

DIVERSITY IN FUNGI

By:

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For:

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

Lecture-06

ASCOMYCETES—THE SAC FUNGI

ECONOMIC IMPORTANCE

- Various forms of yeast , e.g. *Saccharomyces* are extensively employed in brewing, baking industry to form alcoholic beverages, bread etc.
- Most of the fungi from this class cause several plant disease, i.e. **Powdery mildew** by *Erisiphe*, **Ergot** of rye by *Claviceps*.
- *Aspergillus* is known to contaminate cultures in laboratory as well as food stuffs and even human disease, e.g. plmonary spergillosis.
- *Penicillium*, a blue green mould ,is employed in ripening of cheese varieties, production of organic acids, antibiotic **penicillin** by *P.chrysogenum* and an antifungal drug griseofulvin by *P. notatum*, *P. griseofulvum*.
- *Neurospora*, a pink mould is employed in study of biochemical genetics during experiment because of its simple structure and short life cycle.

BASIDIOMYCETES - -CLUB FUNGI

- They are large and have conspicuous fructifications, e.g. toadstools, puff balls etc.
- Their mycelium is of two types- **Primary** consisting of monokaryotic cells(haploid nuclei) which multiply by **oidia** or **pycniospores** and **secondary** which is produced after sexual reproduction.
- Sexual reproduction takes place by plasmogamy between basidiospores and monokaryotic spores or between spores and hypha. While delayed karyogamy produces a new **Secondary mycelium**.
- It is dikaryotic, long lived, profusely branched and septate and capable of forming **clamp connections**, a characteristic feature of club fungi.
- Secondary mycelium can perennate in soil or wood by **sclerotia** or **rhizomorphs**.
- It multiplies by various kinds of spores as aecidiospores, uredospores, teleutospores etc. Karyogamy and meiosis takes place inside basidia. Each basidium produces four basidiospores, exogenously at the tip of sterigmata.

- They may or may not form fructification called basidiocarps.

ECONOMIC IMPORTANCE

They produce two types of diseases, i.e. **Rusts** and **smuts**.

- **Rusts** are characterized by formation of rusty pustules containing spores. They require two hosts to complete their life cycle, i.e. heteroecious. Rusts are pleomorphic as they produce different spore types to complete their life cycle, e.g. Pycniospores, Aeciospores, Teleospore and Basidiospores. Some common rusts diseases are black rusts of wheat by *Puccinia tritici*, yellow rust of wheat by *Puccinia glumarum*.
- **Smuts** are common and serious diseases of various crops. Here, black coloured thick walled resting spores are produced called smuts, i.e. teleutospores i.e. loose and covered, loose smut of wheat by *Ustilago tritici* etc.
- Many fungi of this group are edible. Mushroom which are edible usually possess coloured basidiospores in their umbrella shaped basidiocarp, e.g. *Agaricus campestris*.
- Basidiomycetes are best decomposers of wood as they secrete both cellulose and lignin digestive enzymes.

DEUTEROMYCETES –FUNGI IMPERFECTI

- This is an artificial class of fungi which includes those fungi in which sexual stages are absent, hence called imperfect.
- They are mostly unicellular like yeast.
- Mycelium is septate and coenocytic, clamp connections are absent.
- Reproduces asexually by conidia along with some other types of spores.
- Some common fungi from this *Alternaria*, *Fusarium* etc.

ECONOMIC IMPORTANCE

- A soil fungus *Trichoderma* helps in biological control of other fungi as it produces allelochemicals against them.
- Certain fungi species of *Fusarium* cause wilting in economically important plants as potato, tomato etc.
- **Red rot of sugarcane** is caused by *Colletotrichum falcatum*. It reduces juice content and brings about withering of leaves.
- Early blight of potato and tomato is caused by *Alternaria solani*.

REPRODUCTION

Fungi shows three modes of reproduction i.e. **vegetative**, **asexual** and **sexual**.

Vegetative mode may be as follows

- (1) **Budding**:- Protusion of small bud cells from parent cell that develop into a new organisms e.g. *Saccharomyces*.

- (2) **Fission**:- Splitting of vegetative cells into by constriction.
- (3) **Oidia**:- Hyphae breaks into numerous small fragments called oidia ,each giving rise to new hyphae e.g. *Rhizopus*.
- (4) **Chlamydospores**:-Thick walled,resistant resting spores formed under unfavourable conditions and form mycelium on the onset of favourable conditions.
- (5) **Fragmentation**:-Breaking into fragments

ASEXUAL MODE OF REPRODUCTION:-It may takes place by

- (1) **By zoospores**:-These are thin walled uninucleate structures formed in zoosporangium.These are motile structures formed by lower group of fungi like Phycomycetes.
- (2) **Sporangiospores**:-These are thin walled non-motile structures produced in sporangium, which give rise to new individuals
- (3) **Conidia**:-These are non motile thin walled exogenous spores produced on conidiophores and arranged in chains .e.g.*Penicillum, Aspergillus*.
- (4) **Binucleate spores** :-Some fungi with dikaryotic mycelium form special asexual structures having 2 nuclei in them,e.g. aecidiospores and uredospores in **rust** fungi

Sexual reproduction:-It may takes place by fusion of compatible nuclei of two parents in a definite stage in the life cycle of fungi. It involves three phases:

- (1) **(i)Plasmogamy**,i.e.joinig of two cells and fusion of their protoplast.
- (2) **(ii)Karyogamy**,i.e.two haploid nuclei from two different parents fuse together to form a diploid nucleus.
- (3) **MEIOSIS**:-Result in reduction of chromosome n. to half.Fungi shows progressive ireduction in sexuality.It takes place by following five methods.
 - (1)**Planogametic copulation**:-This type of reproduction involves fusion of flagellate gametes from opposite sex or strain. It may be of three types: **Isogamy ,Anisogamy ,Oogamy**.
 - (2)**Gametangial contact**:- In this type of reproduction male antheridia and female oogonia come in contact with each other to form a fertilization tube through which contents of male gamete are transferred to female gamete to form diploid zygote.
 - (3)**Gametangial copulation** :-This type of reproduction shows direct fusion of antheridium and oogonium to form zygospore, e.g. *Rhizopus*.
 - (4)**Spermatiation**:-In this type of reproduction single celled non-motile gametes called spermatia are transferred to receptive hypha of ascogonium through wind, water, insects etc.so as to form a dikaryotic structure,e.g.*Puccinia*.
 - (5)**Somatogamy**:- In absence of sex organs ,reproduction involves fusion of two hyphae of opposite strains, resulting in dikaryote ,e.g.Agaricus.