

Food Preservation: An Introduction

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To meet the global demand for food requires increasing food production as well as preserving more of the food that we already have.

CONCEPT OF FOOD PRESERVATION

Food preservation is a means of treating foods to delay its deterioration. It implies putting microorganisms in a hostile environment, in order to inhibit their growth or shorten their survival or cause their death. It involves preparing fresh food for long-term storage by using techniques that prevent the food from spoiling. Food preservation is necessary for the following reasons:

- It prevents the growth of microorganisms as well as slowing the oxidation of fats.
- It extends product shelf-life and maintain quality attributes
- It prepare new products like jams, pickles, etc. which are enjoyed all the year round.
- It curbs food losses and wastage and avoids problems like food shortage or famine.
- It is needed today due to the large world population and aging population.

Bacteria and fungi are the major types of microorganisms that cause food spoilage and food-borne illnesses. The two types of fungi that are important in food spoilage are yeasts and molds.

The main objective of food processing is to preserve the overall quality of the food over a certain duration, known as the shelf-life. The shelf-life is the time it takes a food product

ABSTRACT

Food is a very basic requirement for human survival. Food preservation is treating foods to delay its deterioration. It employs any technique to keep food from spoilage after harvest or slaughter. The main idea behind all methods of food preservation is to slow down the activity of disease-causing bacteria or kill the bacteria altogether. Understanding the effects of each preservation method on foods is critical in food processing. In this paper, concepts related to food preservation are discussed.

KEYWORDS: food preservation, food safety, preservation methods

INTRODUCTION

Because food is so important to survival, food preservation has been one of the oldest sciences used by human beings. Food spoils from bacteria if it is not treated. Food deterioration is caused by environmental factors such as temperature, humidity, oxygen and light and will result in loss of quality attributes. Before the dawn of modern agriculture, human beings stored nuts and seeds for winter use and discovered that meat and fish could be preserved by drying in the sun.

Humans since the Stone age have experimented with various methods for successful food preservation. A major concern of the food scientist is to make foods as safe as possible whether they are used fresh or processed.

to decline to an unacceptable level. The main preservation technologies are thermal processing, freezing, , drying, ionizing radiation, chemical preservation, high hydrostatic pressure, pulsed electric field, and intense light.

TRADITIONAL FOOD PRESERVATION METHODS

Many processes designed to preserve food involve more than one food preservation method. Some traditional methods of preserving food have a lower energy input and carbon footprint compared to modern methods. Common traditional ways of preserving food include [1-3]:

- *Drying* in the sun or in an oven. Drying is a common method for drying fruits and some vegetables. It is effective because it removes much of the food's water. Drying and salting are often done together. A traditional method for preserving rice is to allow it to dry naturally in the fields.
- *Salting* binds with water molecules and acts as a dehydrating agent in foods. Salt was used for flavoring. Meat can be preserved by salting it. Sugar means to have effects similar to those of salt in preserving food. Salt and sugar draw liquid out of the food.
- *Smoking* the food with the smoke from burning wood. Smoking meat and fish as a means of preserving them grew out of cooking. Usually, this is done to food that was salted first. Smoking and salting techniques improve on the drying process and add antimicrobial agents that aid in preservation. Certain foods exposed to smoke lasts longer than those that are not. Meats, fish, fowl, and cheese were among such foods.

- *Freezing and Refrigeration* preserves food by slowing down the growth and reproduction of bacteria and other microorganisms that cause the food to rot. Freezing is one of the most commonly used processes, both commercially and domestically, for preserving a very wide range of foods. It helps in retaining quality of food products over long storage periods. Freezing is effective because the pathogens that cause food spoilage are killed at low temperatures. Fish, meat, poultry, and fruit juices are among the foods most commonly preserved by freezing.
- *Heating* food is an effective way of preserving it because the great majority of harmful pathogens are killed at temperatures close to the boiling point of water. Boiling liquid food items such as milk and water can kill any any harmful microbes that may be present in them.
- *Canning* is one of the methods of home preservation. It involves sterilizing a food product, usually by heating, and then placing it within an air-tight container. It preserves food by removing air, preventing growth of bacteria, destroying enzymes, and creating a tight seal.
- Fermentation is the microbial conversion of starch and sugars into alcohol. It transforms low acid foods into high acid foods, giving them a longer shelf life
- Although fermentation adds nutrition, most fermented foods last only weeks or months. Not only can fermentation produce alcohol, but it can also be a valuable preservation technique. Grapes, rice, and barley were fermented into wine and beer. Bread is another food product made by fermentation.

Some traditional methods in food preservation may also destroy or remove some essential nutrients or decrease their digestibility. However, some of them are used in modern industrial food processing and preservation.

MODERN FOOD PRESERVATION METHODS

The process of food preservation in modern times are not as simple or straightforward as in the past. It is now becoming a highly interdisciplinary science. Common modern ways of preserving food include [1-3]:

- *Pasteurization* is a process for preservation of liquid food. Today, it is mainly applied to dairy products.
- *Vacuum-packing* stores food in a vacuum (usually in an air-tight container), which strips bacteria of oxygen needed for survival.
- *Food additives* can inhibit the growth of bacteria. The preservatives delay spoilage of the food and ensure that the food retains, as nearly as possible, its original quality. Common food additives include calcium, sodium, potassium, sodium sorbate, and sorbic acid. The interest in essential oils in food preservation has been amplified in recent years by an increasingly negative consumer perception of synthetic food additives. Essential oil constituents have low or no efficiency against microorganisms. They have the advantages of high efficiency, safety, and nontoxicity.
- *Food irradiation* is the exposure of food to ionizing radiation which can kill bacteria, molds, and insect pests. This is a pasteurization method in which food is exposed to low levels of high-energy ionizing radiation in an effort to kill microbial contaminants.
- *Bio-preservation* is the use of natural or controlled micro biota as a way of preserving food and extending its shelf life.

