Roll No.: 170611610039

Registration No.: 201701010554 of 2017-18

Project Title : Economic Importance of Fungi

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Acknowledgement

First of all, as a token of thanks, I want to mention each and everyone whose contribution I cannot overlook in the completion of this project. I would like to thank our respected principal Dr. Sukriti Ghosal whose role is immense. A special thanks to my supervisor maam Moumita Basu who has guided me with utmost care and love, and also all the other professors of the Botany department. The role of library has been vast in the completion of this project. Last but not the least, I want to thank my parents for being there in every tricks and things.

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Definition of Fungi

Fungi (sing fungus; Latin fungus = a mushroom) can be defined as achlorophyllous organisms whose nucleated somatic bodies are usually surrounded by cell walls containing cellulose or chitin or both, and which reproduce asexually and sexually.

Fungi, plural fungi, any of about 144,000 known species of organisms of the kingdom Fungi, which includes the yeasts, rusts, smuts, mildews, molds, and mushrooms. The are also many funguslike organisms, including slime molds and oomycetes (water molds), that do not belong to kingdom Fungi but are often called fungi. Many of these funguslike organisms are included in the kingdom chromista. Fungi are among the most widely distributed organisms on Earth and are of great environmental and medical importance. Many fungi are free living in soil or water; others form parasitic or symbiotic relationships with plants or animals.

Fungi are eukaryotic organisms; i.e., their cells contain membrane-bound organelles and clearly defined nuclei. Historically, fungi were included in the plant kingdom; however, because fungi lack chlorophyll and are distinguished by unique structural and physiological features (i.e., components of the cell wall and cell membrane), they have been separated from plants. In addition, fungi are clearly distinguished from all other living organisms, including animals, by their principal modes of vegetative growth and nutrient intake. Fungi grow from the tips of filaments (hyphae) that make up

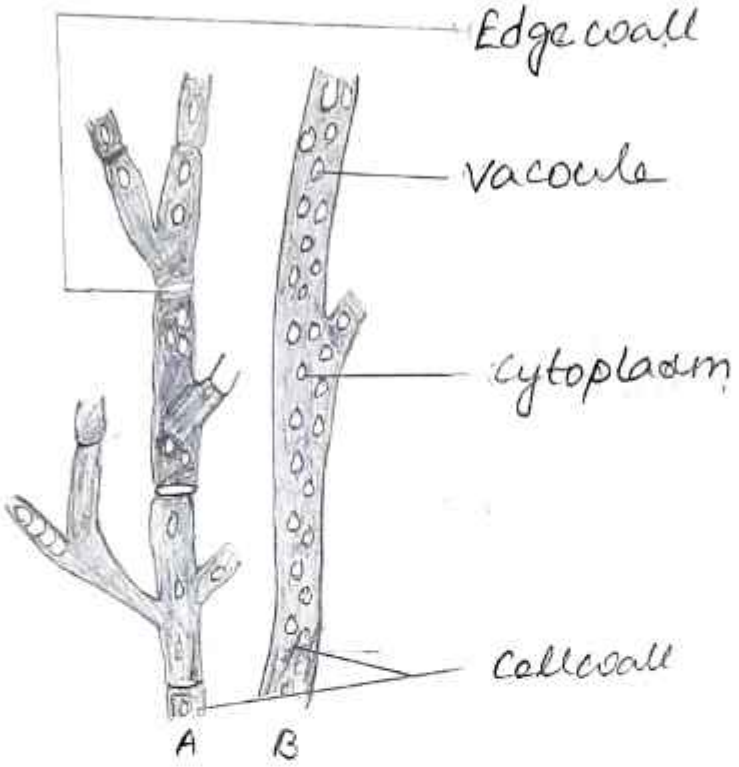
the bodies of the organisms (mycelia), and they digest organic matter externally before absorbing it into their mycelia.

While mushrooms and toadstools (poisonous mushroom) are by no means the most numerous or economically significant fungi, they are the most easily recognized. The Latin word for mushroom, fungus, has come to stand for the whole group. Similarly, the study of fungi is known as mycology — a broad application of the Greek word for mushroom. Fungi other than mushrooms are sometimes collectively called molds, although this term is better restricted to fungi to the sort represented by bread mold.

