

Class – 9

Sub. – Biology

Chapter - 9

ECONOMIC IMPORTANCE OF BACTERIA

What is Bacteria?

Bacteria are microscopic living organisms, usually one-celled, that can be found everywhere.

These are microscopic living organisms, usually one-celled, that can be found and are extremely adaptable to conditions and survive wherever they are. The Economic importance of any organism refers to the advantages and disadvantages of that organism to nature, the humans, and the environment. Listed below are some economic importance of bacteria as well as disadvantages of bacteria.

Useful activities of bacteria -:

•The role of Bacteria in Medicine:

1. ✓Antibiotics

These are also called antibacterials. Antibiotic drugs are made from living organisms such as fungi, molds, and certain soil bacteria that are harmful to disease-causing bacteria. Thus they are used to control bacterial growth and infection.

Example: Terramycin, streptomycin, gentamycin, penicillin.

1. ✓Serums

Serums contain antitoxins of specific pathogens. Genetically modified bacteria are used to produce serum compounds on a large scale.

Example: Blood clotting factor for the treatment of haemophilia.

1. ✓ **Vaccines**

When a weak strain of bacteria is injected into a healthy body, it is not strong enough to produce the disease in the body, but sufficient to produce antibodies. These form the basis of immunisation methods. Vaccines produced in this way are used to prevent the onset of diseases in humans. The administration of vaccines is called vaccination.

Example: BCG is used to prevent TB, cholera and typhoid vaccines have also been developed.

1. ✓ **Toxoids**

Bacteria are also useful in the production of toxoids, which are toxins extracted from bacteria. After extracting a toxic, its toxicity is suppressed by treating it chemically or by using heat, while retaining its useful properties.

Some diseases that are treated using toxoids are diphtheria and tetanus.

• **The role of Bacteria in Agriculture:**

2. ✓ **Nitrogen-fixing bacteria**

The conversion of atmospheric nitrogen into forms of nitrogenous compounds usable by plants is. bacteria living in the root nodules of legume plants fix nitrogen from the atmosphere.

Microorganisms in the soil convert atmospheric nitrogen into ammonium compounds, thereby enabling the plants and animals. Nitrogen is an essential constituent of nucleic acids, chlorophyll and vitamins. Rhizobium, Azobacter and Clostridium are species of bacteria which are capable of converting atmospheric nitrogen into forms usable by plants. Plants cannot use nitrogen in elemental form; hence the role of the nitrogen-fixing bacteria becomes very important

3. ✓ **Nitrifying bacteria**

Nitrifying bacteria convert nitrogenous waste from dead plants and animals present in the soil into nitrates by the process called as nitrification. In this process, certain ammonifying bacteria like Bacillus and Clostridium first convert nitrogenous waste into ammonia. This ammonia is then converted into ammonium compounds by the same ammonifying bacteria. The ammonium compounds are then converted into nitrites by nitrifying bacteria such as Nitrosomonas, Nitrococcus and then into nitrates by nitrifying bacteria such as Nitrobacter.

4. ✓ **Denitrifying bacteria**

Denitrifying bacteria like Pseudomonas putida and Bacillus subtilis are also present in the soil. These bacteria break down nitrates in the soil and release free nitrogen gas, which then enters the atmosphere.

5. ✓ **Scavenging Role**

Saprophytic bacteria obtain food from organic remains such as animal excreta, fallen leaves, meat etc. They decompose these substances by the action of digestive enzymes aerobically or anaerobically (known as fermentation). Thus they help in

sanitation of nature, so also known as scavengers. E.g. Pseudomonas.

6. ✓ **Production of fuel**

Bacteria, while converting animal dung and other organic wastes to manure, help in the production of fuel that is a must in go-bar gas plant.

7. ✓ **Disposal of sewage**

Bacteria help in disposal of sewage by decomposing it and thus, help in environmental sanitation.

The role of Bacteria in the Industry:

- **Curing of tea**

Tea leaves are subjected to fermentation to attain a particular flavour and taste. This process is called curing. *Bacillus megatherium* is used in this process.

- **Tanning of leather**

Hides or skins of animals contain pieces of flesh sticking to them. Bacteria act on these and remove all traces of flesh. The hides are now treated by a process called tanning to get leather. Tanning hide into leather involves a process which permanently alters the protein structure of skin, making it more durable and less susceptible to decomposition, and also possibly colouring it.

Harmful Effects of Bacteria:

- **Food Spoilage**

Bacteria act on sugars and proteins in food to produce products like ammonia and alcohol which change the taste, appearance and smell of food. This process is called fermentation.

- **Food poisoning**

Clostridium botulinum acts on canned food to produce a toxic substance which can even be fatal to humans. This is called botulism. It causes gas to build up in tins which become deformed.

- **Bioweapons**

Toxic substances produced by bacteria can be used to produce disease and even death in living organisms. Bacteria can produce epidemics in people because they spread easily and multiply quickly.

Example: Anthrax has been used as a germ bomb to spread disease in epidemic form.