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Chapter – 2nd

Micro organism

Micro - Organism

Those organisms which are too small to be seen without a microscope are called micro-organisms. We cannot see the micro-organisms around us, we become aware of the presence of micro- organisms through their actions like spoiling our food and causing diseases.

Some of the micro-organisms are harmful to us.

The micro-organisms like certain bacteria and fungi make our food go bad. The micro-organisms also cause diseases in humans, other animals and plants. The diseases like common cold, malaria, skin infections, typhoid, tuberculosis, tetanus, cholera, measles, chickenpox, smallpox and AIDS, etc., are all caused by the action of various types of micro-organisms.

Major Groups of Micro-Organisms Micro - organisms are classified into five major groups.

1. Bacteria

2. Viruses

3. Protozoa

4. Fungi

5. Algae.

Bacteria

Bacteria are very small, single-celled micro-organisms. They are found in large numbers everywhere: in air; soil and water; every surface around us; on our bodies and even inside our bodies. There are mainly three groups of bacteria on the basis of their shape: spherical bacteria, rod-shaped bacteria and spiral bacteria.

Examples: Lactobacillus and Rhizobium bacteria.

Viruses

Viruses are the smallest micro-organisms which can develop only inside the cells of the host organisms.

Viruses are much smaller than bacteria. Viruses do not respire, feed, grow, excrete, or move on their own. They just reproduce. Viruses are able to reproduce if they enter a living cell. That is, viruses can reproduce and multiply only inside the cells of other organisms.

Viruses cause a variety of d beings, other animals and plants. The human diseases such as common cold, influenza polio, chickenpox, and smallpox are all caused by viruses. The two examples of viruses are Human Immunodeficiency Virus' (HIV) and Common cold

Protozoa

Protozoa are a group of single-celled micro-organisms which are classified as animals.

Protozoa are animal like just as algae are plant like. Protozoa are found in ponds, lakes, dirty water drains, sea- water and damp soil.

Examples of protozoa are:

Amorba, Paramecium, Entamocba and Plasmadium. Diseases like dysentery and malaria are caused by protozoa.

Algae

Algae is a large group of simple, plant-like organisms. They contain chlorophyll and produce food by photosynthesis just like plants.

Algae, however differ from plants because they do not have proper roots, stems and leaves.

Examples of algae are:

Chilamydomonas, Spirogyra, Blue-green algae; Diatoms and Seaweeds.

Fungi

Fungi are a large group of organisms which do not have chlorophyll and do not photosynthesis.

Examples of fungi are: Yeast, Moulds (such as Bread mould, Penicillium and Aspergillus), Mushrooms, Toadstools and Puffballs.

Where Do Micro-Organisms Live

Micro-organisms are found practically everywhere in all types of habitats. Micro-organisms are found in air, soil and water bodies. Micro-organisms can live and survive in almost all kinds of environment like hot springs, ice-cold waters, saline water (salty water), desert soil or marshy land.

Micro- organisms are present inside the human body and that of other animals. The micro-organisms also live as parasites on other living things, including us.

FRIENDLY MICRO-ORGANISMS

Micro-organisms are used for various purposes by human beings as well as in nature.

Micro-organisms are utilised in the making of curd, bread and cake.

Micro-organisms are used in the production of alcohol, wine and acetic acid (vinegar).

Micro-organisms are used in the preparation of medicines (or drugs) called antibiotics.

Micro-organisms are used in agriculture to increase the fertility of soil by fixing atmospheric nitrogen gas.

Micro-organisms clean up the environment by decomposing the organic matter of dead plants, dead animals and animal wastes into harmless and useful simple substances

Commercial Use of Micro-Organisms

Micro-organisms are used for the large scale production of alcohol and acetic acid (vinegar). Yeast is the micro-organism which is used for the large scale production of alcohol.

Yeast is capable of converting sugar into alcohol. The process of conversion of sugar into alcohol by the action of yeast is called fermentation.

Fermentation was discovered by Louis Pasteur in 1857.

Medicinal Use of Micro-Organisms

A medicine which stops the growth of, or kills the disease-causing micro-organisms is called an antibiotic. The source of antibiotic medicines are micro-organisms. Some of the common antibiotics which are made from fungi and bacteria are: Penicillin, Streptomycein, Erythromycein and Tetracycline.

Antibiotics kill the disease-causing micro-organisms but usually do not damage human body cells.

Increasing Soil Fertility

Some of the micro-organisms present in the soil can fix nitrogen gas from the atmosphere to form nitrogen compounds. These nitrogen compounds mix with the soil and increase the fertility of soil.

Example:- some bacteria and blue- green algae are able to 'fix' nitrogen gas from the atmosphere to enrich the soil with nitrogen compounds and increase its fertility. The nitrogen-fixing bacteria and blue-green algae are called biological nitrogen fixers.

Since blue-green algae store in them nitrogen compounds made E nitrogen-fixation, they are used as fertiliser in agriculture.

The addition of blue-green algae to barren fields increases the nitrogen content of the soil and makes it fertile.

The nitrogen-fixing blue-green present in the root nodules of leguminous plants (like peas, beans, algae etc.) also fix atmospheric nitrogen and increase soil fertility.

Cleaning the Environment

Some micro-organisms (like certain bacteria and fungi) decompose the organic matter present in dead plants, dead animals and animal wastes, and convert them into simple substances which mix up with the soil. These simple substances contain plant nutrients which are again used by new plants for their growth.

Since micro-organisms decompose the harmful and smelly dead remains of plants and animals, and animal wastes into harmless materials, they clean the environment.