Range of thallus structures in Fungi

In almost all fungi the hyphae that make up the thallus have cell walls. (The thalli of the true slime molds lack cell walls and, for this and other reasons, are classified as protists rather than fungi). A hypha is a multibranched tubular cell filled with cytoplasm. The tube itself may be either continuous throughout or divided into compartments, or cells, by cross walls called septa (singular septum). In non-septate (i.e., coenocytic) hypae the nuclei are scattered throughout the cytoplasm. In septate hyphae each cell may contain one to many nuclei, depending on the type of fungus or the stage of hyphal development. The cells of fungi are similar in structure to those of many other organisms. The minute nucleus, readily seen only in young portions of the hypha, is surrounded by a double membrane and typically contains one nucleolus. In addition to the nucleus, various organelles — such as the endoplasmic reticulum, Golgi apparatus, ribosomes, and liposomes — are scattered throughout the cytoplasm.

Hyphae usually are either nonseptate (generally in the more primitive fungi) or incompletely septate (meaning that the septa are perforated). This permits the movement of cytoplasm (cytoplasmic streaming) from one cell to the next. In fungi with perforated septa, various molecules are able to move rapidly between hyphal cells, but movement of larger organelles, such as mitochondria and nuclei, is prevented. In the



Fungi – Hyphae

A. Hypha with Edge coall

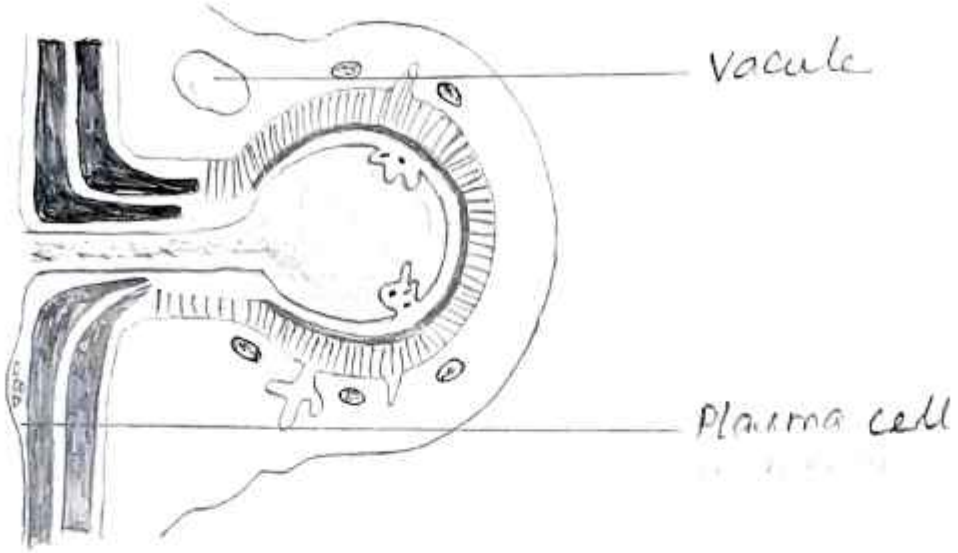
B. Hypha without Edge coall

absence of septa, both mitochondria and nuclei can be readily translocated along hyphae. In mating interactions between filamentous Basidiomycota, the nuclei of one parent often invade the hyphae of the other parent, because the septa are degraded ahead of the incoming nuclei to allow their passage through the existing hyphae. Once the incoming nuclei are established, septa are re-formed.

