SNS COLLEGE OF TECHNOLOGY

Coimbatore-35.

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade(Cycle III)
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

COURSE NAME : 19GET277 - Biology for Engineers

IV YEAR/ VII SEMESTER

UNIT – II - BIODIVERSITY

Topic: Economic importance and control of microbes

- Microorganisms are used to enhance the nutritional content of plants and other food sources.
- The growing nutraceutical sector relies in part on the nutritional enhancements afforded by microbes.
- Bacteria are also useful in providing a degree of resistance to plants.
- The use of bacterial insecticides has reduced the use of chemical insecticides, which is both a cost savings to the producer and less stressful on the environment.
- Microorganisms have also been harnessed as factories to produce compounds that are used in areas as divers as textile manufacture, agriculture, and nutrition.

- Microorganisms like Lactobacillus and other Lactic Acid Bacteria (LAB) grow in milk, which convert it into curd.
- We have seen at home that a starter is added to milk which turn it into curd.
- This starter is known as inoculum, which contains millions of LAB.

Fermentation by Microbes:

(i) Dough:

It is fermented by bacteria in making foods such as dosa and idli. The puffed up appearance of dough is due to the production of CO_2 during fermentation. In bread making, dough is fermented using baker's yeast, i.e., Saccharomyces cerevisiae.

- **(ii) Toddy:**

  It is a traditional drink of some parts of Southern India. It is made by yeast fermentation sap from palms trees, coconut, etc. Microbes are also used to ferment fish, soya bean, bamboo shoots, etc.

(iii) Cheese:

It is known to be the oldest food item in which microbes are used. It is formed by partial degradation of milk by different microorganisms. Different varieties of cheese are known by their texture, flavour and taste.

Microbes in Industrial Products:

- Microbes are used to synthesise a number of products valuable to human beings in industries also e.g., beverages and antibiotic.
- For industrial production, microbes are grown in very large vessels called fermenters.

Fermented Beverages:

Yeasts have been used from ancient time for the production of beverages like wine, beer, whisky, brandy and rum.

Saccharomyces cerevisiae commonly called brewer's yeast is used for bread making, fermenting malted cereals and fruit juices to ethanol.

- **Antibiotics:**
  - The term ‘antibiotics’ was coined by Waksman (1942).
  - The name antibiotic is derived from the Greek words against and bios—life, together they mean ‘against life’ (with reference to disease causing organisms).
  - These are the chemical substances, produced by some microbes and can kill or retard the growth of other disease causing microbes.

- **Chemicals, Enzymes and other Bioactive Molecules:**

Microbes are being used for the commercial and industrial production of certain chemicals like alcohols, organic acids and enzymes.

The other molecules, which are functional in living systems or can interact with their components are called bioactive molecules.

Enzymes are very well established in biotechnology and the microbes are also used in their production.

This treatment is carried out in two stages:

- **1. Primary Treatment:**

  It is also known as physical treatment because it basically involves physical removal of small and large, floating and suspended solids from sewage.

  Primary treatment involves various stages like filtration and sedimentation.

  Initially, floating debris are removed by sequential filtration with progressively small pore filter.

2. Secondary Treatment:

- This treatment is also known as biological treatment because it involves the use of microbes or biota for the treatment of sewage.
- The effluent from primary treatment is passed into a large aeration tank, where it is constantly mechanically agitated and air is pumped into it.
- This air helps in the growth of useful aerobic, microbes into floes (masses of bacteria associated with fungal filament to form mesh likes structures).

Biochemical Oxygen Demand (BOD):

- BOD refers to the amount of the oxygen that would be consumed if all the organic matter in one liter of water was oxidised by bacteria.
- (a) The greater the BOD, more polluting water will result. So, the sewage water is treated till the BOD is reduced.
- (b) When the BOD of effluent is reduced significantly, the effluent is then passed into a settling tank, where the bacterial ‘floes’ are allowed to sediment called activated sludge.
- (c) A small part of the activated sludge is then pumped back into the aeration tank to serve as the inoculum. Then the remaining part of the sludge is pumped into large tanks called anaerobic sludge digesters, in which other anaerobic bacteria are also present.
- (d) They digest the organic mass as well as aerobic microbes bacteria and fungi of the sludge. During the digestion, gases like methane, hydrogen sulphide (H_2S), carbon dioxide (CO_2) etc., are produced.
- (e) These gases form biogas that are used as a source of energy because these are inflammable.
- (f) The effluent from secondary treatment plant is released into natural water-bodies like rivers and streams.


THANK
YOU!