

Aquatic Microbiology:

- Economic significance of aquatic microbes

- Microorganisms are small living things that can only be seen under high power microscope.
- Microorganisms include:
 - Virus
 - Bacteria
 - Protozoa
 - Microscopic Fungi
 - Microscopic Alga

Use of Micro-organisms in environment

1. Fixation of atmospheric nitrogen
2. Decomposition of organic wastes and residues
3. Suppression of soil-borne pathogens
4. Recycling and increased availability of plant nutrients
5. Degradation of toxicants including pesticides
6. Production of antibiotics and other bioactive compounds
7. Production of simple organic molecules for plant uptake
8. Complexation of heavy metals to limit plant uptake
9. Solubilization of insoluble nutrient sources
10. Production of polysaccharides to improve soil aggregation

Beneficial Microorganisms

- Antibiotics
- Food Production
- Soil Fertility and Bacteria and Fungi
- Combating Pollution and water quality modifiers

Antibiotics

- Antibiotic is chemical substance produced by microorganisms that can kill or inhibit the growth of other microorganisms.
- Antibiotics kill or inhibit other organisms by interfering the metabolic process in the bacterium that is not found in the host.
- Penicillin antibiotics were among the first medications to be effective against many bacterial infections caused by staphylococci and streptococci.
- Examples of naturally synthesized penicillin are Penicillin G, Penicillin K, Penicillin N, Penicillin O and Penicillin V produced by moulds species.

Food production

- Fermentation: $C_2H_{12}O_6$
- $2C_2H_5OH + 2CO_2 + \text{energy}$
- Dairy Products: cheese, yogurt and butter
- Wine and bread: yeast (*Saccharomyces cerevisiae*)

Soil Fertility and Bacteria and Fungi

- Formation of Humus: –
 - ❖ Organic compounds are decomposed by saprophytic bacteria.
- Nitrogen Fixation
 - ❖ Nitrogen - Ammonia
- Nitrifying bacteria
 - ❖ NH_4^+ , NH_3 Nitrosomonas NO_2^- - nitrobacter NO_3^- -

Combating Against Pollution

- Sewage Treatment.
- Oil spillage: *Pseudomonas* sp. can digest the oil into harmless forms.
- Microorganism in other productions:
 - ✓ vaccines
 - ✓ amino acid
 - ✓ Enzymes (invertase)
 - ✓ Vitamins (e.g. B2)