

Applications and Risk Factors Involved in Food Fermentation

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Opinion Article

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ABOUT THE STUDY

Fermentation is the conversion of carbohydrates to alcohol or organic acids by microorganisms (yeasts or bacteria) under anaerobic (oxygen-free) conditions in food processing. Fermentation usually implies the microorganism. Zymology or zymurgy is the science of fermentation. The term "fermentation" is sometimes used to refer to the chemical conversion of sugars into ethanol, which results in the production of alcoholic beverages such as wine, beer, and cider. Similar processes occur in the leavening of bread (the production of CO₂ by yeast activity) and the preservation of sour foods with the production of lactic acid, such as in sauerkraut and yoghurt. Vinegar, olives, and cheese are also popular fermented foods. Fermented foods prepared locally may also include beans, grains, vegetables, fruit, honey, dairy products, and fish. Natural fermentation existed before human history. Humans have used fermentation since the beginning of time.

Applications

1. The fermentation of sugars and other carbohydrates into alcohol or preservative organic acids and carbon dioxide is known as food fermentation. All three products have found human applications.

2. Alcohol is produced when fruit juices are converted to wine, grains are converted to beer, and starchy foods, such as potatoes, are fermented and then distilled to produce spirits such as gin and vodka.
3. Carbon dioxide production is used to leaven bread. Organic acid production is used to preserve and flavour vegetables and dairy products.
4. Food fermentation serves five primary functions enriching the diet through the development of a variety of flavours, aromas, and textures in food substrates; preserving significant amounts of food through lactic acid, alcohol, acetic acid, and alkaline fermentations; enriching food substrates with protein, essential amino acids, and vitamins; eliminating antinutrients; and reducing cooking time and associated fuel use.

Risk factors

Sterilization is an important consideration during food fermentation. Failure to completely remove microbes from equipment and storage vessels may result in the multiplication of harmful organisms within the ferment, potentially increasing the risks of food-borne illnesses such as botulism. Botulism in vegetable ferments, on the other hand, is only possible if they are not properly canned. Off-odors and discoloration may be indicators that harmful bacteria have been introduced into the food.

Since 1985, Alaska has seen a steady increase in botulism cases. It has the most botulism cases of any state in the United States of America. This is due to the traditional Alaska Native practice of fermenting animal products such as whole fish, fish heads, walrus, sea lion, and whale flippers, beaver tails, seal oil, and birds before consumption. The risk is increased when a plastic container is used instead of the old-fashioned, traditional method of a grass-lined hole, because the *Clostridium botulinum* bacteria thrive in the anaerobic conditions created by the airtight enclosure in plastic.

Based on epidemiological studies, the World Health Organization has classified pickled foods as possibly carcinogenic. Other studies have discovered that fermented foods contain a carcinogenic byproduct called ethyl carbamate (urethane). "A 2009 review of existing Asian studies concluded that eating pickled vegetables on a regular basis roughly doubles a person's risk of esophageal squamous cell carcinoma."