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Effect of Okra *(Abelmoschus esculentus)* Mucilage and Xanthan Gum on the Physicochemical Properties of Fresh-Cut Starfruit *(Averrhoa carambola)*

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Structured Abstract

Background: Tropical starfruit is a popular Malaysian export, yet its commercial value is limited by high perishability, rapid moisture loss and enzymatic browning. This research explores a natural, biodegradable alternative to synthetic waxes using an edible coating of okra mucilage and xanthan gum. Okra mucilage, contains functional polysaccharides with antioxidant properties that help neutralise free radicals. Xanthan gum is integrated to enhance the coating's performance due to its superior viscosity and ability to improve adherence to the fruit surface. Together, these polymers aim to create a synergistic barrier that maintains the physicochemical and microbiological quality of fresh-cut starfruit during chilled storage.

Methods: The procedures involved okra mucilage preparation from overripe pods using distilled water (1:2 ratio) at 60–70°C. Starfruit slices underwent four treatments (control, 1.0% okra, 1.0% xanthan gum, or a 1.0% blend) via a 2-minute dipping method. Samples were stored at 4°C for 12 days, with physical, chemical, and microbiological analyses conducted every three days to evaluate weight loss, hardness, acidity, and spoilage.

Results: This study demonstrates that a functional edible coating was successfully developed using a combination of okra mucilage and xanthan gum, forming an effective protective barrier on fresh-cut starfruit. The findings show that the 1.0% okra–xanthan gum treatment (T4) significantly improved firmness retention compared with the rapid softening observed in the uncoated control. Regarding chemical stability, the synergistic interaction between film-forming okra mucilage and stabilising xanthan gum reduced browning and preserved higher phenolic content. Additionally, this combination effectively stabilised pH, maintained titratable acidity, and supported total soluble solids retention. Composite-coated samples also exhibited reduced weight loss after 12 days, meanwhile uncoated samples showed slightly lower yeast and mold counts.

Conclusion: In conclusion, the findings of this study show that the synergistic interaction between okra mucilage and xanthan gum forms an effective edible coating for fresh-cut produce. This formulation delays ripening and reduces physicochemical deterioration, providing a sustainable alternative to synthetic preservatives. Overall, the use of these natural hydrocolloids offers a practical approach to extending shelf life and improving the marketability of fresh-cut tropical starfruit.

Keywords: Edible Coating, Okra Mucilage, Xanthan Gum, Fresh-cut Starfruit

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