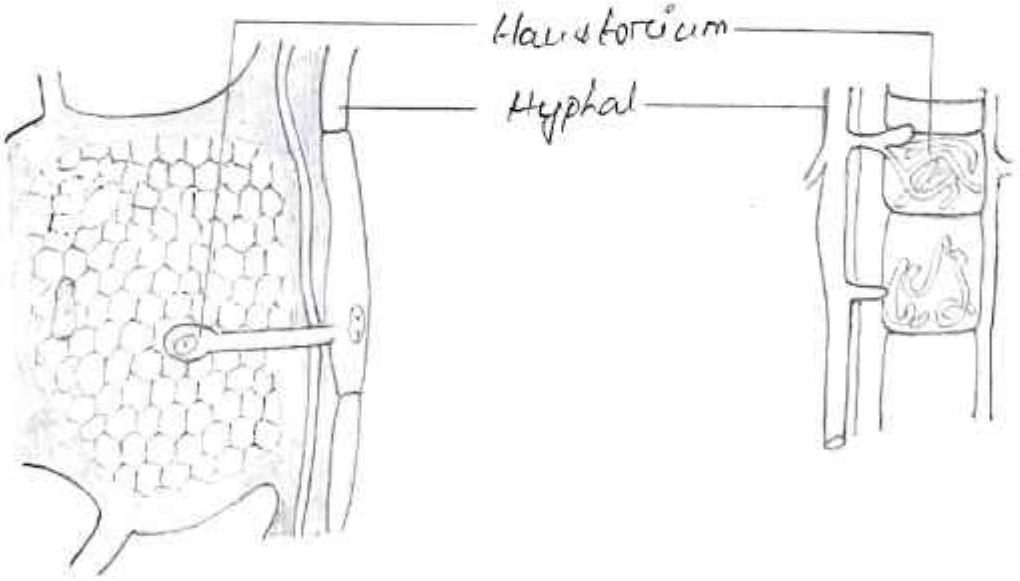
Variations in the structure of septa are numerous in the fungi. Some fungi have sievelike septa called pseudosepta, whereas fungi in other groups have septa with one to few pores that are small enough in size to prevent the movement of nuclei to adjacent cells. Basidiomycota have a septal structure called a dolipore septum that is composed of a pore cap surrounding a septal swelling and septal pore. This organization permits cytoplasm and small organelles to pass through but restricts the movement of nuclei to varying degrees.

The wall of the hypha is complex in both composition and structure. Its exact chemical composition varies in different fungal groups. In some fungus like organisms the wall contains considerable quantities of cellulose, a complex carbohydrate that is the chief constituent of the cell walls of plants. In most fungi, however, two other polymers — chitin and glucan (a polymer of glucose linked at the third carbon and branched at the sixth), which forms an α-glucan layer and a special β-1,3-1,6-glucan layer — form the main structural components of the wall. Among the many other chemical substances in the walls of fungi

Variation of hyphal structure



Microscopic View of Haustorium



Haustorium

are some that may thicken or toughen the wall of tissues, thus imparting rigidity and strength. The chemical composition of the wall of a particular fungus may vary at different stages of the organism's growth— a possible indication that the wall plays some part in determining the form of the fungus. In some fungi, carbohydrates are stored in the wall at one stage of development and are removed and utilized at a later stage. In some yeasts, fusion of sexually functioning cells is brought about by the interaction of specific chemical substances on the walls of two compatible mating types.

When the mycelium grows in or on a surface, such as in the soil, on a log, or in culture medium, it appears as a mass of loose, cottony threads. The richer the composition of the growth medium, the more profuse the threads and the more feltlike the mass. On the sugar-rich growth substance used in laboratories, the assimilative hyphae are so interwoven as to form a thick, almost leathery colony. On the soil, inside a leaf, in the skin of animals, or in other parasitized plant or animal tissue, the hyphae are usually spread in a loose network. The mycelia of the so called higher fungi does, however, become organized at times into compact masses of different sizes that serve various functions. Some of these masses, called sclerotia, become extremely hard and serve to carry the fungus over periods of adverse conditions of temperature and moisture. One example of fungus that forms sclerotia is ergot, which causes a disease of cereal grasses. The underground sclerotia of Wolfiporia extensa, an edible pore fungus also know as tuckahoe, may reach a diameter of 20cm.

Economic Importance of Fungi

Fungi include hundreds of species which are of tremendous economic importance to man. Infact our lives are intimately linked with those of fungi. Hardly a day passes when we are not benefited or harmed directly or indirectly by these organisms.

There are two aspects present in fungi—

A. Beneficial Aspects

B. Harmful Aspects

A. Beneficial Aspects

Fungi play an important role in medicine yielding antibiotics, in agriculture by maintaining the fertility of the soil, forming basis of many industries and as important means of food. Some of the fungi are important to research tools in the study of fundamental biological processes.

Some articles about the beneficial aspects of fungi are —

1. In the maintenance of soil fertility
2. In the production of essential industrial products
3. In the production of antibiotics substance and alkaloids
4. Used as food
5. Useful for academic purposes
6. Useful for biological control of soil-borne pathogens

1. In the maintenance of soil fertility –

Fungi are microscopic cells that usually grow as long threads or strands call hyphae, which push their way between soil particles, roots and rocks. Saprophytic fungi are commonly active around woody plant residue. Under dry conditions, fungi can bridge gaps between pockets of moisture and continue to survive and grow, even when soil moisture and continue to survive and grow, even when soil moisture is too low for most bacteria to be active. Fungi are able to use nitrogen up from the soil, allowing them to decompose surface residue which is often low in nitrogen.