- *Pulsed Electric Field (PEF)* processing is a method for processing cells by means of brief pulses of a strong electric field. When the low frequency electric field is applied to the cell, the voltage concentrates to the cell membrane and breakdown occurs in the cell membrane when a particular voltage is reached. Through PEF treatment a permeabilization of plant, animal and microbial cells is achieved.
- *Hurdle technology* is the application of combined preservation techniques. It is a method of ensuring that pathogens in food products can be controlled by combining more than one approach. These approaches can be thought of as "hurdles" the pathogen has to overcome if it is to remain active in the food. Typical hurdles in a food system are high temperature during processing, low temperature during storage, and increasing the acidity.

Other modern methods include biotechnology, nanotechnology, ultraviolet and microwave radiation, ultrasound, ozone, and pulsed light. Some of these will play a more important role in the future.

Both the traditional and modern food preservation methods are illustrated in Figure 1 [4]. Selection of food preservation method depends on factors inherent to the food product and its physical and chemical characteristics. A mix of food preserving methods is recommended. Some of the common preservation techniques are no longer recommended due to food safety concern.

APPLICATIONS

Home food preservation helps you stock up and save money, whether you're growing your own food or buying in bulk. Preservation as a home activity is gradually disappearing, setting the stage for a more commercial scale of preservation. Advances in food preservation have paved the way for industrial-scale applications involving ultrasound combined with other technologies in the preservation of foods. Successful food preservation requires the use of multiple preservation techniques in the manufacturing and storage of food products. Feeding the world population, especially the refugees, is made possible by food preservation.

CONCLUSION

Food preservation is about applying some techniques to preserve food and making it possible to store in a good condition for future use. It is been the main goal of food processors in addition to food safety and quality. A major trend is to combine these techniques in ways that minimize the extreme use of any one of them. More information on food preservation can be found in books [5-10] and journals on food such as *British Food Journal*.

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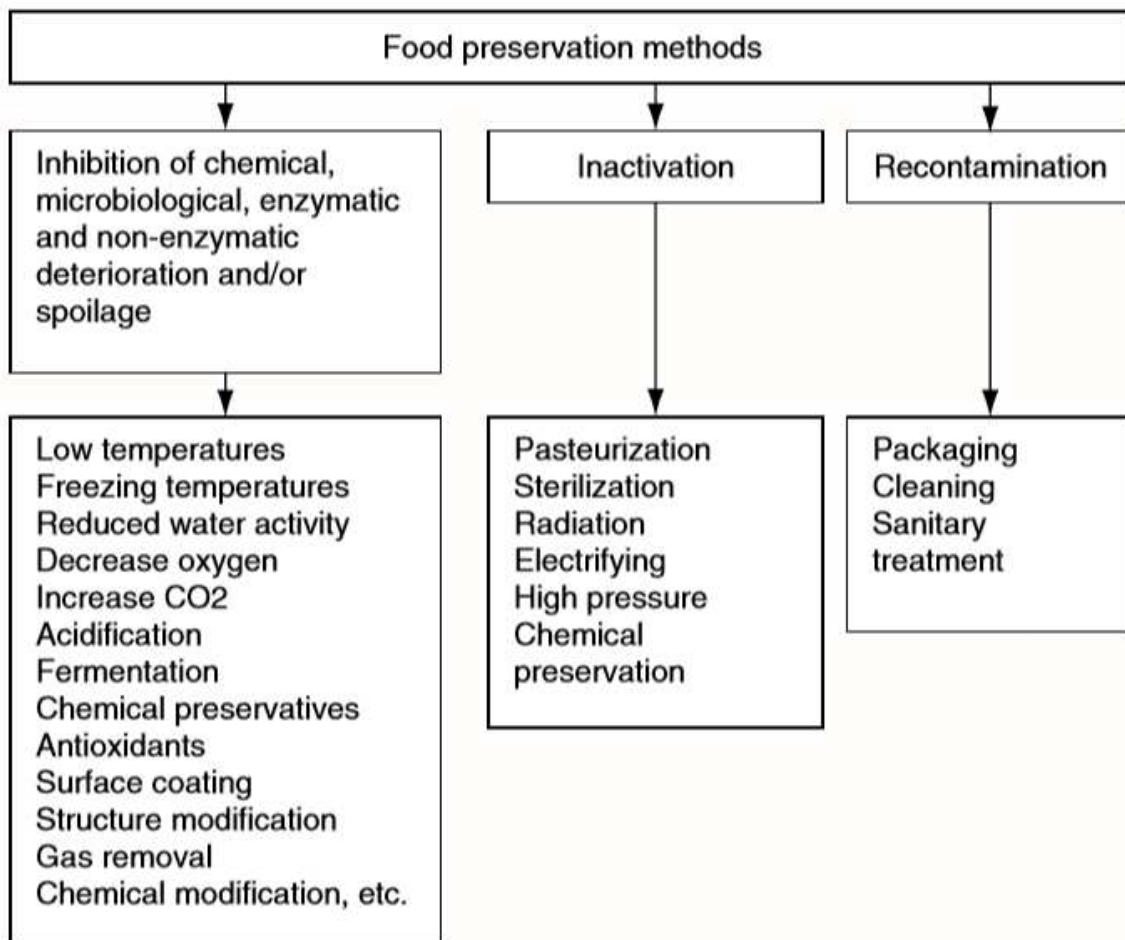


Figure 1 Major food preservation methods [4].