

BENHA UNIVERSITY

EXAM(3rdMicro&Chem).

Faculty of science

Time:2 hour.

Botany Department

January 2014.

Answer the following questions:-

- 1- Compare between properties of fungi in fresh and marine habitats?
- 2- The main groups' biodiversity of fresh water fungi?
- 3- Roles of fungi in fresh water ecosystem?
- 4- Ecological factors affecting aquatic microbial distribution?
- 5-Ecology of microorganisms in different aquatic habitat?
- 6-Classification of natural water?

With best wishes.

1-Compare between properties of fungi in fresh and marine habitats

A-Marine fungi

Capable of growth at low nutrient concentrations found in marine water.

Capable of growth at low temperature(psychrophilic).

Require sodium chloride for growth ,other are salt tolerant.

Yeasts are frequently found in marine waters.

Filamentous basidiomycetes are rarely found in marine ecosystem.

Exhibit different shapes of unfurling and branched meiospore appendages
scolecosporous,staurosporous and gelatinous sheath.

B-Fresh water fungi

Most fungi are saprophyte and motile by means of flagella or other mechanisms.

Exhibit different shapes of conidia sigmoid,ovate and leafy shape.

Increase the ratio of surface area to volume, allowing more efficient uptake of low levels of nutrients available.

Filamentous hyphomycetes, ascomycetes and basidiomycetes are found in fresh ecosystem.

2- The main groups' biodiversity of fresh water fungi imperfecti:-

a- **The Ingoldian fungi** : which occurs on decaying leaves in streams and Lakes on tropical regions in many countries around the world.The aquatic ascomycetes and hyphomycetes occurs on submerged woody materials, in temperate regions. Ingoldian hyphomycetes produce conidia that are mostly unpigmented and branched or long and narrow, and are adapted for life in running water.Ascospore with various sheaths, appendages and surrounded by gel-like sticky mucilaginous sheath. Which function in dispersal and/or attachment .

b-Aeroaquatic hyphomycetes : they are found in stagnant ponds , ditches or slow flowing fresh water their vegetative hyphae grow on submerged leaves and woody substrates under semi-anaerobic fresh water and are found around the world, produce purely vegetative mycelium in substrates under water, but produce conidia with special flotation devices ,only when the substrates on which the fungus is growing are exposed to moist aerial environment.

c- Dematiaceous and hyaline hyphomycetes : they are distinct from ingoldian hyphomycetes, because the conidia is not specifically adapted for aquatic existence. The fungi occur mainly on decaying herbaceous plant material and woody debris in aquatic and semi aquatic habitats worldwide. They are classified into main groups : **indweller** ,have reported only from fresh water habitats, whilst **immigrants** have been reported from terrestrial as well as fresh water habitats.

3-Role of fungi in fresh water ecosystem:-

- 1- Fresh water fungi are involved in the decay of wood and leafy material.
- 2- They may also involved in the degradation of animal parts.
- 3- Production of degrading enzymes in fresh water ecosystem.

- 4- Aquatic fungi can macerate the leaf matrix and make the energy available to feeding animals in fresh water habitats.
- 5- Animals feed on a diet rich in fungi have higher growth rates & fecundity.
- 6- Fungi are important to other fresh water organisms in nutrient cycling.
- 7- Microorganisms possess role in the decay of particulate detritus in sediments.

4- Ecological factors affecting aquatic microbial distribution:-

a- Nutrient availability: the quality as well as quantity of nutrient entering water is important in the microbial ecology. Any increase in the concentration of available nutrient is known as **eutrophication** as in sewage discharge into stream, or natural as with rain water washings. The easily digested carbohydrates such as starch and sugars stimulate the development of bacteria and fungi, when proteins added to water stimulate the development of proteinic bacteria. On exhaustion of the substrate, these primer invaders die, releasing cellular materials encourages a secondary development of proteinaceous and other bacteria.

b-Temperature: high temp(30-37 C)encourage enteric organisms , while extremely high temp(higher than45 C)select thermophiles. Thus in hot springs. Thermophilic bacteria and blue green algae are encountered. Low temp such as found in oceans (4-10 C)encourage the growth of psychrophils. Temp

play role on the rate of growth, nutrient requirement, enzyme and chemical composition of cell.

C- Ph : affect on the morphology and physiology of microorganisms, At ph values of 4-5, the fungi predominant and bacteria are completely excluded. At ph values of 7 and above ,the predominant organisms are bacteria . Acidophillic > neutral > basiphillic.

d- light : tends to inhibit the growth of bacteria, but encourages the development of algae. When nutrients are plentiful under aerobic and light conditions such as in an oxidation pond, the bacteria breakdown the organic matter releasing CO₂ in the process, then used up by algae for photosynthesis. The latter process release oxygen which is required by bacteria. Clear area more favorable than turbid area.

e- depth of water : more bacteria are generally found in the upper portion of water than the lower. Furthermore, the type of organisms developing at the various region of stream or lake differ one from the other. e.g Cocci are generally benthic where the Gram-negative mobile rods are generally tectonic.

f- Oxygen tension: when the system is aerated, fungi, bacteria and protozoa grow rapidly, and organic materials are broken-down ultimately into CO₂ and water and new cells are produced. Under anaerobic conditions, anaerobic bacteria well

developed and fungi, protozoa are absent. Sulfate reducing bacteria occur in a large number if sulfate is present forming sulfide in the process, some reduce it to H₂S. If sulfate is absent methan producing bacteria occur. Anaerobic bacteria found in mud, their activation lead to the formation of foul gases such as methane and H₂S.

g-Velocity of moving water: affects the type of organisms developing in water. Some aquatic algae and bacteria grow better in flowing water under natural condition than in stagnant water. The protozoa grow better in slow moving water.

5-Ecology of microorganisms in different aquatic habitat :-

Aquatic habitats are classified into fresh and marine water

Fresh water the salinity less than 1gm/L and found in a- lentic (standing water) e.g pond and lake b-lotic (running water) e.g river, streams and rivule. While marine water the salinity more than 1gm/L and found in sea and oceans.

6-Classification of natural water:-

Atmospheric water

Surface water.

Underground water.

Each of the major division contain numerous microorganisms within an ecosystem. Autochthonous (indigenous)M.O are capable of survival ,growth and metabolic activity in the habitat.In contrast Allochthonous(migrates)M.O are transient and transported into a foreign ecosyetem.