SINTESIS DAN KARAKTERISASI BIOPLASTIK DARI PATI UBI JALAR UNGU (*Ipomoea batatas* L.)–KITOSAN–GLISEROL UNTUK APLIKASI KEMASAN MAKANAN

Oleh

Marcel Aristha, NIM 2213081007

Jurusan Kimia

ABSTRAK

Penggunaan plastik konvensional yang sulit terdegradasi telah menimbulkan berbagai permasalahan lingkungan sehingga diperlukan alternatif bahan kemasan yang ramah lingkungan. Salah satu alternatif yang memiliki potensi adalah bioplastik berbahan dasar pati ubi jalar ungu (*Ipomoea batatas* L.) dengan penambahan kitosan dan gliserol serta mengkaji karakteristik bioplastik yang dihasilkan. Pati ubi jalar ungu diisolasi menggunakan metode ekstraksi basah dan dikarakterisasikan menggunakan *Fourier Transform Infrared Spectroscopy* (FTIR). Bioplastik disintesis melalui metode pencampuran dan pemanasan dengan variasi komposisi pati dan kitosan. Karakterisasi bioplastik meliputi analisis morfologi permukaan menggunakan *Scanning Electron Microscope* (SEM), pengujian kuat tarik, perpanjangan saat putus, daya serap air, dan biodegradabilitas. Hasil penelitian menunjukkan bahwa rendemen pati ubi jalar ungu yang diperoleh sebesar 15,06 %. Analisis FTIR mengonfirmasi keberadaan gugus fungsi khas pati berupa hidroksil (O–H), alkana (C–H), dan ikatan glikosidik (C–O–C). Penambahan gliserol 10 % dan variasi konsentrasi kitosan memengaruhi karakteristik bioplastik berbasis pati ubi jalar ungu. Penambahan gliserol dan kitosan meningkatkan persen perpanjangan serta menurunkan daya serap air. Kuat tarik tertinggi diperoleh pada sampel A (Pati 100 %) sebesar 30,95 MPa, sedangkan persen perpanjangan tertinggi diperoleh pada sampel F (Pati 70, Kitosan 20, Gliserol 10 %) sebesar 35,83 %. Daya serap air menurun secara konsisten dari 100,89 % pada sampel A menjadi 28,43 % pada sampel F seiring dengan peningkatan konsentrasi kitosan. Seluruh sampel menunjukkan biodegradabilitas yang tinggi dengan tingkat degradasi 89–98 % setelah 15 hari penguburan dalam tanah. Hasil penelitian menunjukkan bahwa kombinasi pati ubi jalar ungu, kitosan dan gliserol berpotensi menghasilkan bioplastik yang fleksibel dan memiliki ketahanan air yang lebih baik sehingga berpeluang dikembangkan sebagai bahan kemasan makanan ramah lingkungan.

Kata kunci: bioplastik, pati, kitosan, gliserol, biodegradabilitas.

SYNTHESIS AND CHARACTERIZATION OF BIOPLASTICS FROM PURPLE SWEET POTATO (Ipomoea batatas L.) STARCH-CHITOSAN-GLYCEROL FOR FOOD PACKAGING APPLICATIONS

By

Marcel Aristha, NIM 2213081007

Chemistry Department

ABSTRACK

The extensive use of petroleum-based plastics that are difficult to degrade has caused significant environmental problems, creating the need for environmentally friendly packaging alternatives. One promising alternative is starch-based bioplastics derived from renewable resources. This study aimed to synthesize bioplastics from purple sweet potato (Ipomoea batatas L.*) starch with the addition of chitosan and glycerol and to investigate the characteristics of the resulting bioplastics. Purple sweet potato starch was isolated using the wet extraction method and characterized using Fourier Transform Infrared Spectroscopy (FTIR). Bioplastics were synthesized through a mixing and heating process with varying starch and chitosan compositions, while the glycerol concentration was kept constant. The characterization included surface morphology analysis using Scanning Electron Microscopy (SEM), tensile strength, elongation, water absorption, and biodegradability tests. The results showed that the starch yield obtained from purple sweet potato was 15,06 %. FTIR analysis confirmed the presence of characteristic starch functional groups, including hydroxyl (O–H), alkane (C–H), and glycosidic (C–O–C) bonds. The addition of 10 % glycerol and varying chitosan concentrations affected the characteristics of purple sweet potato starch-based bioplastics. The incorporation of glycerol and chitosan increased the elongation at break while reducing water absorption. The highest tensile strength was obtained in sample A (100 % starch), reaching 30.95 MPa, whereas the highest elongation at break was achieved in sample F (70 starch, 20 chitosan, and 10 % glycerol), with a value of 35.83 %. Water absorption decreased consistently from 100.89 % in sample A to 28.43 % in sample F as the chitosan concentration increased. All samples exhibited high biodegradability, with degradation rates ranging from 89–98 % after 15 days of soil burial. These findings indicate that the combination of purple sweet potato starch, chitosan, and glycerol has the potential to produce biodegradable bioplastics with improved flexibility and water resistance, making them promising candidates for environmentally friendly food packaging materials.*

Keywords: *bioplastic, starch, chitosan, glycerol, biodegradability.*