Mentor Guru

Class 12 – Biology

Chapter 8 – Microbes in Human Welfare

Microbes or microorganisms form a significant component of the biological systems on the Earth. They are ubiquitous, present everywhere – in the soil, around us, in water, the air we breathe, and both in and on our bodies. Also, microbes are present in other animals and plants. They are so tiny, microscopic in nature, varying in shape and size. They can only be seen through the microscope. The different types of microbes are:

- Algae
- Bacteria
- Fungi
- Protozoa
- Virus

Microbes in Human Welfare: Apart from the harmful and infectious disease-causing pathogens, there are several useful microorganisms which are beneficial to humans in various ways. Some of the most important contributions of microbes to human welfare are discussed below.

In Household Products

- Fermentation of milk to prepare yoghurt.
- Curdling of milk to prepare curd, cheese, and paneer.
- Fermentation of dough, which is used for making bread, idli, and dosa.

In Industrial Products

- Production of alcoholic beverages.
- Production of antibiotics like Penicillin and other chemical substances to kill or hamper the growth of disease-causing microbes.
- A few chemicals, enzymes and other bioactive molecules are also produced by these microbes for various human uses.

In Sewage Treatment

- Sewage is treated in sewage treatment plans(STPs) before disposing of so as to make it less polluting, which is naturally carried out by heterotrophic microbes present in the sewage. The treatment is carried out in two stages – Primary treatment, Secondary treatment or biological treatment.
- These processes reduce the BOD(biochemical oxygen demand) of the effluent significantly. BOD is the amount of oxygen that would be consumed if all the organic matter in one litre of water were oxidized by the bacteria. The sewage water is treated until the reduction of BOD as the BOD gauges the rate of uptake of oxygen by microbes in a water sample. Therefore, BOD is a measure of the organic matter present in water. The greater the BOD of wastewater, the more its polluting potential.

In Biogas Production

- Methanobacterium, commonly found in anaerobic sludge, facilitates sewage treatment. They are also found in the rumen of ruminants.
- The excreta of cattle, known as gobar, is bacteria-rich. Hence dung can be used for the generation of biogas, commonly referred to as gobar gas.

As Biocontrol Agents

- The utilization of biological methods to control plant pests and diseases is referred to as biocontrol which has been achieved through chemicals – pesticides and insecticides.
- The use of biocontrol measures will reduce the dependence on toxic chemicals and pesticides to a greater extent.
- Biological farming promotes life forms such as the inhabiting of the field, pests and predators, life cycles, and feeding patterns that will help in developing suitable means of biocontrol.
- Microbial biocontrol agents example – Bacillus thuringeinsis, available as dry spores, sprayed on vulnerable plants.
- Genetic engineering developments have enabled scientists to release B. thuringiensis toxins genes into plant bodies thereby making them resistant to attacks by insect pests. Example – Bt-cotton.
- Most of the baculoviruses used as biological control agents are in the genus Nucleopolyhedrovirus. Microbes are also used as biofertilizers.