DISEASE-CAUSING MICRO-ORGANISMS IN HUMANS

Disease-causing micro-organisms (or pathogens) enter our body through the air we breathe, the water we drink, or the food we eat. The disease-causing micro- organisms can also get transmitted by

direct contact with an infected person or carried through an insect (or other animal).

When pathogens (such as bacteria, viruses, protozoa, fungi, etc.) enter our body, they cause diseases. A person who has disease-causing micro-organisms (or microbes) in his body is said to be an 'infected person'.

Those microbial diseases which can spread from an infected person to a healthy person through air, water, food or physical contact, etc., are called communicable diseases. In communicable diseases, the disease-causing germs (or infection) get transmitted from a human being, an animal or the environment to another human being.

Some of the examples of communicable diseases Common cold, Cholera, Chickenpox, Tuberculosis (TB), Malaria, and AIDS.

Disease-Causing Micro-Organisms in Animals

Several micro-organisms cause diseases in other animals (such as cow, buffalo, sheep, goat and poultry birds).

Some of the examples of diseases caused in animals by the micro-organisms (or microbes) are:

Anthrax is a dangerous disease of animals (like cattle) which is caused by a bacterium. Thus, anthrax disease is a bacterial disease of animals. The causative micro-organism of anthrax disease is a bacterium (known as Bacillus anthracis).

Aspergillosis is a disease of animals (like poultry birds) which is caused by a fungus. Thus, aspergillosis is a fungal disease of animals. The causative micro-organism of aspergillosis disease is a fungus.

FOOD POISONING

Micro-organisms that grow on our food sometimes produce toxic substances (poisonous substances). The food spoiled in this manner starts giving foul smell and bad taste. Its colour may also change.

If such a food is eaten, it will lead to food poisoning. The disease caused due to the presence of a large number of micro-organisms (like bacteria and fungi) in the food, or due to the presence of toxic substances in food formed by the action of micro-organisms, is called food poisoning. Thus, food poisoning occurs due to the consumption of food spoilt by some micro-organisms.

The major symptoms of food poisoning are: Vomiting, Diarrhoea (Loose motions), Pain in abdomen, Headache and Fever. Food poisoning can cause serious illness and even death.

PRESERVATION OF FOOD

The process in which the food materials are given a suitable physical or chemical treatment to prevent their spoilage is called food preservation.

Some of the methods for preserving foods are:

Sun-drying (or Dehydration)

Heating

Cooling (or Refrigeration)

Deep freezing

Addition of common salt

Addition of sugar

Addition of mustard oil and vinegar

Use of special chemical preservatives (such as sodium met bisulphite, sodium benzoate and citric acid)

Pasteurisation

Packing food in air-tight packets.

Preservation of Food by Sun-Drying

Drying (or dehydration) means removal of water from food materials which are to be preserved. Sun- drying (or dehydration) reduces the water content (or moisture content) of food materials and makes them dry.

The vegetables like Spinach (Palak, Saag), Methi leaves, and Cauliflower and Peas (Mutter) are preserved in our homes by the sun-drying method

Preservation of Food by Heating

Heating kills many micro-organisms and prevents the food from spoilage. So, some foods can be preserved just by heating. For example, we boil milk to prevent it from spoilage.

Preservation of Food by Cooling (or Refrigeration

When food is kept in a cold place (like that in a refrigerator), then the food does not get spoiled easily. It remains fresh for a much longer period. The food materials like milk, kneaded flour (dough), cooked food (like cooked vegetables and pulses), and fresh fruits and vegetables are kept in a cool place like refrigerator to prevent their spoilage

Preservation of Food by Deep Freezing

At the very low temperature in deep freezer, the growth of food-spoiling micro-organisms is prevented completely.

Due to this, the frozen food remains unspoiled and fresh for long periods. Deep freezing method is used for the preservation of foods like meat, fish and their products; fruits and vegetables.

Preservation of Food by Common Salt

Common salt prevents the growth of food-spoiling micro-organisms due to which it is used to preserve a number of food materials. Common salt has been used to preserve meat and fish for ages.

Common salt does not allow bacteria or fungus to grow on fruits and vegetables preserved in it.

Preservation of Food by Sugar

Sugar is used as a preservative in making jams and jellies from fruits.

Sugar reduces the moisture content from the fruits which inhibits the growth of micro-organisms like bacteria which spoil the fruits, etc.

Preservation of Food by Mustard Oil and Vinegar

Mustard oil and vinegar (sirka) are widely used as preservatives for the preservation of fruits and vegetables in the form of pickles (achar).

Preservation of Food by Using Special Chemicals as Preservatives

The three special chemicals which are used as preservatives in the preservation of food are: Sodium Meta bisulphite, Sodium benzoate and Citric acid.

Sodium Meta bisulphite and sodium benzoate are used to preserve foods such as jams, jellies, juices and squashes so as to save them from spoilage.

Citric acid is used as a preservative in confectionary (sweets). These special chemicals kill the food-spoiling bacteria but they do not harm us.

Preservation of Food by Pasteurisation

The method of pasteurisation is used for the preservation of milk in big milk dairies, and it involves the process of heating, followed by quick cooling.

Pasteurised milk can be consumed without boiling because it is free from harmful micro-organisms. The milk that comes in packets also does not get spoiled for a fairly long time. This is because it is pasteurised milk.

Preservation of Food by Packing in Air-Tight Packets

Now days, dry fruits and even vegetables are sold in sealed, air-tight packets to prevent the attack of micro-organisms on them. This helps the dry fruits and vegetables to remain unspoiled for a longer time.