

Chapter 10: Microbes in Human Welfare

Microbes and Household Products:

Lactic Acid Bacteria: Ferments milk, leading to curd formation.

Saccharomyces cerevisiae: Used in dough fermentation for bread-making.

Trichoderma: Produces enzymes that soften cellulose fibers in textiles.

Microbes in Industrial Products:

Fermented Beverages: Production involves fermentation by yeasts.

Antibiotics: Products like penicillin (from Penicillium) used as drugs against bacterial infections.

Chemicals: Microbes used to produce citric acid, acetic acid, etc.

Enzymes: Lipase, protease, etc., used in detergents and other industries.

Microbes in Sewage Treatment:

Primary Treatment: Physical removal of particles.

Secondary Treatment (Biological Treatment): Bacteria break down organic matter; flocs (bacterial clumps) are allowed to sediment and further processed.

Treated water is then released into water bodies.

Microbes in Production of Biogas:

Methanobacterium helps in converting organic waste into methane-rich biogas.

Microbes as Biocontrol Agents:

Bacterial Pesticides: Safe for plants and non-target animals (e.g., *Bacillus thuringiensis*).

Fungi: *Trichoderma* is used against plant pathogens.

Viruses: Specific to insect pests and hence can be used in pest control.

Microbes as Biofertilizers:

Nitrogen-fixing Bacteria: *Rhizobium*, *Frankia* (fix atmospheric nitrogen in leguminous plants' roots).

Mycorrhiza: Fungus that forms symbiotic relationships with plants, helping them absorb essential nutrients from the soil.

Cyanobacteria: Fix atmospheric nitrogen and can be used to fertilize paddy fields.

Microbes and Pollution Control:

Bioremediation: Using microbes to reduce pollution or degrade harmful substances. For instance, several bacteria can degrade oil spills.

Microbes in Human Health:

Probiotics: Microbes used to replenish beneficial gut microflora in humans.