

Chapter 9

Microbes in Human Welfare

- Microbes in Household Products
- Microbes in Industrial Products
 - Fermented Beverages
 - Antibiotics
 - Chemicals, Enzymes and other Bioactive Molecules
- Microbes in Sewage Treatment
- Microbes in Production of Biogas
- Microbes as Biocontrol Agents
- Microbes as Biofertilisers

MICROBES IN HOUSEHOLD PRODUCTS

Apart from visible plants and animals, microbes play essential roles in Earth's biological systems.

Microorganisms are omnipresent, inhabiting diverse habitats including soil, water, air, and the bodies of humans, animals, and plants. They flourish even in extreme environments where most other organisms would struggle to survive, such as deep within geysers (thermal vents) where temperatures can soar to 100°C, in the depths of soil, beneath thick layers of snow, and in highly acidic surroundings.

Every day, we utilize microbes or their byproducts in various aspects of our lives.

(1) Curd

Microorganisms like *Lactobacillus* and other lactic acid bacteria (LAB) proliferate in milk, transforming it into curd. During their growth, LAB produce acids that cause the milk proteins to coagulate and undergo partial digestion. Adding a small quantity of curd as inoculum or starter to fresh milk introduces millions of LAB, which, under suitable temperatures, multiply and convert the milk into curd. This process also enhances the nutritional quality of curd by increasing its vitamin B₁₂ content. Additionally, LAB present in our stomachs play a beneficial role in preventing the proliferation of disease-causing microbes.

(2) Cheese

Cheese, one of the oldest food products, relies on microbes for its production. Various types of cheese are distinguished by their unique textures, flavors, and tastes, each of which is attributed to specific microbial strains used in its production.

For instance, the distinctive large holes found in Swiss cheese result from the production of a significant amount of CO₂ by a bacterium known as *Propionibacterium shermanii*.

Nearly 400 varieties of cheese available which can be classified into following type

	Types of cheese	Microorganisms used for ripening
1.	Soft (Camembert cheese)	<i>Penicillium camembert</i>
2.	Semi hard (Roquefortine cheese)	<i>Penicillium roquefortine</i>
3.	Hard (Swiss cheese)	<i>Propionibacterium Sharmaine</i>

Other Products

- The batter utilized for preparing foods like dosa and idli undergoes fermentation facilitated by bacteria. The expansion of the batter is attributed to the generation of CO₂ gas. Likewise, the dough employed in bread-making undergoes fermentation with the aid of baker's yeast (*Saccharomyces cerevisiae*).
- Various traditional beverages, such as 'Toddy' made from palm sap, and foods are also produced through microbial fermentation.
- Microorganisms are employed in fermenting fish, soybeans, and bamboo shoots to create a variety of food products.