Karakteristik Intelligent Film Berbasis Glukomanan Porang, Gelatin Ikan, dan Carboxymethyl Cellulose
dengan Kopigmentasi Antosianin Kulit Rambutan
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KARAKTERISTIK *INTELLIGENT FILM* BERBASIS GLUKOMANAN PORANG, GELATIN IKAN, DAN *CARBOXYMETHYL CELLULOSE* DENGAN KOPIGMENTASI ANTOSIANIN KULIT RAMBUTAN

INTISARI

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Intelligent film merupakan sistem kemasan yang dirancang untuk memantau perubahan mutu bahan pangan dan memberikan respons visual terhadap perubahan tersebut. Antosianin telah banyak digunakan sebagai pigmen dalam indikator kesegaran karena kepekaannya terhadap perubahan pH, tetapi dibatasi oleh stabilitas yang rendah terhadap cahaya, suhu, dan waktu penyimpanan. Penelitian ini mengembangkan *intelligent film* melalui penggabungan tiga polimer, yaitu glukomanan porang, gelatin ikan, dan *carboxymethyl* cellulose, sebagai matriks dan menerapkan strategi kopigmentasi asam galat pada antosianin kulit rambutan untuk mengatasi keterbatasan stabilitas pigmen.

Tahapan penelitian yang dilakukan adalah: (1) Pembuatan ekstrak antosianin dan analisis kadar total; (2) Pembuatan sampel *intelligent film*; (3) Pengujian karakteristik fisik (*initial color* dan *thickness*), mekanik (*tensile strength* dan *elongation at break*), pengujian barrier film yaitu *Water Vapor Permeability*, pengujian kimia (kadar air dan aktivitas antioksidan), dan pengujian fungsional (warna terhadap sensitivitas pH dan warna terhadap TVB-N). Karakteristik film yang dihasilkan memiliki ketebalan 0,16 mm, *tensile strength* 1,41–1,63 MPa, *elongation at break* 13,93–20,38%, nilai WVP sebesar 1,32E-06–1,43E-06, kadar air 20,31–24,09%, aktivitas antioksidan tertinggi sebesar 96,40%, dan mampu merespons perubahan pH serta senyawa TVB-N.

Kata kunci: CMC, gelatin ikan, glukomanan porang, *intelligent film*, kulit rambutan, kopigmentasi

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CHARACTERISTICS OF INTELLIGENT FILM BASED ON PORANG GLUCOMANNAN, FISH GELATIN, AND CARBOXYMETHYL CELLULOSE WITH CO-PIGMENTATION OF RAMBUTAN PEEL ANTHOCYANINS

ABSTRACT

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Intelligent film is a packaging system designed to monitor changes in food quality and provide a visual response to these changes. Anthocyanins have been widely used as pigments in freshness indicators due to their sensitivity to pH changes, but are limited by their low stability to light, temperature, and storage time. This research developed an intelligent film by combining three polymers, porang glucomannan, fish gelatin, and carboxymethyl cellulose, as a matrix and applying a gallic acid copigmentation strategy to rambutan peel anthocyanins to overcome the limitations of pigment stability.

The research stages were: (1) Preparation of anthocyanin extracts and analysis of total content; (2) Preparation of intelligent film samples; (3) Testing of physical characteristics (initial color and thickness), mechanical (tensile strength and elongation at break), film barrier testing (water vapor permeability), chemical testing (water content and antioxidant activity), and functional testing (color sensitivity to pH and color to TVB-N). The characteristics of the resulting film include a thickness of 0.16 mm, tensile strength of 1.41–1.63 MPa, elongation at break of 13.93–20.38%, WVP value of 1.32E-06–1.43E-06, water content of 20.31–24.09%, the highest antioxidant activity of 96.40%, and is able to respond to changes in pH and TVB-N compounds.

Keywords: CMC, fish gelatin, porang glucomannan, intelligent film, rambutan peel, co-pigmentation