Funguis decomposes dead organisms these can be of high value in agriculture. Many saprophytic fungi along with bacteria decompose the dead organic matter of the soil and thereby, help to return the nutrients to the soil in the form available to green plants. When plant body and animal are dead, they contribute to the big heaps of organic wastes. All most all fungi along with bacteria are the key of degradation of these organic wastes which makes our environment clean. When fungi degrade such organic wastes, these generate a kind of organic nutrient for plant called humus. All plant nutrient for plants for growth and development is actually locked in plant and animal bodies in a complex form. Fungi degenerates these. A few fungi are called

'sugar fungi' because they use the same simple substrates as do many bacteria. Like bacteria, fungi are important for immobilizing, or retaining, nutrients in the soil. In addition, many of the secondary metabolites of fungi are organic acids, so they help increase the accumulation of humic-acid rich organic matter that is resistant to degradation and may stay in the soil for hundreds of years.

Mutualists – the mycorrhizal fungi – colonize plant roots. In exchange for carbon from the plant, mycorrhizal fungi help solubolize phosphorus and and bring soil nutrients to the plant. One major group of mycorrhizae, the ectomycorrhizae grow on the surface layers of the roots and are commonly associated with trees. The second major group of mycorrhizae are the endomycorrhizae that grow within the root cells and are commonly associated with grasses, row crops, vegetables, and shrubs. The third group of fungi, pathogens or parasite, cause reduced production or death when they colonize roots and other organisms.

I've mentioned below some of complex organic molecules along with the fungi degrading them—

cellulose: Aspergillus, Penicillium, Fusaricum etc.
Hemicellulose: Aspergillus, Penicillium, Phoma etc.
Pactin: Aspergillus, Penicillium, Rhizopus etc.
Lignin: Many whit rod fungi of Basidiomycotina and many Agricus. These fungi enriches minerals and other nutrients in soil increasing fertility.

2. In the production of essential industrial products —

The industrial uses of fungi are many and varied. There are a number of industrial processes in which the biochemical activities of certain fungi are harnessed to good account.

Some of the most important of these processes are given below:

(I) Alcoholic Fermentation:— Fungi are the most useful organisms in industries like baking and brewing. Both are dependent on the fact that the fermentation of sugar solutions by yeasts produces ethyl alcohol and carbon-di-oxide.

In brewing or wine making industry alcohol is the important product. Saccharomyces cerevisiae is a species of yeast. It has been instrumental in wine making, baking and brewing. CO_2 is also a useful product for baking. It is collected, solidified and sold as "dry ice".

H. rouxii and some species of Rhizopus, Aspergillus flavus is used in the production of African native beer.

(II) Cheese Industry:— Certain fungi popularly known as the cheese molds play an important role in the refining of cheese. They give cheese a characteristic texture and flavour.

The two chief kinds of mould refined cheese are — a. Camembert b. Roquefort Gorgonzola

a. Camembert and Brie types: They are soft and white in colour. The mould is added to the outside surface of the cheese and it grows from there.

b. Roquefort Gorgonzola and Stilton types: They are green or blue veined cheese. The colour of the mould gives this type of cheese its name. The mould is injected into the cheese and it grows throughout.

The mould concerned are Penicillium camemberti and Penicillium caseicolum in the first types and Penicillium roqueforti in the second type.

(iii) Preparation of Organic acids :— Some fungi are well known for their natural capability to produce high amounts of various useful organic acids. Organic acids and metabolites play an important role in food processing. The important organic acids produced commercially as the result of the biochemical activities of moulds are oxalic acid, citric acid, gluconic acid, gallic acid, fumaric acid etc. Citric acid is the major organic acid produced by fungal fermentation. Most industrial processes for citric acid production use Aspergillus niger. Oxalic acid is also the fermentation product of Aspergillus niger. The acid is produced on the commercial scale and is cheaper than the acid made from the citrus fruits.

The gluconic acid is prepared from sugars.

