Acetic acid in food packaging: A technological approach to enhance shelf life.

Mahdieh Aghazadeh*

Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, Indonesia

Introduction

In the intricate landscape of food technology, the quest to prolong the shelf life of perishable goods has led to groundbreaking innovations in packaging. Among these innovations, acetic acid has emerged as a key player, contributing not only to the preservation of food but also to the development of sustainable and efficient packaging solutions. This article explores the technological approach of integrating acetic acid into food packaging and its profound impact on enhancing shelf life. Understanding the need for extended shelf life- The challenges associated with food spoilage, degradation, and safety have long been a focus in the food industry. The demand for convenience, the globalization of food supply chains, and the reduction of food waste have intensified the need for technologies that can extend the shelf life of products without compromising their quality [1,2].

The role of acetic acid in food packaging- Antimicrobial properties of acetic acid- Acetic acid, with its proven antimicrobial properties, offers a natural and effective solution for inhibiting the growth of bacteria, molds, and yeasts. When incorporated into food packaging materials, acetic acid creates a protective barrier that helps to maintain the freshness and safety of the enclosed products. pH regulation and preservation- The acidity provided by acetic acid not only serves as a deterrent to microorganisms but also contributes to the regulation of pH levels in packaged foods. Controlling pH is critical for preserving the quality of various food items, and acetic acid, with its ability to establish an acidic environment, becomes a valuable tool in this regard [3,4].

Flavor enhancement and preservation- Beyond its preservative properties, acetic acid is renowned for its ability to enhance flavors. When integrated into food packaging, it can subtly influence the taste of the enclosed products, contributing to an improved overall sensory experience. This feature is particularly beneficial for products that are sensitive to changes in flavor over time. Innovative approaches to acetic acid in food packaging- Acetic acid-infused films and coatings- One of the most direct applications of acetic acid in food packaging is through the development of films and coatings infused with this organic acid. These materials act as a protective layer around the food, releasing acetic acid in a controlled manner to create an inhospitable environment for spoilage microorganisms. Research has shown that acetic acid-infused films are effective in extending the shelf life of various products, including fruits, vegetables, and meats. The slow release of acetic acid inhibits the growth of bacteria and molds, reducing the risk of contamination and decay [5,6].

Smart packaging incorporating acetic acid sensors- Advancements in technology have given rise to smart packaging solutions that incorporate sensors capable of detecting changes in the environment within the package. Acetic acid sensors, when integrated into packaging materials, allow for real-time monitoring of the acidity levels surrounding the food. This technological marvel enables the identification of potential spoilage or contamination based on deviations from the expected acidity range. Consumers and retailers can receive alerts, ensuring timely interventions to maintain the quality and safety of the packaged products. Controlled release systems- To optimize the benefits of acetic acid in food packaging, researchers are exploring controlled release systems that enable a gradual and sustained release of the acid over time. This approach aims to strike a balance between preserving the product and minimizing any potential impact on flavor or sensory attributes [7,8].

By fine-tuning the release rate, food technologists can tailor the packaging to the specific needs of different products. This innovation holds great promise for extending the shelf life of a wide range of perishable goods. Advantages of acetic acid in food packaging: Natural preservation- The use of acetic acid aligns with the growing consumer preference for natural and clean-label products. As naturally occurring compound found in vinegar, acetic acid offers a more palatable alternative to synthetic preservatives, addressing concerns related to the use of artificial additives. Sustainability and biodegradability- Acetic acid is an eco-friendly option in the realm of food packaging. When derived from renewable sources, it can contribute to the sustainability goals of the food industry. Additionally, packaging materials incorporating acetic acid can be designed to be biodegradable, reducing the environmental impact of packaging waste. Reduction in food waste- By extending the shelf life of perishable goods, acetic acid in food packaging directly contributes to the reduction of food waste. Products remain fresher for longer periods, reducing the likelihood of premature disposal due to spoilage. This not only benefits consumers but also aligns with global efforts to address food sustainability challenges [9,10].

***Correspondence to:** Mahdieh Aghazadeh, Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, Indonesia, E-mail: mahdiehaghazadeh@purdue.edu

***Received:** 21-Dec-2023, Manuscript No. AAFTP-24-124534; **Editor assigned:** 23-Dec-2023, PreQC No. AAFTP-24-124534 (PQ); **Reviewed:** 01-Jan-2024, QC No. AAFTP-24-124534; **Revised:** 11-Jan-2024, Manuscript No. AAFTP-24-124534(R); **Published:** 16-Jan-2024, DOI:10.35841/2591-796X-8.1.212*

***Citation:** Aghazadeh M. Acetic acid in food packaging: A technological approach to enhance shelf life. J Food Technol Pres. 2024;8(1):212*

References

1. Chapman B, Gunter C. Local food systems food safety concerns. Preharv Food Saf. 2018:249-60.
2. Gizaw Z. Public health risks related to food safety issues in the food market: A systematic literature review. Environ Health Prev Med. 2019;24(1):1-21.
3. Banach JL, Hoek-van, Van HJ. Food safety hazards in the European seaweed chain. Compr Rev Food Sci Food Saf. 2020;19(2):332-64.
4. He S, Shi X. Microbial food safety in China: past, present, and future. Foodborne Pathog Dis. 2021;18(8):510-8.
5. Jagadeesan B, Gerner-Smidt P, Allard MW, et al. The use of next generation sequencing for improving food safety: Translation into practice. Food Microbiol. 2019;79:96-115.
6. Guan ZB, Luo Q, Wang HR, et al. Bacterial laccases: Promising biological green tools for industrial applications. Cell Mol Life Sci. 2018;75(19):3569-92.
7. Zhang Y, Lin DF, Hao J, et al. The crucial role of bacterial laccases in the bioremediation of petroleum hydrocarbons. World J Microbiol Biotechnol. 2020;36(8):1-0.
8. Akram F, Ashraf S, Shah FI, et al. Eminent Industrial and biotechnological applications of laccases from bacterial source: A current overview. Appl Biochem Biotechnol. 2022:1-21.
9. Choolaei Z, Flick R, Khusnutdinova AN, et al. Lignin-oxidizing activity of bacterial laccases characterized using soluble substrates and polymeric lignin. J Biotechnol. 2021;325:128-37.
10. Chauhan PS, Goradia B, Saxena A. Bacterial laccase: Recent update on production, properties and industrial applications. J Biotech. 2017;7(5):1-20.

Citation: *Aghazadeh M. Acetic acid in food packaging: A technological approach to enhance shelf life. J Food Technol Pres. 2024;8(1):212*