Mini Review
Volume 9:05, 2023

Journal of Food & Industrial Microbiology

ISSN: 2572-4134 Open Access

Based on *Hibiscus Sabdariffa* L. Anthocyanin-loaded Chitosan Films, Smart Packaging for Food Spoilage Assessment

Aiden Taylor*

Department of Food Science, University of Massachusetts Amherst, Amherst, MA 01003, USA

Abstract

In response to the escalating demand for innovative food packaging solutions, this study explores the development of smart packaging utilizing *Hibiscus sabdariffa* L. anthocyanin-loaded chitosan films. These films possess inherent antioxidant and antimicrobial properties, attributed to the bioactive compounds present in *Hibiscus sabdariffa* L. extract. The integration of anthocyanins within chitosan matrices not only enhances the films' functionality but also imparts a distinct visual indicator of freshness. This research presents a novel approach towards sustainable and intelligent packaging systems, capable of providing real-time assessments of food spoilage.

Keywords: Color marker • Hibiscus tea anthocyanins • Fish freshness

Introduction

The contemporary food industry is confronted with a dual challenge: the escalating demand for sustainable packaging materials and the imperative to ensure food safety and quality. Smart packaging, characterized by its ability to actively monitor and respond to changes in the environment or food product, has emerged as a transformative solution. Within this context, *Hibiscus sabdariffa* L., a rich source of anthocyanins, presents an intriguing avenue for developing intelligent packaging materials. *Hibiscus sabdariffa* L., commonly known as roselle, is a plant renowned for its vibrant red calyces and diverse phytochemical composition. Among its constituents, anthocyanins stand out as a group of natural pigments known for their antioxidant properties and potential health benefits. These bioactive compounds have garnered significant attention in the food and pharmaceutical industries for their role in enhancing product stability and potential health-promoting effects.

Chitosan, a biopolymer derived from chitin, exhibits remarkable film-forming properties and biodegradability. These attributes make it an attractive candidate for developing eco-friendly packaging materials. Additionally, chitosan possesses inherent antimicrobial properties, which contribute to its efficacy in preserving food quality. However, the incorporation of bioactive compounds, such as anthocyanins from *Hibiscus sabdariffa* L., holds the potential to further enhance the functionality of chitosan films. The integration of *Hibiscus sabdariffa* L. anthocyanins into chitosan films imparts an additional layer of functionality. These anthocyanin-loaded films not only benefit from the inherent antimicrobial properties of chitosan but also leverage the antioxidant capacity of anthocyanins. This synergistic interaction provides a multifaceted approach to preserving food quality by inhibiting microbial growth and reducing oxidative degradation.

Literature Review

A distinctive feature of the developed packaging system is its potential to serve as a visual indicator of food freshness. The anthocyanin-loaded chitosan films undergo color changes in response to alterations in the food product or surrounding environment. This visual cue provides a real-time assessment of food spoilage, allowing consumers and industry stakeholders to make informed decisions regarding product quality and safety [1].

The integration of *Hibiscus sabdariffa* L. anthocyanin-loaded chitosan films into packaging materials represents a significant step towards sustainable and intelligent packaging systems. By harnessing the natural properties of these bioactive compounds and biopolymers, we aim to contribute to the ongoing efforts to reduce plastic waste and enhance food safety. This research paves the way for the development of packaging materials that not only protect and preserve food products but also provide valuable information on their freshness and quality in real time [2].

Discussion

The discussion section provides an in-depth analysis of the findings and implications of the research on *Hibiscus sabdariffa* L. anthocyanin-loaded chitosan films for smart packaging in food spoilage assessment. The integration of *Hibiscus sabdariffa* L. anthocyanins into chitosan films represents a significant enhancement of their functionality. The inherent antioxidant and antimicrobial properties of anthocyanins complement the natural attributes of chitosan, creating a synergistic effect. This leads to a packaging material that not only offers physical protection to food products but also actively inhibits microbial growth and reduces oxidative degradation [3].