The moulds chiefly employed for this purpose are some species of Penicillium and Aspergillus.

Gallic acid is prepared on commercial scale in Europe and America. Calmette (1902) obtained the gallic acid as the fermentation product of an extract of tannin by Aspergillus gallomyces.

(iv) Manufacture of Proteins :— As a supplement to the normal diet, some fungi particularly the yeasts are employed to synthesize proteins. The yeast (Saccharomyces cerevisiae and Candida utilis) contain high percentage of protein of great nutritive value.

They are grown with ammonia as the source of nitrogen and molasses as the source of carbon. The manufactured product is called Food yeast. It contains 15% protein and B group of vitamins.

(v) Vitamins :— The yeasts are the best source of Vitamin B complex. A number of preparations of high potency have been made from the dried yeast or yeast extracts and sold in the market.

A number of moulds and yeasts are utilised in the synthesis of Ergosterol which contains Vitamin D. Riboflavin — another vitamin useful both in human and animal food — is obtained from a filamentous yeast, Ashby gossypii.

(vi) A good many fungi synthesize fat from carbohydrates! Endomyces vernalis, Penicillium javanicum have a high fat content. The microbiological production of fat is, however, too costly for use.

3. In the production of Antibiotic substance and Alkaloids –

Antibiotics are one of the important metabolic products produced by fungi. They either destroy or inhibit the growth of bacteria and other microorganisms. The most important antibiotics are produced by the moulds, actinomycetes or bacteria. They are used to combat the evil effects of pathogenic bacteria and viruses. The use of antibiotics is not limited to disease treatment. The addition to certain antibiotics in small amounts to the feed of slaughter animals promotes rapid growth and improves the quality of the mead products. Application of an antibiotic to surface of freshly killed poultry preserves the fresh-killed taste during long periods of refrigeration.

Therefore, antibiotics produced by various fungi are used in the manufacture of drugs. The wonder drug 'Penicillin' is an antibiotic substance extracted from Penicillium notatum and Penicillium chrysogenum. In 1929 Sir Alexander Fleming extracted this great antibiotic drug Penicillin from Penicillium notatum. It was the first antibiotic to be widely used. Penicillin is an organic substance lethal to microbes. It is far more effective than ordinary drugs and germicides. It kills bacteria especially gram positive type. Penicillin is now produced on a commercial scale all over the world including India from the improved Penicillium notatum and Penicillium chrysogenum.

The antibiotic streptomycin obtained from Streptomyces griseus is widely used for treatment

of pulmonary tuberculosis. It is of great value in medicine. It destroys many organisms which are not killed by Penicillin particularly the gram negative organisms. A number of antibiotics have also been extracted from Aspergillus cultures. These have not been proved as effective as Penicillin.

Griseofulvin is an antifungal antibiotic obtained from Penicillium griseofulvum. It acts on the hyphae by interfering with wall formation consequently the hypal tips curl and cease to grow. When administered orally it is absorbed into the body where it accumulates in the keratinized tissues of the epidermis and hair. It is thus effective against fungal skin disease such as ringworms and athlete's food disease.

Various types of alkaloids obtained from fungi are also used as medicine. A number of alkaloids such as ergotamine, ergometrine etc. are obtained from 'ergots', i.e, the Sclerotium of the fungus Claviceps purpurea causing ergot disease of rye. Ergot is used in veterinary and human medicine. Ergot is highly poisonous. These alkaloids are used in medicine for the preparation of abortifacients and also in controlling haemorrhage after child-birth. It is used to control bleeding during child-birth. Sclerotia are hard dark resting bodies of certain fungi formed by egg regation of somatic hyphae.

4. Used as Food —

Fungi also a great source of food. Humans have collected and grown mushrooms for food for thousands of years. The mushroom has a great important as a food material because it is rich source of protein and vitamin and their excellent flavour. There are two types of mushroom — poisonous and nonpoisonous. Nonpoisonous mushrooms are used as food.

Agaricus compestris is a white fleshy mushroom that is very similar to the widely eaten and cultivated button mushroom — Agaricus bisporus. Agaricus compestris is well known and widely distributed throughout the world; although, due to loss of habitat and chemical treatments, its presence may now be less common. This mushroom is also known as the field mushroom or in North America the meadow mushroom.

