

Advanced Textiles and Its Application in Food Preservation [★]

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Abstract

In today's fast-paced life, ensuring food's freshness, safety, and optimal nutritional and economic value is paramount for both consumers and businesses. Textiles have played a significant role in the food preservation industry throughout history. With the continuous development of the textile and preservation industries, novel methods have been explored to enhance the effectiveness of preservation. This article provides a comprehensive overview of textiles' performance requirements and limitations in the food preservation process. Additionally, it introduces innovative techniques and recent advancements in textile materials designed explicitly for preservation purposes. Furthermore, the paper highlights the key challenges that must be addressed in future research. Consequently, this scientific review serves as a valuable reference for the application and advancement of textiles in the dynamic field of food preservation.

Keywords: Textiles; Food Preservation; Intelligent Textile; Antimicrobial Textile

1 Introduction

In recent years, the issue of food waste has reached critical levels, imposing substantial economic and environmental pressures on numerous countries. Food waste occurs at various stages, including production, harvesting, transportation, distribution, and storage [1]. Mitigating food waste, preventing spoilage, and optimising food utilisation have emerged as imperative challenges that demand utmost attention and diligent efforts. Various techniques have been used to prevent food from being corrupted and causing the loss of nutrients. Food preservation techniques include cool temperature Storage, drying, canning (water bath), canning (pressure canning), freezing, fermentation, preserving in salt and sugar, alcohol, vinegar pickling and Olive Oil Preserving.

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Due to their unique physical and chemical properties, textile materials have long been instrumental in food preservation and storage. With the continuous advancement of science and technology, researchers have persistently sought to refine existing preservation methods and pioneer novel processing techniques and approaches, all aimed at augmenting the efficacy of preservation.

This scientific paper presents a comprehensive overview of textiles' applications and advancements in food preservation. It encompasses exploring preservation principles, delineating various textile types used for preservation, and elucidating innovations in textile treatments. Furthermore, this study offers insights into future trends in preservation textiles. Additionally, a comprehensive analysis of the pros and cons associated with different improvements and innovations is provided, with the ultimate objective of fostering the widespread adoption of textiles in food preservation, thereby curbing food waste and minimising losses.

2 Methods

Search for relevant literature: Relevant literature was retrieved from the China National Knowledge Infrastructure (CNKI) and Web of Science databases using the Chinese search terms “food preservation,” “textile,” and “textile packaging,” as well as the English search terms “food preservation,” “textile,” “textile packaging,” “textile improvement,” and “textile modification”.

Evaluate sources: 178 articles were analysed based on their abstracts and content. Through inclusion and exclusion criteria, pertinent literature was identified, resulting in a final selection of 27 articles that met the criteria for comprehensive review.

Identify themes and gaps: This work will review advanced food preservation techniques. We emphasize functional textiles in food preservation because they allow both pathogen reduction and improvement of nutritional and physicochemical properties.

Write a review according to this structure: this work will first comprehensively overview the performance of traditional textiles, then introduce innovative techniques and recent advancements in textile materials specifically designed for preservation purposes.

3 Textiles Used for Preservation

Food deterioration and spoilage are attributed to various external physical, chemical, and biological factors encountered during transportation and storage. These factors contribute to moisture loss, microbial corrosion, and self-damage, ultimately leading to a decline in the nutritional and economic value of the food.

Effective food preservation entails addressing several crucial aspects, including reducing moisture loss, mitigating microbial corrosion, preventing mechanical damage, mitigating the adverse effects of temperature fluctuations, and preserving the food's desirable attributes. By diligently addressing these aspects, minimising food waste during storage and transportation becomes possible, ensuring the preservation of the food's optimal economic and nutritional value [2, 3].

Textiles employed for preservation serve as a protective barrier through external packaging, safeguarding the food against external physical, chemical, and biological factors. This barrier