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Food fermentation: An overview

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Abstract
Food fermentation is most common food processing method used in worldwide. In southern India fermented food items are widely used, Idli is the one of the popular fermented recipe in India. Food fermentation begins with the help of the microorganism such as yeast, mold and bacteria which breakdown the complex structure of the nutrient and make it in the simpler form which mainly increase the nutritive value of the foo items. Food fermentation is the processing methods of the food items, which improve the functional properties and also enhance the color, texture and aroma of the food.

Keywords: fermentation, micro-organisms, nutritive value

Introduction
Fermentation is one of the most important food processing technologies. Many fermented products are preserved with extension of shelf life. In addition to being more shelf - stable products and removal of antinutritional components, all fermented foods have aroma and flower characteristics that result directly or indirectly from the fermenting microorganisms.

The most common groups of microorganisms involved in food fermentation are bacteria, yeasts, and molds. Microbial enzymes also play an important role in food fermentation. Fermented foods play an important role in improving food security, increasing income and employment, enhancing livelihoods and improving the nutrition and social well - being of millions of people around the world, and others.

Fermentation is influenced by numerous factors, including moisture, temperature, dissolved O_2concentration, and dissolved CO_2. Variation of these factors may affect the rate of fermentation, the organoleptic properties of the product, nutritional quality, and other physicochemical properties. Fermentation preserves perishable raw materials.

Fermented foods are foods produced by the activity of microorganisms, which while forming only a small proportion of the total weight of the foods have a profound effect on the character of the foods.

Fermented foods may be defined as foods, which are processed through the activity of microorganisms. The weight of the microorganisms in the food is usually small, but their influence on the nature of the food, especially in terms of flavor and other organoleptic properties, is profound.

Definition of fermented food
Campbell-Platt (1987) has defined fermented foods as those foods, which have been subjected to the action of micro-organisms or enzymes so that desirable biochemical changes cause significant modification to the food. However, to the microbiologist, the term" fermentation" describes a form of energy-yielding microbial metabolism in which an organic substrate, usually a carbohydrate, is incompletely oxidised, and an organic carbohydrate acts as the electron acceptor (Adams, 1990). This definition means that processes involving ethanol production by yeasts or organic acids by lactic acid bacteria are considered as fermentations, but not the production of fish sauces in Southeast Asia, that still has not been shown to have a significant role for microorganisms, and not the tempe production since the metabolism of the fungi is not fermentative according to Adams definition.

Fermentation Process?
Fermentation occurs in the absence of oxygen (anaerobic conditions), and in the presence of beneficial microorganisms (yeasts, molds, and bacteria) that obtain their energy through fermentation. If enough sugar is available, some yeast cells, such as *Saccharomyces cerevisiae*, prefer fermentation to aerobic respiration even when oxygen is abundant.

- During the fermentation process, these beneficial microbes break down sugars and starches into alcohols and acids, making food more nutritious and preserving it so people can store it for longer periods of time without it spoiling.
- Fermentation products provide enzymes necessary for digestion. This is important because humans are born with a finite number of enzymes, and they decrease with age. Fermented foods contain the enzymes required to break them down.
- Fermentation also aids in pre-digestion. During the fermentation process, the microbes feed on sugars and starches, breaking down food before anyone's even consumed it.

Common Fermented foods
Kefir, Sauerkraut, Tempeh, Natto, Cheese, Kombucha, Miso, Kimchi, Salami, Yogurt, Sourdough bread, Beer, Wine, Olives.

Types of Fermentation
There are many types of fermentation that are distinguished by the end products formed from pyruvate or its derivatives. The two fermentations most commonly used by humans to

produce commercial foods are ethanol fermentation (used in beer and bread) and lactic acid fermentation (used to flavor and preserve dairy and vegetables).

Ethanol Fermentation

In ethanol fermentation, the pyruvate produced through glycolysis is converted to ethanol and carbon dioxide in two steps. First, the pyruvate releases carbon dioxide to form a two-carbon compound called acetaldehyde. Next, acetaldehyde is reduced by NADH to ethanol, thereby regenerating the NAD^+ for use in glycolysis. Overall, one molecule of glucose is converted into two molecules of carbon dioxide and two molecules of ethanol. Ethanol fermentation is typically performed by yeast, which is a unicellular fungus.

Lactic Acid Fermentation

There are two main types of lactic acid fermentation: homolactic and heterolactic. In homolactic acid fermentation, NADH reduces pyruvate directly to form lactate. This process does not release gas. Overall, one molecule of glucose is converted into two molecules of lactate. In heterolactic fermentation, some lactate is further metabolized, resulting in ethanol and carbon dioxide via the phosphoketolase pathway.

Lactic acid fermentation is primarily performed by certain types of bacteria and fungi. However, this type of fermentation also occurs in muscle cells to produce ATP when the oxygen supply has been depleted during strenuous exercise and aerobic respiration is not possible.

Advantage of fermented foods

- Fermentation serves as a means of preserving foods in a low cost manner; thus cheese keeps longer than the milk from which it is produced;
- The organoleptic properties of fermented foods are improved in comparison with the raw materials from which they are prepared; cheese for example, tastes very different from milk from which it is produced;
- Fermentation sometimes removes unwanted or harmful properties in the raw material; thus fermentation removes flatulence factors in soybeans, and reduces the poisonous cyanide content of cassava during garri preparation
- The nutritive content of the food is improved in many foods by the presence of the microorganisms; thus the lactic acid bacteria and yeasts in garri and the yeasts in bread add to the nutritive quality of these foods;
- Fermentation often reduces the cooking time of the food as in the case of fermented soybean products, or ogi the weaning West African food produced from fermented maize.

Food safety aspects of fermented foods

It has been estimated that more than 13 million infants and children under five years of age die annually in the tropical regions of the world. After respiratory infections, diarrhoea diseases are the commonest illnesses and have the greatest negative impact upon the growth of infants and young children. The causes of diarrhoea have traditionally been ascribed to water supply and sanitation (Motarjemi *et al.*, 1993). Foods prepared under unhygienic conditions and frequently heavily contaminated with pathogenic organisms play a major role in child mortality through a combination of diarrhoea diseases, nutrient malabsorption, and malnutrition. All food items contain microorganisms of different types and in different amounts. Which microorganisms that will dominate depends on several factors, and sometimes microorganisms initially present in very low numbers in the food, for example lactic acid bacteria (LAB), will outnumber the other organisms inhibiting their growth. In contrast to fermented meat, fish, dairy and cereal products, fermented vegetables have not been recorded as a significant source of microbial food poisoning (Fleming & McFeeters, 1981).

Conclusion

Fermentation is a cost effective technique utilized in various food processing items. It enhance the food items with color and texture and also increases the shelf life of the product. It not only preserves the food commodity for off-season consumption, but also increases its nutritional and functional value. Fermented foods are cherished for their specific taste and flavor. Fermented foods are laid with large number of probiotic microorganisms, which have proven health beneficial effect.

References

1. https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781119237860.ch39
2. https://www.healthline.com/nutrition/fermentation#foods
3. https://biologydictionary.net/fermentation/
4. Biotechnology – Vol VIII - *Fermented Foods and Their Processing* - Nduka Okafor