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Commentary

Importance of Microbes in Various Industrial Processes

Joo Kwang*

Department of Biotechnology, AIMST University, Bedong, Malaysia

DESCRIPTION

Microbes are tiny living things. They are employed in numerous extensive industrial procedures. They create a variety of compounds, including ethanol, which is used as a fuel, solvent, and for a variety of other things, as well as glycerol, a common metabolite in food and medicine.

Additionally, bacteria are utilised in the bioleaching process, which removes metals like iron and manganese from sewage and soil. In addition to having the capacity to control water flow in aquifers and produce commercially valuable biomaterials, bioleaching has the ability to alter sediment structure.

The ability of microbes, particularly fungus, to increase the availability of nutrients to plants and boost crop development and output makes them effective bio-fertilizers. Additionally, microbes are helpful in medicine. Recombinant DNA technology modifies microbes to produce drugs for diabetic patients, such as synthetic insulin.

In order to produce a variety of goods, fermentation depends heavily on bacteria. Fermented drinks, malted cereals, broths, fruit juices, antibiotics, and other items are two frequent products that are obtained through industrial operations using the fermentation process.

The most common microorganism utilised in the creation of drinks like beer, brandy, rum, wine, whiskey, etc. is the yeast. Yeasts are eukaryotic, single-celled microorganisms that belong to the kingdom Fungi. The *Saccharomyces cerevisiae* species of yeast, often known as the Brewer's Yeasts, is employed in this industrial procedure to ferment fruit juices and malted cereals to make ethanol. Following fermentation, these drinks are distilled to create alcoholic and non-alcoholic drinks like whiskey, brandy, and rum, among others.

The industrial manufacturing of several organic acids also uses microbes. Citric acid, derived from the microbial fermentation of lemon, a citrus fruit, was the first organic acid to be found. Glucose can also be used to directly create organic acids. *Acetobacter acute*, *Lactobacillus*, and *Aspergillus Niger* are a few examples of microorganisms employed in the synthesis of organic acids for industrial purpose.

Enzymes are biological catalysts that exist in nature and are mostly used in living systems to regulate specific biochemical reactions. Enzymes are used in a wide variety of products, both in the medical and non-medical fields. In addition to being found in plants and animals, some microorganisms can also produce enzymes, which are known as microbial enzymes. Industrial enzymes are mostly produced by microorganisms using secure gene transfer techniques. In 1896, the fungal amylase was utilised to create the first microbial enzymes that were commercially generated. These enzymes were used to treat dyspepsia and a number of other digestive diseases.

Antibiotics are chemicals made by specific microorganisms that work by either eradicating or slowing the growth of pathogenic microbes without harming the host cells. In 1928, Alexander Fleming isolated the first antibiotic, penicillin, from the fungus *Penicillium notatum*. Streptomycin is one of many different antibiotics produced by microorganisms that are used to treat a variety of bacterial infections. Vitamins are organic substances that may carry out a variety of vital bodily tasks that keep us alive. They are vital micronutrients that the body's metabolism needs in trace amounts of. These vitamins must be obtained through diet as our bodies cannot create them. In addition to supplies from plants and animals, microorganisms can also synthesize vitamins. The term "gut microbiota" refers to a small number of families of microorganisms found in both human and animal digestive tracts. The production of vitamin K is carried out by these bacteria. Ascorbic acid, beta-carotene, biotin, ergosterol, folic acid, vitamin B12, thiamine, pantothenic acid, riboflavin, and pyridoxine are more examples of microbial vitamins.

These were a few facts on how microorganisms are used in industrial products. Microbes are also utilized to make biofuel, vaccines, protein, and other hormone supplements, which are used to treat malnutrition and other deficiency conditions in both humans and animals, in addition to these items. For many years, doctors used the insulin extracted from the pancreases of

Correspondence to: Joo Kwang, Department of Biotechnology, AIMST University, Bedong, Malaysia, E-mail: joo@kwang.my

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dead cows and pigs to treat patients with diabetes mellitus. Insulin is produced by genetically modified bacteria in a purified form that is less prone to trigger allergic reactions in individuals. Recombinant DNA is a technique that allows scientists to insert a human gene for insulin synthesis into the DNA of bacteria. The gene makes the mutated bacteria produce a lot of insulin when they are put in huge stainless steel fermentation tanks. The scientists collect and purify the insulin after fermentation is finished, making it ready for injection into diabetes patients. To avoid contaminating the equipment with bacteria, it is always kept sterile.

Bio-fertilizers are living microorganisms that are applied to the soil to speed up plant growth by supplying more nutrients to the plants. Phosphate-solubilizes, which make phosphates accessible to plants and boost growth and crop yield, are a common type of bio-fertilizer. In natural ecosystems, mycorrhiza, fungi attached to plant roots, is frequently essential for sufficient nutrient intake and plant survival. Through a process known as nitrogen fixing, *azospirillum* bacteria promote plant development. Microbes play a significant role in our daily lives. While some microorganisms are harmful, the majority are beneficial. On our globe, various types of bacteria exist. They are fungi, viruses, bacteria, protozoa, and algae. In addition to human bodies, microbes can be found in the soil, water, and air. In milk, a lactic acid bacterium develops and turns milk into curd.