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Raw materials in fermentation industries

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Fermented products have gained popularity among people for thousands of years. More than preservation, fermentation offers interesting flavours, vitamins, enzymes, organic acids, secondary metabolites, good bacteria, etc. Fermentation is a process performed in fermentation industries that utilises suitable raw materials and microorganisms to obtain desired products. The raw materials are generally organic or inorganic sources required by microbes to convert them into respective products. The raw materials play a vital role in the growth and reproduction of microorganisms as they provide them with enough nutrients and help in improving the yield. The most applied raw materials by far are biomass-based raw materials. However, there are also raw materials that are derived from the petrochemical industry. Molasses is a by-product of cane, which is an economical source of sucrose. In addition to sucrose, it comprises a good amount of carbohydrates, nitrogenous substances, vitamins, and minerals that support the growth of desired strains of microbes. Aqueous extract of malted barley is another raw material that is used as a carbon source for the cultivation of filamentous fungi, yeast and actinomyces; it comprises 90% carbohydrates, 20% hexose, 55% disaccharides and 10% maltose.

Polysaccharides, starch and dextrins found in this substrate could be directly metabolised by amylase-producing microorganisms like filamentous fungi. Their extracellular enzymes help in hydrolysing the substrate to a mixture of glucose, maltose or maltotriose. Sulphite waste liquor, a by-product of the wood pulp industry is used for the cultivation of yeast. It contains sugar (2-3%) along with hexoses (80%) and pentoses (20%). Whey is an aqueous by-product obtained in dairy industries, which contains an appreciable amount of lactose to support the growth of lactic acid bacteria. Corn steep liquor is a by-product that is obtained from maize; it contains nitrogen, vitamins and minerals. Peptones that are extortionate for large-scale industrial fermentation are prepared by acid or enzyme hydrolysis of meat, casein, gelatin, keratin, peanuts, soy meal, cotton seeds, etc. They act as excellent sources of amino acids, peptides and proteins in fermentation media. Thus, for microbes, these raw materials form the environment that supply required carbon and nitrogen source, minerals and specific nutrients for their reproduction and specific metabolic functioning to produce the desired product. As a result of this, fermentation media development is undergoing many optimisations every time with better substrate choice to increase the yield.

Keywords: Whey, Molasses, Cellulose, Starch, Corn steep liquor, Fermentation, Raw materials in fermentation, Fermentation media

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