

# Diversity in Fungi

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**For:**

B.Sc. Botany(Part-I)  
Fungi  
Paper-I

## Lecture-05

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Fungi constitute a kingdom of heterotrophic organisms with a great diversity in both morphology and habitat. They are achlorophyllous, non-vascular thallophytic and spore forming organisms. Fungi are most adaptable living organisms and form **decomposers** of dead organisms. Hence, helps in sustaining ecosystem.

### 1. HABITAT

- Fungi have ability to grow in diverse habitats.
- Terrestrial forms occur in soil with death decaying organic materials and some live inside tissues of plants and animals while others are aquatic.

### 2. GENERAL CHARACTERISTICS

- Fungi have filamentous structure called hypha. The hypha is usually a branched tube-like structure having protoplasm with reserve food material and bounded by a wall of **chitin**.
- The mass of connected hyphae is called mycelium, which grows through and penetrates the substratum and establishes its relationship.
- The protoplasm of the hypha may be continuous without cross walls called aseptate hypha. Septa is formed when reproductive structures are produced. The multinucleate condition in it is called **coenocytes**.
- The hypha may be with transverse partition or septa(septate hypha).It has central pore and thus also called porous septa.
- Hyphal wall contains chitin along with other polysaccharides, proteins, lipids and other substances.
- Nutrition in fungi is heterotrophic. Most of the fungi are saprophytic, i.e. feed upon the organic products or remains of plants and animals, while some are parasitic i.e. depend on living plants and animals.

- Parasitic fungi may be ectoparasite (ectophytic) enter into the tissue of host and absorb food through haustoria or endoparasite (endophytic) enter into the tissues of host.
- Some fungi are **predatory**, i.e. derive their food from protozoans, rotifers etc..
- Fungi also live in symbiotic association with algae known as lichens, while some live symbiotically with roots of higher plants, called **mycorrhiza**.

Fungal mycelium may develop as following false tissue for the formation of fruiting bodies in certain fungi.

- a) **Plectenchyma**:-When hyphae of a mycelium grow together and intertwine with one another forming a thick woven tissue, called plectenchyma It may be of following two types:
  - (i) **Prosenchyma**:- These are loosely interwoven tissue with hyphal components lying more or less parallel to each other.
  - (ii) **Pseudoparenchyma**:- In this type hyphae are compactly arranged an loose their identity.Thus apper isodiametric resembling parenchyma,therefore named so.
  
- b) **Sclerotia**:-Sometimes mycelium pass into a dormant or resting stage by formation of hard resting bodies during unfavourable conditions. It is composed of central prosenchymatous and peripheral psedoparenchymatous tissue .
  
- c) **Rhizomorph**:-The fungal hyphae aggregate together to form a root- like strand with a thick hard cortex and a growing tip. Since it resembles root and helps in absorpion,it is called **rhizomorph**.

### 3. CLASSIFICATION OF FUNGI

Depending upon the various criterias as morphology of vegetative and reproductive structures, types of spores, life cycle etc. **Eumycetes(Fungi) is divided into 04 classes.**

#### **(A) PHYCOMYCETES (Algal fungi)**

- This is the lower group of fungi characterized by aseptate, coenocytic hyphae.
- Asexual reproduction by zoospores or aplanospores produced exogenously inside sporangia.
- Sexual reproduction may be isogamous or heterogamous.
- *This class is further divided into two sub-groups-oomycetes and zygomycetes.*

#### **(a) OOMYCETES :-**

- Oogamous fungi have cellulose and other glycans as main components of cell wall in many members.
- In aquatic oocytic fungi, the asexual reproduction takes place by biflagellate zoospores.
- In terrestrial oocytic fungi, it takes place by conidia.
- Sexual reproduction takes place by gametangial contact resulting in oospore formation. Gametes are usually nonflagellate, e.g. *Phytophthora*, *Albugo*, *Pythium* etc.

#### **ECONOMIC IMPORTANCE**

- Late blight of potato is caused by *Phytophthora infestans*.
- Blight refers to appearance of brownish to black dead areas formed first on the margins and tips of tips of leaflets and later on entire foliage.
- White rust of crucifer.

#### **(b) Zygomycetes:-**

- It includes terrestrial and saprophytic fungi whose hyphal wall is made up of chitin.
- Asexual reproduction by sporangiospores, Motile spores absent.
- Sexual reproduction by gametangial copulation resulting in diploid zygospore (hence called Zygomycetes).
- It germinates indirectly by producing germ sporangium, which produces germ spores or meiospores, e.g. *Mucor*, *Rhizopus*, etc.

#### **ECONOMIC IMPORTANCE**

- Both *Rhizopus* and *Mucor* species are used in alcoholic fermentation to produce a number of organic acids like citric acid, lactic acid etc.
- *Rhizopus* is also known as bread moulds. It also causes soft rot of apple.

#### **(B) ASCOMYCETES- THE SAC FUNGI**

- This is the most diverse class of fungi including mainly saprophytic forms. They consist of septate mycelium hyphae and are multicellular except yeast (unicellular).
- Most of them show asexual reproduction through conidia.
- Sexual reproduction takes place through gametangial contact between antheridium and ascogonium.
- **Fertilisation** occurs as *plasmogamy* and *karyogamy*. The latter is delayed and a new phase called dikaryotic phase appears due to presence of two nuclei.
- Some dikaryotic cell function as ascus mother cells which produce asci, each of which produces haploid ascospores.
- The asci may get aggregated with dikaryotic mycelium to form fructifications called **ascocarps**. It may be cup like (**apothecium** e.g. *Peziza*) flask shaped (**perithecium** e.g. *Neurospora*), elongated with slit (**hysterothecium**) or closed (**cleistothecium**, *Penicillium*)

- Some of the fructifications are edible, e.g. morels, truffles.

**Note:** The further discussion on the topic **Diversity in Fungi** will be continued in next lecture.