Volvariella volvaceae also more commonly known as paddy straw mushroom, is an edible mushroom with high nutritional content. It is a popular mushroom variety because it produces aromatic and pleasant flavour and tastes. Mushroom are rich in nutrients and provide medicinal properties. Volvariella volvaceae typically contains 85–90% moisture and rapidly respire, hence is highly perishable. Volvariella volvaceae does not contain cholesterol.

Oyster mushroom is one of the most suitable fungal organisms from Pleurotus sajor-caju for producing protein rich food. The economic importance of this mushroom lies primarily in its uses as food for human consumption. It is rich in vitamins and B complex. The

folic acid present in Oyster mushroom helps to cure anemia.

Morchella esculenta (commonly known as common morel, yellow morel, sponge morel) is a species of fungus. It is one of the most readily recognized of all the edible mushrooms and highly sought after. It is especially found in North America, Europe, Central America and Asian countries. This type of mushroom is collected for its delicious test. It is a good source of protein, copper, zince, selenium and B vitamins. This fungus is also low in fiber-rich, saturated and unsaturated fats.

Tuber melanosporum, called the black truffle or French black truffle is a species of truffle native to Southern Europe. It is one of the most expensive edible mushrooms in the world. Winter black truffles are best if used when cooking a dish, as their aroma and flavor are long-lasting, fats work perfectly with truffles, and help bring the full flavor out, which is why truffles are usually paired with fatty foods like foie gras, butter, cheese, cream and oils, pasta, rice, potatoes this type of bland foods are brilliant to bring out delicious flavour of the truffle.

Lycoperdon is a genus of puffball mushrooms. It is also edible when young. Only young specimens should be collected, as once the spore mass begins turning yellow the fungi are unsuitable for eating.

The young maize cob tumours formed due to localized infection by the fungus Ustilago maydis. The fungus forms galls on all above ground parts of corn species. It is edible and is know in Mexico as the

delicacy huitlacoche, which is eaten, usually as a filling, in quesadilla and other tortilla-based food and soup.

Other fungi are used in fermenting a wide variety of foods, including soy sauce, tempeh and cheeses.

a. Soy Sauce:— Soy sauce or simply 'Soy', also called soya sauce is an East Asian liquid condiment of Chinese origin, traditionally made from a fermented paste of soybeans, roasted grain, brine and Aspergillus oryzae. It is considered to contain a strong Umami flavor.

b. Tempeh:— Tempeh or tempe is a traditional Indonesian soy product, that is made from fermented soybeans. It is made by a natural culturing and controlled fermentation process that binds soybeans into a cake form. Here a special fungus is used, Rhizopus oligosporus.

c. Cheese:— Cheese is a diary product, derived from milk and produced in wide ranges of flavours, textures and forms by coagulation of the milk protein casein.

5. Useful for academic purpose —

The fungus Gibberella fujikuroi is the source of gibberellic acid used widely as a growth promoting substance in studies of growth patterns of various plants. Gibberellic acid is the most common form of gibberellins. Gibberellic acid has long been used in agriculture due to its properties as a plant growth regulator. Gibberellic acid is known to induce seed germination, promote shoot growth and internode elongation, determine the sex expression of a plant, and it is involved in promoting the flowering of plants. Gibberellic acid can be applied to plants in a variety of ways, from spraying an aqueous form onto the plant, to growing plants in a media containing the hormone, to dipping the plants into a gibberellic acid paste. In a 1956 study, researchers examined the effects of gibberellic acid on forty-nine different plant species. An additional study, conducted in 1967, looked at the effects of gibberellic acid on Solanum tuberosum growth and tumor formation. The plant that were treated with gibberellic acid grew taller and had a larger dry weight than the controls did.

A number of fungi such as Neurospora crassa, Saccharomyces, Ascobolus immersus and Sordaria fimicola are widely used by cytologists, geneticists and biochemists as important research tools in the studies of fundamental genetical and biochemical processes.

Neurospora crassa is actively used in research around the world. It is important in the elucidation of molecular events involved in circadian rhythms, epigenetics and gene silencing, cell polarity, cell fusion,

development, as well as many aspects of cell biology and biochemistry.

The fungal genus Ascobolus was established in 1791 by persoon. Ascobolus has small apothecia with large asci protruding beyond the hymenium at maturity. These fungi usually live on dung or rotting plant remains and have a world wide distribution.