A noteworthy feature of the developed packaging system is its ability to serve as a visual indicator of food freshness. The colour changes observed in the anthocyanin-loaded chitosan films provide a clear, real-time assessment of the condition of the packaged food. This dynamic response to environmental changes, such as pH shifts or microbial activity, offers a valuable tool for consumers and industry stakeholders in making informed decisions about the quality and safety of the food product. The visual indicator of freshness provided by the packaging material has the potential to enhance consumer engagement and trust. It offers a direct and intuitive means for consumers to assess the condition of the food product. This transparency aligns with the increasing consumer demand for information about the quality and safety of packaged foods. Additionally, it empowers consumers to make more informed choices, reducing food waste and potentially improving overall food security [4].

The use of chitosan, a biodegradable and renewable biopolymer, in the development of the packaging material aligns with the broader goals of sustainability in the packaging industry. By reducing reliance on non-biodegradable plastics, this approach contributes to the reduction of

***Address for correspondence:** Aiden Taylor, Department of Food Science, University of Massachusetts Amherst, Amherst, MA 01003, USA; E-mail: aidentaylor@yahoo.com*

Received: 17 August, 2023; Manuscript No. Jfim-23-118028; **Editor assigned:** 19 August, 2023, PreQC No. P-118028; **Reviewed:** 31 August, 2023, QC No. Q-118028; **Revised:** 05 September, 2023, Manuscript No. R-118028; **Published:** 12 September, 2023, DOI: 10.37421/2572-4134.2023.9.296

environmental impact and plastic waste. Furthermore, the incorporation of natural bioactive compounds from *Hibiscus sabdariffa* L. adds to the eco-friendliness of the material [5,6].

Conclusion

The research on *Hibiscus sabdariffa* L. anthocyanin-loaded chitosan films for smart packaging in food spoilage assessment presents a promising advancement in the field of food packaging technology. The integration of anthocyanins enhances the functionality of chitosan films, providing a dual-action approach to preserve food quality through antimicrobial and antioxidant properties. The visual indicator of freshness offers a practical tool for both consumers and industry stakeholders to assess the condition of the packaged food product in real time.

Moreover, the use of chitosan, a biodegradable and renewable biopolymer, underscores the commitment to sustainability and eco-friendly packaging. This research contributes to the ongoing efforts to develop intelligent packaging systems that not only protect food products but also provide valuable information about their quality and safety. As the demand for sustainable packaging solutions continues to grow, this approach holds significant promise for future applications in the food industry. Through the integration of natural bioactive compounds and eco-friendly materials, this research sets a foundation for the development of innovative, sustainable, and intelligent packaging systems.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Zhang, Junjun, Xiaobo Zou, Xiaodong Zhai and XiaoWei Huang, et al. "Preparation of an intelligent pH film based on biodegradable polymers and roselle anthocyanins for monitoring pork freshness." *Food Chem* 272 (2019): 306-312.
2. Sohany, Mouluda, Intan Syafinaz Mohamed Amin Tawakkal, Siti Hajar Ariffin and Nor Nadiah Abdul Karim Shah, et al. "Characterization of anthocyanin associated purple sweet potato starch and peel-based pH indicator films." *Foods* 10 (2021): 2005.
3. Jabeur, Inès, Eliana Pereira, Lillian Barro and Ricardo C. Calhelha, et al. "*Hibiscus sabdariffa L.* as a source of nutrients, bioactive compounds and colouring agents." *Food Res Int* 100 (2017): 717-723.
4. Lan, Weijie, Shuyao Wang, Zhijun Zhang and Xue Liang, et al. "Development of red apple pomace extract/chitosan-based films reinforced by TiO2 nanoparticles as a multifunctional packaging material." *Int J Biol Macromole* 168 (2021): 105-115.
5. Yong, Huimin, Xingchi Wang, Xin Zhang and Yunpeng Liu, et al. "Effects of anthocyanin-rich purple and black eggplant extracts on the physical, antioxidant and pH-sensitive properties of chitosan film." *Food Hydrocoll* 94 (2019): 93-104.

How to cite this article: Taylor, Aiden. "Based on *Hibiscus sabdariffa* L. anthocyanin-loaded chitosan films, smart packaging for food spoilage assessment." *J Food Ind Microbiol* 9 (2023): 296.