RINGKASAN

ILIL ARIFATIN. Karakteristik dan Potensi Bioplastik Berbasis Kulit Mangrove *Rhizophora mucronata*. Dibimbing oleh JELITA RAHMA HIDAYATI dan R. FATHUL RAHMAN.

Permasalahan limbah plastik berbasis minyak bumi sulit terurai menjadi isu lingkungan serius, terutama di kawasan pesisir yang rentan terhadap pencemaran. Hal ini mendorong pencarian alternatif material ramah lingkungan yang dapat menggantikan plastik konvensional. Salah satu sumber daya lokal yang berpotensi adalah kulit mangrove *Rhizophora mucronata*, diketahui mengandung lignoselulosa serta senyawa bioaktif. Pemanfaatan kulit mangrove sebagai bahan baku bioplastik diharapkan mampu memberikan nilai tambah sekaligus mendukung pengurangan pencemaran plastik. Penelitian ini dilakukan melalui tahapan skrining fitokimia, analisis kandungan lignoselulosa, serta pengujian karakteristik fisik, kimia, dan biodegradasi bioplastik. Proses pembuatan dilakukan dengan perlakuan alkali menggunakan NaOH untuk meningkatkan kadar selulosa sekaligus menurunkan lignin, kemudian dicampur dengan tepung tapioka sebagai matriks. Hasil analisis menunjukkan kadar selulosa sebesar 14% dan lignin 30%. Kandungan lignin yang cukup tinggi berpengaruh terhadap tekstur dan homogenitas bioplastik, sementara selulosa berperan penting dalam pembentukan matriks film. Karakteristik fisik bioplastik ditandai dengan warna gelap kemerahan, ketebalan rata-rata 0,032 cm, serta tekstur agak kasar akibat distribusi serat selulosa dan residu lignin. Dari sisi kimia, komposisi lignoselulosa menjadi faktor penentu kualitas, di mana selulosa mendukung fleksibilitas sedangkan lignin cenderung menghambat homogenisasi. Bioplastik juga menunjukkan daya serap air cukup tinggi, dengan peningkatan berat dari 71% pada menit ke-15 hingga mencapai 157% pada menit ke-60. Sifat hidrofilik ini memang menurunkan ketahanan fisik, tetapi sekaligus mempercepat proses biodegradasi. Pengujian biodegradasi menggunakan larutan EM4 menunjukkan penurunan bobot sebesar 27% pada hari ke-7 dan meningkat menjadi 34% pada hari ke-14. Selain itu, hasil skrining fitokimia memperlihatkan bahwa kulit mangrove positif mengandung tanin dan flavonoid. Kedua senyawa ini berperan sebagai metabolit sekunder yang memberi warna gelap kemerahan, mendukung kekuatan ikatan antarmolekul, serta memberikan aktivitas antioksidan yang menambah nilai fungsional bioplastik. Kulit mangrove *R. mucronata* memiliki potensi besar sebagai bahan pembuatan bioplastik berkelanjutan. Penelitian ini memberikan dasar ilmiah untuk kajian lanjutan yang lebih aplikatif, sekaligus mendukung inovasi pengembangan bioplastik berbasis sumber daya lokal dalam upaya mengurangi pencemaran plastik.

Kata Kunci: Biodegradasi, Bioplastik, Kulit Mangrove, Lignin, *Rhizophora mucronata*, Selulosa, Skrining Fitokimia.

SUMMARY

ILIL ARIFATIN. Characteristics and Potential of Bioplastics Derived from Mangrove Bark *Rhizophora mucronata.* Supervised by JELITA RAHMA HIDAYATI and R. FATHUL RAHMAN.

The problem of petroleum-based plastic waste that is difficult to decompose has become a serious environmental issue, especially in coastal areas that are vulnerable to pollution. This situation encourages the search for environmentally friendly alternative materials that can replace conventional plastics. One promising local resource is the bark of mangrove *Rhizophora mucronata*, which is known to contain lignocellulose and bioactive compounds. The utilization of mangrove bark as raw material for bioplastics is expected to provide added value while supporting efforts to reduce plastic pollution. This study was carried out through several stages, including phytochemical screening, lignocellulose content analysis, and testing of the physical, chemical, and biodegradation characteristics of bioplastics. The production process involved alkaline treatment using NaOH to increase cellulose content while reducing lignin, followed by mixing with tapioca flour as the bioplastic matrix. The analysis results showed cellulose content of 14% and lignin content of 30%. The relatively high lignin content affected the texture and homogeneity of the bioplastic, while cellulose played an important role in film matrix formation. The physical characteristics of the bioplastic were marked by a dark reddish color, an average thickness of 0.032 cm, and a slightly rough texture due to the distribution of cellulose fibers and lignin residues. Chemically, lignocellulose composition was a determining factor of quality, with cellulose supporting flexibility and lignin tending to hinder homogenization. The bioplastic also demonstrated relatively high water absorption, with weight increasing from 71% at 15 minutes to 157% at 60 minutes. This hydrophilic property reduced physical resistance but simultaneously accelerated biodegradation. Biodegradation testing using EM4 solution showed a weight reduction of 27% on day 7 and increased to 34% on day 14. In addition, phytochemical screening revealed that mangrove bark tested positive for tannins and flavonoids. These secondary metabolites contributed to the dark reddish color, strengthened intermolecular bonding, and provided antioxidant activity that enhanced the functional value of the bioplastic. In conclusion, mangrove bark *Rhizophora mucronata* has great potential as a sustainable bioplastic material. This research provides a scientific basis for further applied studies while supporting innovation in the development of bioplastics based on local resources to help reduce plastic pollution.

Keywords: Biodegradation, Bioplastic, Cellulose, Mangrove Bark, Lignin, *Rhizophora mucronata*, Phytochemical Screening.