Although many species have been studied mycologically, nearly all genetic work has used Ascobolus immerseus, which is common and widely distributed, especially on the dung of herbivorous mammals. Ascobolus immerseus has been extremely important in elucidating recombination mechanisms, mainly through studies of segregation ratios in unordered octads from crosses using ascospore color markers, so that aberrant segregation ratios can be identified visually.

The earlier studies on the genetics of Sordaria fimicola were begun with the object of establishing a procedure for ordered tetrad analysis in a homothallic species. This was accomplished by first obtaining spore color mutants by ultraviolet irradiation.

6. Useful for biological control of soil-borne pathogens —

Biological control of soil-borne plant pathogens is a potential alternative to the use of chemical pesticides, which have already been proved to be harmful to the environment. Several strains of the fungus Trichoderma have been isolated and found to be effective biocontrol agents of various soil-borne plant pathogenic fungi under green house and field conditions.

A number of fungi have developed ingenious mechanisms for trapping microorganisms such as amoebas, roundworms (nematodes) and rotifers. After the prey is captured, the fungus uses hyphae to penetrate and quickly destroy the prey.

Other fungi produce hyphal loops that ensnare small animals, thereby allowing the fungus to use its haustoria to penetrate and kill a trapped animal. Perhaps the most amazing of these fungal traps are the so-called constricting rings of some species of Arthrobotrys, Dactylella, and Dactylaria – soil-inhabiting fungi easily grown under laboratory conditions. In the presence of nematodes, the mycelium produces large numbers of rings through which the average nematode is barely able to pass. When a nematode rubs the inner wall of a ring, which usually consists of three cells with touch-sensitive inner surface, the cells of the ring swell rapidly, and the resulting constriction holds the worm tightly. All efforts of the nematode to free itself fail, and a hypha, which grows out of one of the swollen ring cells at its point of contact with the worm, penetrates and branches within the animal's body, thereby killing the animal. The dead animal is then used for food by the

fungus. In the absence of nematodes, these fungi do not usually produce rings in appreciable quantities. A substance secreted by nematodes stimulates the fungus to form the mycelial rings.

B. Harmful Aspects

Fungi have a negative value because they are the causative agents of different diseases of our crop, fruit and other economic plants. These fungal diseases take a heavy toll and cause tremendous economic losses.

Some articles about the harmful aspects of fungi are —

1. Causes spoilage of food and other essential commodities
2. Induce diseases of plants
3. Induce diseases of animals and human beings
4. Poisonous Fungi

1. Causes spoilage of food and other essential commodities—

The modest estimate is that about 30 thousand different diseases (including bacterial and virus) attack the economic plants grown for food or commercial purposes.

Fungi cause spoilage of fruits—

(I) Downy mildews of grapes :— It ruins the vine yards and thus causes heavy losses to the crop. When the disease was first introduced into France from U.S.A it caused a havoc to the vine yards. Downy mildew is an extremely serious fungal disease of grapes that can result in severe crop loss. It is caused by the fungus Plasmopara viticola.

(II) Apple scab :— Apple scab is a common and serious disease of the apple crop. It is caused by the ascomycete fungus Venturia inaequalis. It lowers the quality as well as quantity of the fruit.

(III) Brown rot of stone fruits :— Brown rot is the most serious disease of stone fruits in Maine. It is caused by the fungus Monilinia fructicola. Affected fruits include peaches, plums, cherries, apricots and other Prunus species. The disease is highly destructive and can ruin half or more of the fruit before harvest with the remaining fruit subject to post harvest infection. Additional losses are caused by blighting of flowers and twigs.

Fruit preparations are also spoiled by Penicillium digitatum, Debr, omyces, Zygosaccharomyces etc. Vegetables are spoiled by Rhizopus nigricans. Besides

microorganism, members of Mucorales (e.g., Rhizopus Mucor), yeasts, Moniliales, Aspergillus oryzae. Penicillium digitatum are chief cause of food spoilage. These are saprophytic fungi which grow on food articles such as bread, jam, pickles, meat etc. For instance, food items are spoiled by yeasts, Aspergillus oryzae, Penicillium digitatum etc.

Dairy products are spoiled by Aspergillus nepens, Mucor, Penicillium, Cladosporium, Oidium lactis etc.

