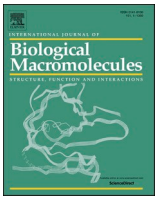
International Journal of Biological Macromolecules 259 (2024) 128932

Contents lists available at ScienceDirect

International Journal of Biological Macromolecules

journal homepage: www.elsevier.com/locate/ijbiomac



Development of hyaluronic acid based polysaccharide-protein composite edible coatings for preservation of strawberry fruit

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ARTICLE INFO

Keywords:
Chitosan
Hyaluronic acid
Gelatin
Polysaccharide-protein coatings
Antioxidant
Edible coatings
Food packaging

ABSTRACT

With the growing demand for extending the shelf-life of perishable goods such as fruits and vegetables, there is continued interest towards the development of edible coatings derived from natural sources. To avoid rapid dissolution, water insoluble polysaccharide such as chitosan has been widely explored. In this work, we developed robust hyaluronic acid-based edible polysaccharide-protein coatings by combining it (hyaluronic acid) with chitosan and gelatin to introduce additional antioxidant properties. This work is the first example of using hyaluronic acid in edible coatings for fruit preservation. The effect of developed edible composite coatings on the quality of coated strawberries was investigated over a 15 day storage period with 3-day examination intervals. The obtained results revealed hyaluronic acid dose-dependent improvement in intrinsic properties of coated strawberries including weight loss, pH, titratable acidity (TA) and total solids content (TSS). Furthermore, the inclusion of hyaluronic acid significantly enhanced the antioxidant properties of developed edible coatings as measured using total phenolic content, change in ascorbic acid content and DPPH assay prolonging the shelf-life of coated strawberries.

1. Introduction

Globalisation of the food industry has led to wider accessibility of fresh produce across the globe making it possible to obtain fruits and vegetables all year round. This accessibility requires long distance transportation of fresh produce from farms which can be in different countries across the globe to consumers in different parts of the world. To withstand prolonged transportation time from farms to supermarkets, fresh produce needs to be protected against damage and fouling and to extend its shelf-life. Furthermore, there is a growing push to minimise postharvest loss of fresh produce by extending their shelf-life. [1] To this end, edible coatings remain the most effective strategy with cost effectiveness and no harmful health implications. [2–4] The effectiveness of edible coatings has been attributed to reducing weight loss, change in pH and other quality attributes by minimizing lipid peroxidation, altering the respiration rate and preservation of color and texture. [5–9]

Strawberries (*Fragaria Xananassa*) are one of the most popular summer fruits with considerable health benefits owing to the presence of natural antioxidants including polyphenols and anthocyanin, vitamins and amino acids. [10] However, they are highly perishable with very short post-harvest shelf-life due to their vulnerability to mechanical injury, physiological deterioration, water loss, fungal decay and high respiration rate. [5,11,12] Traditional approach to extend postharvest strawberry shelf-life is to use cold storage conditions and exposure to modified atmospheres with elevated CO_2 levels. [13] However, due to only short-term benefits and associated costs of cold storage and reduction in taste with prolonged exposure to elevated levels of CO_2, alternate strategies are desired. To this end, edible coatings have been explored with the majority focussing on using natural biopolymers and polysaccharides in particular chitosan, which has emerged as a primary component in edible coatings due to the reasons mentioned above. [10,12–18] Furthermore, lately use of natural antioxidant and antimicrobial constituents are used in edible coatings to provide additional benefit with prolonged safety. [19,20] In terms of natural antioxidants, chitosan is the most widely explored polysaccharide in edible coatings due to its additional antimicrobial properties. [15,21] Coatings produced using chitosan and its blending with other components have been shown to both extend the shelf-life of fruits and enhance intrinsic antioxidants profile of coated fruits. [10,13,22,23] Another benefit of using

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https://doi.org/10.1016/j.ijbiomac.2023.128932
Received 16 October 2023; Received in revised form 14 December 2023; Accepted 19 December 2023
Available online 22 December 2023