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Ch-9 Economic Importance of Bacteria and Fungi

(A) Economic Importance of Bacteria Notes:-

Economic Importance of Bacteria: Bacteria consists of a large domain of prokaryotic microorganisms. These are microscopic living organisms, usually one-celled, that can be found everywhere. They are extremely adaptable and they can survive wherever they are.

A. Role of Bacteria in Medicine:

- **Antibiotics:**
Antibiotic drugs are obtained from living organisms such as fungi, moulds, and certain soil bacteria that are harmful to disease causing bacteria. Thus, they are used to control bacterial growth and infection.
- **Example:** Tetracycline, Streptomycin, Gentamicin, Penicillin.
- **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.

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• **Vaccines:**

- A special category of bacteria that is capable of converting the atmospheric nitrogen into nitrogenous compounds, usable by plants is called nitrogen-fixing bacteria.
- *Rhizobium*, *Azotobacter*, and *Clostridium* are species of bacteria that are capable of converting atmospheric nitrogen into forms usable by plants.
- B. **Role of Bacteria in Agriculture:**
 - **Nitrifying Bacteria:**
Nitrifying bacteria convert nitrogenous waste from dead plants and animals present in the soil into nitrates by a process known as nitrification.
 - *Bacillus* and *Clostridium* first convert nitrogenous waste into ammonia. This is then converted into ammonium compounds by the ammonifying bacteria.
 - The ammonium compounds are then converted into nitrates by nitrifying bacteria such as *Nitrobacter*.
 - **Denitrifying Bacteria:**
Denitrifying bacteria such as *Pseudomonas* and *Bacillus* break nitrates in soil and release free nitrogen gas into the atmosphere.
 - **Saprophytic Bacteria** decompose dead organic matter using digestive enzymes, aerobically or anaerobically, helping natural sanitation. They act as a scavenger.
 - Anaerobic bacteria produce energy-rich methane.

during decomposition. Methane forms a major part of biogas.

- Bacteria help in sanitation by decomposing sewage and waste, maintaining environmental cleanliness.

C. Role of Bacteria in Industry:

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

- Hides or skins of animals have 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 obtain leather.

D. Harmful effects of Bacteria:

- Bacteria act on sugars and proteins, producing ammonia and alcohol, changing its taste, smell and appearance. Process called fermentation.
- *Clostridium botulinum* grows in canned food and produces botulinum toxin, which is fatal to humans. Causes botulism.
- Bacteria like *Thiobacillus* and *Microbacillus* convert nitrates into gaseous nitrogen, reducing soil fertility.
- Bacteria cause black rot of mustard and cauliflower and bacterial blight of chowpea.
- *Desulfovibrio* converts soil sulphates into hydrogen sulphide, which is non-usable for plants.

- Diseases in cattle: Anthrax and tuberculosis.
- Human diseases: Whooping cough, tuberculosis, Tetanus, cholera, typhoid, pneumonia, diphtheria.
- Biological weapons: Toxins from bacteria cause epidemics. Example: Anthrax caused by *Bacillus anthracis*.

(B) Economic Importance of Fungi

Notes:-

- In Medicine: Antibiotic drugs are obtained from fungi.
- In industry: Breweries use yeast to produce alcohol. Brewers yeast and wine yeast, for example, contain zymase, an enzyme enzyme that can convert glucose to ethanol. Fructose is converted to glucose by the action of invertase. Then zymase converts glucose into ethanol and carbon dioxide.
- In Food Industry: Bakeries use yeast to make bread and cakes. It acts on the sugar present in the dough and releases carbon dioxide in the process.
- In As food: Some of the fungi like mushroom are edible and serve as food.
- In Cheese Processing: Special varieties of cheese like blue cheese are manufactured using bacteria and fungi.

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Some of the terms for the whole chapter:

- Diplococci: Many bacteria live simple but some occur in pairs (diplococci).
- Streptococci: Bacteria live in long chains (streptococci).
- Staphylococci: Bacteria live in clusters (staphylococci).
- Penicillin: It was the first antibiotic which invented in 1928 by Alexander Fleming.
- Sterilization: Boiling or heating temperature 121°C. Sterilization of water kills all bacteria except spores.
- Pasteurization: The heating of milk for a period of 30 minutes at about 60°C for a period of 30 minutes and then killing quickly. Pasteurization kills a majority of the bacteria but not all.
- Saccharomyces cerevisiae: It is the yeast which helps in fermentation of wine produced by fermenting sugar (glucose).

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