Fungi also cause spoilage of stored grains. A number of fungi, particularly some Ascomycetes and Fungi imperfecti are highly destructive of food grains like wheat and maize. Many infected grains carry fungal hyphae which cause seed borne diseases in crops.

Fungi cause destruction of fabrics, leather, paper, and optical equipments. Some fungi are the common wood rotters. They destroy timber and lumber.

2. Induce diseases of plant —

Of all parasitic diseases of plants those caused by fungi are most common.

(I) The Potato blight :— The Potato blight (Late blight of potatoes) is another destructive crop disease. It does a great damage to the potato tubers. A heavy attack of this disease is Ireland in 1845 destroyed the entire potato crop and caused so severe a famine that over a million Irish people migrated to U.S.A. It is caused by Phytophthora infestans. It infects egg plants, tomatoes etc.

(II) Rust diseases :— The stem, black and cereal rusts are caused by the fungus Puccinia graminis. They attack our cereal crops and forest timber. Some of them such as black stem rust, yellow rust and orange rust are a serious threat to our wheat crop.

(III) Brown spot of Rice :— Cochliobolus miyabeanus causes brown spot disease in rice. This disease was the causal agent of the Bengal famine. It was considered for use by the USA as a biological weapon against Japan during World War II.

(IV) Red rot disease of sugarcan :— It is a serious disease of sugarcane whose incidence has increased during the last few years, particularly in the northern parts of country. It is caused by the fungus Colletotrichum falcatum.

(V) Damping off disease :— The seedlings of almost every type of plant grown as a commercial crop such as

tomatoes, corn, cotton, mustard, peas, beans, tobacco, spinach, etc., are prone to this disease. It is caused by a species of Pythium.

(iv) Ergot disease of rye :– It is an important disease of cereal crop rye. It results in the formation of poisonous sclerotia in the rye kernel. It is called ergot of rye. Ergot is highly poisonous to man. Ergot poisoning causes hallucination, instantly and finally death.

3. Induce diseases of animals and human —

Fungi can effect animals, including humans, in several way. Mycosis is a fungal disease that results from infection and direct damage. Fungi attack animals directly by colonizing and destroying tissues. Mycotoxicosis is the poisoning of humans (and other animals) by foods contaminated by fungal toxins (mycotoxins). Many fungal infections are superficial; that is, they occur on the animal's skin. Batrachochytrium dendrobatidis, which infects the skin of frogs.

Fungi that cause the superficial mycoses of the epidermis, hair and nails rarely spread to the underlying tissues. These fungi are often misnamed "dermatophytes", from the Greek words dermis meaning skin and phyte meaning plant, although they are not plants. Dermatophytes are also called "ringworms" because of the red ring they cause on skin. They secrete extracellular enzymes that break down keratin (a protein found in hair, skin, and nails). Systemic mycoses spread to internal organs, most commonly entering the body through the respiratory system. Histoplasmosis is caused by the dimorphic fungus Histoplasma capsulatum. Mycetisms can occur when poisonous mushrooms are eaten. It causes a number of human fatalities during mushroom-picking season.

4. Poisonous fungi —

The most common cause of poisonings due to ingestion victoria is Agaricus xanthodermus yellow staining mushroom.

There are three kinds of poisonous fungi —

(I) ones that will kill us
(II) ones that will make us seriously ill.
(III) ones that will give use hallucinations.

The most deadly is Amanita phalloides death cap, responsible for 90% of the deaths attributable to fungal poisoning in the world. Amanita muscaria-fly Agaricus easily identified by almost everyone from its constant presence will cause gatrointestinal upsets.

Hence, it is advisable for people to consume only mushrooms after consulting an expert. They should also thoroughly search their pickings to ensure that only edible mushrooms are in the collection. If the person is consuming that particular species for the first time, no more than 150 grams of mushrooms should be eaten. Allergi reactions could occur and this acts as a precaution.

Conclusion

Fungi can't move around the way animals do and they don't produce their own food the way plants do. Mycorrhiza are associations of fungi with the roots of plants. This association is important for many different crops that humans rely on for food. The fungi help the plants absorb nutrients and water more efficiently. Fungi play a big part in the biosphere because they are one of the many different organisms that decompose organic matter. A lack of fungi in the environment could disrupt the cycle of the ecosystem. Fungi are responsible for decomposition, nutrient cycling, symbiosis, and a food source.

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