  - Geitler 1937 observed presence of fugal hausteria in the algal cells.
  - The fungus not only parasitizes the algal cell but also lives saprobically on dead algal cell.
  - It is demonstrated experimentally that the algal partner of lichen thallus can be grown without the fungus , where as lichen associated fungus cannot servive without algae which indicate the dependence of the fungus on alga.

- **Symbiotic Association:**

- This is most accepted hypothesis
- The fungi benefit from the carbohydrates produced by the algae or cyanobacteria via photosynthesis. The algae or cyanobacteria benefit by being protected from the environment by the filaments of the fungi, which also gather moisture and nutrients from the environment, and (usually) provide an anchor to it.

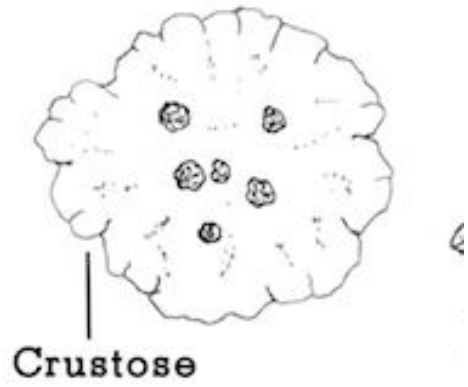
- **Helotism association:**

- In this association benefits are heavily in favour of the fungi.
- In lichens, a relationship occurs in which the fungus lives as a dominant organism and algae like a slave, the relationship is known as helotism. It is a form of symbiosis in which one species is forced to perform tasks for another, for their mutual benefit.

3.3 Forms of Lichen

Morphologically lichen are classified into three types:

1. Crustose lichen
2. 2.Foliose lichen
3. 3. Fructiose lichen.

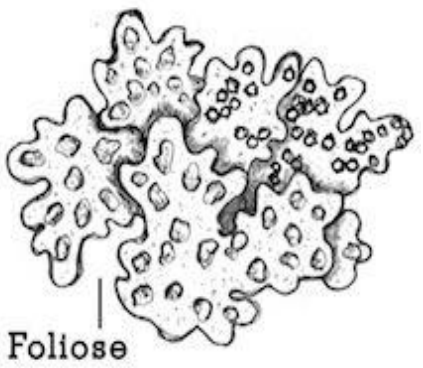


1. Crustose lichen :

- Lichens which form a crust closely attached to substrate may be partly or wholly embedded in it is called crustose lichen.In these lichens, the thallus is a flat, dorsiventral structure, closely adpressed to the substratum, e.g. Parmelia acetabulum.

- **2.Foliose Lichen**

- The foliose thallus is more striking. It is flat, broad, much lobed and leaf-like. In form it often resembles crinkled and twisted leaves. It grows more or less free of the substratum but close to it. It has a distinct upper and a lower surface. The lower surface may be white or sooty.

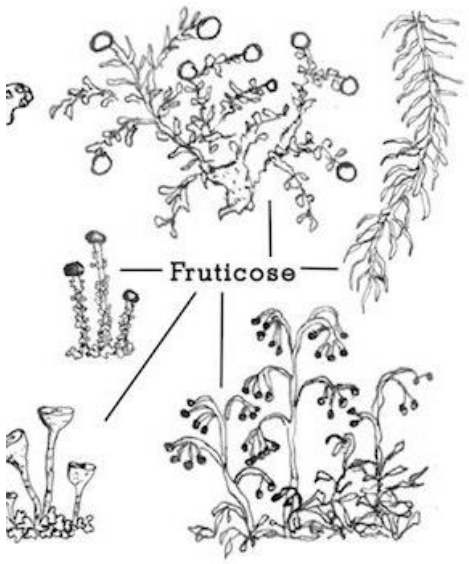


- The edges are usually curled up. The foliose thallus is attached to rocks and twigs by rhizoid-like outgrowths called the rhizinae. The rhizinae arise from its lower surface. In some foliose lichens, the rhizine consists of a single, simple to branched hypha.

- The common examples of foliose lichens are Xanthoria, Physcia, Peltigera, Parmelia, Cetraria and Cluiudhuria.

- **3.Fruticose Lichen:**

- Lichen which are more or less bushy-branched to upright in habit are called frutiose.



- Special form of fruticose lichen often designated as pendant forms posses long and slender branches which frequently remain hanging from the twig or branches of tree being attached only at localized spot.

- The thallus is attached only at the base by a flattened disc.

- *Usnea*, *Cladonia* and *Ramalina* are the common examples of fruticose lichens.

3.4: Utilization of lichens.

- Pioneers of Vegetation
- Source of food and fodder
- Source of Medicine
- Preparation of Dye
- Perfumes and Scents
- Tanning and Distillaries
- Pollution Indicator

Summary

- A lichen is a composite organism that emerges from algae or cynobacteria living among the filaments (hyphae) of the fungi in a mutually beneficial symbiotic relationship.
- Fungal component is called as Mycobiont.
- Algal component is called as Phycobioant.
- Mycobiont are from Ascomycetes or Basidiomycetes .
- Phycobiont are green (chlorophyta) or Blue-green (Cyanophyta) algae.
- Morphologically lichen are classified into three types: 1. Crustose lichen 2.Foliose lichen 3. Fructiose lichen.
- Lichen are pioneers of vegetation.
- Lichen are utilized as Source of food and fodder,Source of Medicine,used in preparation of Dye, Perfumes and Scents,Tanning and Distillaries.
- T can not grow in pollutaed area so consider as Pollution Indicator.

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