

Economic Importance of Bacteria

Bacteria play an important role in day to day activities of human beings. Some of them have harmful effects and others are useful to man kind.

Harmful activities

1. Diseases caused by bacteria in plants:

Name of the host	Name of the disease	Name of the pathogen
Citrus	Citrus Canker	<i>Xanthomonas citri</i>
Rice	Bacterial blight	<i>Xanthomonas oryzae</i>
Cotton	Angular leaf spot	<i>Xanthomonas malvacearum</i>
Pears	Fire blight	<i>Pseudomonas solanacearum</i>
Carrot	Soft rot	<i>Erwinia caratovora</i>

2. Diseases caused by bacteria in animals :

Name of the host	Name of the disease	Name of the pathogen
Sheep	Anthrax	<i>Bacillus anthracis</i>
Cattle	Brucellosis	<i>Brucella abortus</i>
Sheep,goat	Brucellosis	<i>Brucella melitensis</i>

3. Diseases caused by bacteria in human beings:

Name of the disease	Name of the pathogen
Cholera	<i>Vibrio cholerae</i>
Typhoid	<i>Salmonella Ttyphi</i>
Tuberculosis	<i>Mycobacterium tuberculosis</i>

Beneficial Activities of Bacteria

1. **Sewage disposal** : Organic matter of the sewage is decomposed by saprotrophic bacteria.
2. **Decomposition of plant and animal remains**: Saprotrophic bacteria cause decay and decomposition of dead bodies of plants and animals. They release gases and salts to atmosphere and soil. Hence these bacteria are known as nature's scavengers.

3. Soil fertility :

1. The **ammonifying** bacteria like *Bacillus ramosus* and *B. mycoides* convert complex proteins in the dead bodies of plants and animals into ammonia which is later converted into ammonium salts.
2. The **nitrifying bacteria** such as *Nitrobacter*, *Nitrosomonas* convert ammonium salts into nitrites and nitrates.
3. **Nitrogen fixing bacteria** such as *Azotobacter* and *Clostridium* and *Rhizobium* (a symbiotic bacterium) are capable of converting atmospheric nitrogen into organic nitrogen. All these activities of bacteria increase soil fertility.

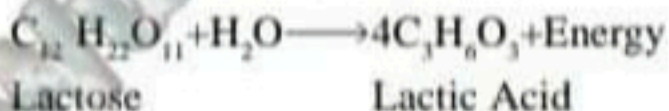
Recycling of matter

Bacteria play a major role in cycling of elements like carbon, oxygen, Nitrogen and sulphur. Thus they help in maintaining environmental balance. As biological scavengers they oxidize the organic compounds and set free the locked up carbon as CO_2 . The nitrogenous organic compounds are decomposed to form ammonia which is oxidized to nitrite and nitrate ions by the action of nitrifying bacteria. These ions are used by higher plants to synthesize nitrogenous organic compounds. The nitrogenous compounds are also oxidized to nitrogen by denitrifying bacteria.

Role of Bacteria in Industry

1. Dairy Industry

Lactic acid bacteria e.g. (*Streptococcus lactis*) are employed to convert milk sugar lactose into lactic acid.



Different strains of lactic acid bacteria are used to convert milk into curd, yoghurt (*Lactobacillus bulgaricus*) and cheese (*Lactobacillus acidophobus*).

2. Vinegar

Vinegar (Acetic acid) is obtained by the activity of acetic acid bacteria (*Acetobacter aceti*). This bacterium oxidizes ethyl alcohol obtained from molasses by fermentation to acetic acid or vinegar.

3. Alcohols and Acetone

Butyl alcohol, methyl alcohol and acetone are prepared from molasses by the fermentation activity of the anaerobic bacterium *Clostridium acetobutylicum*.

Curing of tobacco, tea and coffee

The leaves of tea, tobacco and beans of coffee are fermented by the activity of certain bacteria to impart the characteristic flavour. This is called **curing of tea, tobacco and coffee**.

Retting of fibres

The fibres from the fibre yielding plants are separated by the action of bacteria like *Clostridium* species. This is called retting of fibres.

Role of bacteria in medicine

1. **Antibiotics:** Antibiotics such as bacitracin (*Bacillus subtilis*), polymyxin (*Bacillus polymyxa*), Streptomycin (*Streptomyces griseus*) are obtained from bacterial sources.
2. **Vitamins:** *Escherichia coli* living in the intestine of human beings produce large quantities of vitamin K and vitamin B complex. Vitamin B₂ is prepared by the fermentation of sugar by the action of *clostridium* species.

Role of bacteria in genetic engineering

Most of our knowledge in genetics and molecular biology during 20th century has been due to research work on micro-organisms, especially bacteria such as *E.coli*. One success has been the transfer of human insulin genes into bacteria and commercial production of insulin has already commenced.

Role of bacteria in biological control

Certain *Bacillus* species such as *B.thuringiensis* infect and kill the caterpillars of some butterflies and related insects. Since the bacteria do not affect other animals or plants they provide an ideal means of controlling many serious crop pests.