

CHAPTER 9 - ECONOMIC IMPORTANCE OF BACTERIA AND FUNGI

This lesson is for Class 8 for the subject of Biology Topic - Economic importance of bacteria which is covered in Chapter 9 titled - Economic importance of bacteria and fungi starting on Page No 83 of your text book titled - Concise Biology, Selina Publications and is being submitted to you on 19.08.2024

So dear students let us learn about -

Nitrogen fixing bacteria

[Role of Bacteria in agriculture]

- (i) Rhizobium bacteria lives in the root nodules (swollen areas) of leguminous plants (pulses, pea, beans etc) Bacteria convert the free nitrogen of the soil and air into soluble nitrates (compounds of nitrogen) which may be used by the plants for their growth.
- (ii) Azotobacter and Clostridium are free living bacteria in soil which use free nitrogen of soil and convert it into ammonia with hydrogen which further converts into amino acids and nitrates, thus enriching the soil.

iii) Nitrifying bacteria

Nitrification - is the process of conversion of ammonium compounds [in dead organic material] into nitrates and then into nitrites by the special soil bacteria. In this process some bacteria first convert the nitrogenous wastes of animals and dead remains of plants/animals into ammonia. Ammonia is then converted into ammonium compounds which in turn gets converted first into nitrites by Nitrosomonas bacteria and then into nitrates by Nitrobacter bacteria.

Ammonia $\xrightarrow{\text{Nitrosomonas}}$ Nitrites
Nitrites $\xrightarrow{\text{Nitrobacter}}$ Nitrates

Denitrifying Bacteria

Denitrification is the process of conversion of nitrates (nitrogen compounds) into nitrogen gas.

Pseudomonas is the denitrifying bacteria.

Decay is incomplete breakdown of organic matter by bacteria without giving out a foul smell.

Eg cowdung exposed to air is reduced to soil in a few days

Putrefaction is the incomplete breakdown of organic matter by bacteria, emitting a foul smell

Role of bacteria in Industry

- i) Curing and ripening of tea and tobacco leaves is carried out by bacteria to produce special flavour
- ii) Certain bacteria are used in breaking down the soft perishable parts of the skin, thus help in making of leather from hides and skin of animals.
- iii) Bacteria help in formation of curd, cheese, vinegar, alcohol etc by fermentation process.
- iv) Bacteria helps in retting of jute and other fibres.

Spoilage of food by bacteria

Cooked food, fruits, vegetables, butter, fish etc may be spoiled by bacteria by the fermentation process and may cause food poisoning.

Botulism is serious food poisoning caused by special bacteria sometimes found in improperly tinned/canned food.

Now before going further let us take a short break. Answer the following questions during the break -

Q1 - Name the nitrogen fixing bacteria that is found in the root nodules of leguminous plants.

Q2 - Name one free living bacteria found in the soil that helps in nitrification process.

Q3 - Name the process of conversion of nitrates into nitrogen gas.

Children you may pause the lesson for 3 mins break. Break is over children. Listen to the correct answers -

A1 - Rhizobium

A2 - Azotobacter

A3 - Denitrification

Now let us resume the topic with the discussion of -

Food Preservation methods.

1) Boiling or Heating at high temperature - Sterilization

Boiling water kills bacteria except its spores.

High temperature (110°C) at increased pressure (in autoclave / pressure cooker) kills bacteria as well as spores.

This method is used in canning food industry.

2) Salting Adding salt to foods like fish, pickles, cheese etc. preserves them for long period. Treatment of food with salt is called curing.

3. Dehydration (Drying) Microbes cannot grow without water. Hence dehydration of meat, fish, vegetables etc. reduces water content of these articles thereby bacterial growth is completely checked.
4. Irradiation Radioactive radiations, UV rays and similar high energy radiations are used in sterilizing food and air.
5. Pasteurization is technique of partial sterilization applied to milk. Milk is heated to temperature of about 60°C for 30 minutes and then chilled quickly. Pasteurization does not completely sterilize milk.
6. Refrigeration Microbes cannot grow at low temperature. Thus chilling of milk and keeping vegetables at low temperature does not kill bacteria but reduces their metabolic activities and growth to negligible.
7. Preservatives - Pickles, jams, jellies etc are preserved by adding salt or sugar. By doing so bacteria are plasmolysed [lose water] and are killed. Other chemical preservatives include sodium benzoate, benzoic acid, ascorbic acid etc.

Bacterial diseases

Plant diseases - Eg (i) Black rot of mustard and cauliflower (ii) Bacterial blight of cowpea.

Animal diseases - Eg Bovine tuberculosis; Anthrax

Human diseases - Eg whooping cough, cholera, tuberculosis, diphtheria, typhoid, pneumonia, tetanus etc.

Bioweapons is a device that carries and delivers a disease causing biological agent [like bacteria, viruses etc.] or a toxin derived from it to the target organism. Some of the bioweapons are those that cause anthrax, small pox etc. which may take epidemic shape and cause widespread death, generation after generation.

CLASS - 8

SUBJECT - BIOLOGY

TEACHER - Ms Nidhi Rana

Dear Students with this I am ending today's discussion. Kindly go through the given explanation and with reference to the detailed explanation answer the following home assignment questions in your notebooks.

Home assignment

Q Answer the following Review questions (given on Page 89-90 of your text book) in notebook.

C Short Answer Type

Q No 5 and 6

D Long Answer Type

Q No 4 and 6

E Structured / Application Type

Q No 1.