CHAPTER 2 – MICROORGANISMS

By – www.netexplanations.com Teachers Staff

Those organisms which cannot be seen by naked eyes and are visible if observed with the help of magnifying glass or microscope are called microorganisms. They can be unicellular for example bacteria or they may be multicellular like some algae and fungi.

Classification:

Microorganisms are divided into 4 major groups

1) Bacteria
2) Protozoa
3) Fungi
4) Algae

Viruses are different from microorganisms as they require a host organism like bacteria, plant or animal. They are obligate intercellular parasitic organisms.

Microorganisms are ubiquitous. They are present in all possible habitats such as air, water and soil. Apart from this they are also found in extreme habitat from ice cold slow clad to deep hydrothermal vents. Microorganisms are also found on living organisms such as plants, animals and humans.

Microorganisms and their relationship with us:

Microbes can be both beneficial and harmful to humans

- **Uses of microorganisms**

1) Used in dairy and bakery:
   Lactobacillus is used to convert milk into curd. It is also used to make cheese, bread, pickles etc. Yeast is used in bakery to make cakes and bread.
2) Alcohol production:
   Yeast is used to convert sugars from barley, wheat, rice, crushed fruit juices, etc. to alcohol, wine and acetic acid on a commercial scale.
   - Fermentation: The process of making alcohol from sugar is called fermentation
3) Used in medicine:
   Streptomycin, tetracycline and erythromycin are examples of antibiotics produced by microorganisms. These are used to prevent diseases in animals, plants and livestock.
   - Antibiotics: These are compounds that target bacteria and funguses by preventing their growth or killing them.

   Apart from this vaccine is an important biological preparation to prevent infection.
   - Vaccine: vaccines are prepared from dead and weakened bacteria and viruses. They help in antibody production and improving the immune status of an organism against a disease.
4) Agricultural industry:

Some bacteria have the ability to convert atmospheric nitrogen to nitrates and nitrites. These microorganisms have the ability to convert dead decaying organic waste of plants and animals converting them into manure.

- **Harmful Microorganism:**
  These organisms cause food spoilage, diseases in plants, animals and humans
  - Pathogen: these are organisms who have the ability to cause an illness, disease or infection in plants, animals or humans
  - Carrier: carrier is the primary host of infectious agent, but itself has no signs and symptoms of the disease. A carrier organism can be either an insect or animal.
  - Communicable disease: the disease which can spread from infected person when they come in direct contact with another healthy person is called communicable disease. Examples of such disease include cholera, common cold, chicken pox and tuberculosis
- **List of common animal pathogens**

CAUSTITIVE AGENT	DISEASE	MODE OF TRANSMISSION
Bacteria	Tuberculosis	Air
	Cholera	Water
	Typhoid	Water/food
Virus	Measles	Air
	Chickenpox	Air/Contact
	Polio	Air/Water
	Hepatitis A	Water
Protozoa	Malaria	Mosquito bite

- **List of common plant pathogens**

CAUSTITIVE AGENT	DISEASE	MODE OF TRANSMISSION
Bacteria	Citrus canker	Air
Virus	Yellow vein mosaic of bhindi	Insect
Fungi	Rust of Wheat	Air/ seed

- **Food poisoning and preservation**
  - Food poisoning: Consumption of food which has toxins or pathogenic organisms growing in it causes food poisoning.

To prevent food from getting spoiled preservatives are added to it.

- Preservative: some chemicals prevent food spoilage and increase the shelf life of the food item when added to the food. These chemicals are called preservatives.

Examples of preservatives:

1. Common salt: It is a common home method to prevent spoilage of fruits like amla, mangoes etc. by inhibiting growth of bacteria. It is also used to preserve meat and fish

2. Sugar: It lowers the moisture content of food thus preventing growth of bacteria. It is used in preservation of jam, jellies and squashes.
3. Oil and vinegar: Vegetables,fruits, fish and meat are preserved by adding oil or vinegar to them.
4. Pasteurization: It is commercially used method to prevent spoilage of milk. In this method milk is heated at 70° C for 15 to 30 seconds. After heating the milk is subjected to cooling before packaging and storing.
5. Air tight packaging: Most micro-organisms require air for its growth. So many dry fruits and vegetables are sealed in air tight packets to prevent its spoilage.

- **Nitrogen cycle:**
  Nitrogen cycle is an important process. in this cycle atmospheric inorganic nitrogen is converted into usable organic form, which can be used by the plants and other organisms. After this it is passed back into the atmosphere.
  Steps in nitrogen fixation:
    1. Atmospheric nitrogen is converted into simpler form by either natural phenomenon like lightning. An alternative is the biological fixation of nitrogen by bacteria such as *Rhizobium and blue-green algae* into less stable forms which can be consumed by plants.
    2. Plants use their roots to absorb these nitrates and nitrites from soil. The nitrogen is then used for production of proteins and other metabolites.
    3. the nitrogen is passed on into animals and humans in the next step as they feed upon the plant.
    4. The nitrogen is passed back into the environment form animals in form of nitrogenous waste and death of animals.
    5. From here some bacterial decomposers act on the dead and decaying matter and convert it back into plant usable form.
    6. Another kind of bacteria convert organic nitrogen toinorganic gaseous form which is released back into the atmosphere.