

## 5. Microbes in Human Welfare

### Advantages of microbes in sewage treatment and biogas production-

- **In sewage treatment:**

- o **Sewage** is municipal waste matter that is carried away in sewers and drains.
- o **Primary sewage treatment:** It is a mechanical process that involves the removal of coarse solid material.
- o **Secondary sewage treatment:** It is a biological process that involves the action of microbes.

- **In the production of biogas:**

- o Microbes are used as a source of energy.
- o Bacteria such as *Methanobacterium* are found in anaerobic sludge during the treatment of sewage.
- o Such bacteria help in the production of *gobar gas* or biogas.
- o Biogas is a mixture of methane and carbon dioxide produced by bacterial degradation of organic matter and used as a fuel.

### Biological oxygen demand (BOD)

- It is used for measuring the amount of organic matter present in waste water.
- The greater the BOD of a water sample, the more will be its pollution.

### Advantages of microbes as bio-control agents and bio-fertilizers -

- **As bio-control agents:**

- o Microbes are used as bio-pesticides to control insect pests in plants.
- o Examples include the bacterium called *Bacillus thuringiensis* and the fungi called

*Trichoderma*.

o Baculovirus is also used as a bio-pesticide against insects and arthropods.

- **As bio-fertilizers:**

o Biofertilizer refers to living organisms that increase the soil fertility.

o *Rhizobium* is a symbiotic bacteria found in the root nodules of leguminous plants.

o *Azospirillum* and *Azotobacter* are free-living, nitrogen-fixing bacteria.

o *Anabaena*, *Nostoc*, etc., are examples of nitrogen-fixing cyanobacteria.