

Chapter 8: Economic Importance of Bacteria and Fungi

Economic Importance of Bacteria:

Bacteria play both beneficial and harmful roles in various sectors, including medicine, agriculture, and industry.

A. Useful Roles of Bacteria:

1. Medicine:

- **Antibiotics:** Bacteria like *Streptomyces* produce antibiotics (e.g., streptomycin, tetracycline) to fight infections.
- **Serums and Vaccines:** Bacteria are used in vaccine production (e.g., BCG for tuberculosis).
- **Genetic Engineering:** Recombinant bacteria produce insulin and growth hormones.

2. Agriculture:

- **Nitrogen Cycle:**
 - **Nitrogen Fixing Bacteria:** *Rhizobium* in legume root nodules converts atmospheric nitrogen into nitrates.
 - **Nitrifying Bacteria:** *Nitrosomonas* and *Nitrobacter* convert ammonia into nitrates, enriching the soil.
 - **Denitrifying Bacteria:** *Pseudomonas* converts nitrates back to nitrogen gas, completing the cycle.
- Enhances soil fertility and boosts crop production.

3. Industry:

- **Curing of Tea:** Bacteria help in the fermentation process, giving tea its characteristic flavor.
 - **Tanning of Leather:** *Bacillus* species break down animal hide for leather production.
 - **Dairy Industry:** Lactic acid bacteria (e.g., *Lactobacillus*) are used in curd and cheese production.
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B. Harmful Roles of Bacteria:

1. Spoilage of Food:

- Bacteria like *Clostridium botulinum* and *Salmonella* cause food spoilage and poisoning.
- Improperly stored food becomes a breeding ground for pathogenic bacteria.

2. Diseases:

- **In Plants:** Bacterial blight, citrus canker.
- **In Animals:** Anthrax, tuberculosis.
- **In Humans:** Cholera (*Vibrio cholerae*), Typhoid (*Salmonella typhi*), Pneumonia (*Streptococcus pneumoniae*).

3. Bio-Weapons:

- Some pathogenic bacteria are used in biological warfare (e.g., *Bacillus anthracis* in anthrax).

Economic Importance of Fungi:

Fungi are valuable in food processing, medicine, and agriculture, but can also be harmful.

A. Useful Roles of Fungi:

1. Food Industry:

- **Breweries:** Yeast (*Saccharomyces cerevisiae*) ferments sugars to produce alcohol in brewing.
- **Bakeries:** Yeast is used in baking to make the dough rise.
- **Cheese Processing:** Fungi like *Penicillium* are used to ripen cheeses (e.g., Roquefort, Camembert).
- **Mushroom Cultivation:** Edible mushrooms like *Agaricus* are cultivated for food.

2. Medicine:

- **Antibiotics:** *Penicillium* produces penicillin, the first antibiotic.
- **Immunosuppressants:** *Cyclosporine* from fungi helps in organ transplantation.

3. Decomposers:

- Decompose organic matter, recycling nutrients back into the soil.
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B. Harmful Roles of Fungi:

1. Food Spoilage:

- Fungi like *Aspergillus* and *Rhizopus* spoil food by decomposing organic matter.

2. Diseases:

- **In Plants:** Rusts, smuts, and mildew affect crops.
- **In Animals and Humans:** Ringworm, athlete's foot caused by dermatophytes.

3. Toxins:

- **Mycotoxins:** Produced by *Aspergillus flavus* (aflatoxin), contaminating food grains.

Conclusion:

Bacteria and fungi play crucial roles in agriculture, medicine, and industry, making them economically significant. However, they can also cause food spoilage, diseases, and economic losses. Understanding their positive and negative impacts helps in utilizing them beneficially while controlling their harmful effects.

