

RINGKASAN

SALSABILA PUTRI. Degradasi Mikroplastik LDPE (*Low-Density Polythelene*) oleh Bakteri Dari Sedimen Mangrove. Dibimbing oleh AGUNG DHAMAR SYAKTI dan YUSTIAN ROVI ALFIANSAH.

Penelitian ini bertujuan mengetahui potensi biodegradasi LDPE oleh bakteri yang diisolasi dari sedimen mangrove di wilayah Dompok dan Pengudang. Metode yang digunakan meliputi *pretreatment* LDPE menggunakan penyinaran UV selama 24 jam untuk meningkatkan reaktivitas permukaan, kemudian plastik diinokulasikan ke dalam media *Minimum Salt Medium* (MSM) yang mengandung isolat bakteri hasil kultur dari Laboratorium BRIN dan diinkubasi selama 30 hari. Evaluasi dilakukan melalui pengukuran penurunan berat LDPE sebagai indikator degradasi serta analisis perubahan gugus fungsi menggunakan spektroskopi *Fourier Transform Infrared* (FTIR). Hasil menunjukkan bahwa beberapa isolat menunjukkan efisiensi biodegradasi tinggi, dengan isolat P.3-K mencapai tingkat degradasi tertinggi sebesar 91,6%, diikuti D.2-F dan D.4-L masing-masing sebesar 67,0% dan 65,9%. Analisis FTIR menunjukkan perubahan signifikan struktur kimia LDPE setelah proses biodegradasi, ditandai dengan munculnya pita O-H serta penurunan intensitas pita C=O, yang mengindikasikan adanya proses oksidatif dan pembentukan senyawa baru. Uji statistik ANOVA digunakan untuk mengetahui apakah adanya perubahan dalam proses biodegradasi oleh bakteri yang diisolasi dari sedimen mangrove. Hasil penelitian menunjukkan bahwa tingkat degradasi mencapai 91,6%. Temuan ini membuktikan bahwa bakteri yang berasal dari lingkungan sedimen mangrove memiliki potensi besar dalam mendegradasi plastik LDPE terutama dalam kondisi minim nutrisi. Penelitian ini diharapkan memberikan kontribusi terhadap strategi pengurangan limbah plastik melalui pendekatan biodegradasi alami dan menjadi dasar bagi penelitian lanjutan mengenai efektivitas serta mekanisme kerja mikroorganisme dalam mengatasi pencemaran plastik di lingkungan perairan.

Kata kunci: Biodegradasi , Plastik, *Low-Density Polyethylene* (LDPE)

SUMMARY

SALSABILA PUTRI. Degradation of LDPE (Low-Density Polythelene) Microplastics by Bacteria from Mangrove Sediments. Supervised by AGUNG DHAMAR SYAKTI and YUSTIAN ROVI ALFIANSAH.

This study aims to determine the biodegradation potential of LDPE by bacteria isolated from mangrove sediments in the Dompok and Pengudang areas. The methods used include pretreating LDPE with UV irradiation for 24 hours to increase surface reactivity, then inoculating the plastic into Minimum Salt Medium (MSM) containing bacterial isolates from the BRIN Laboratory and incubated for 30 days. Evaluation was conducted through measurement of LDPE weight loss as an indicator of degradation, as well as analysis of functional group changes using *Fourier Transform Infrared* (FTIR) spectroscopy. The results showed that some isolates exhibited high biodegradation efficiency, with isolate P.3-K achieving the highest degradation rate of 91.6%, followed by D.2-F and D.4-L at 67.0% and 65.9%, respectively. FTIR analysis revealed significant changes in the chemical structure of LDPE after the biodegradation process, marked by the appearance of O-H bands and a decrease in the intensity of C=O bands, indicating the presence of oxidative processes and the formation of new compounds. ANOVA statistical tests were used to determine whether there were changes in the biodegradation process by bacteria isolated from mangrove sediments. The results showed that the degradation rate reached 91.6%. This finding demonstrates that bacteria originating from mangrove sediment environments have great potential in degrading LDPE plastic, especially under low nutrient conditions. This study is expected to contribute to strategies for reducing plastic waste through natural biodegradation approaches and serve as a foundation for further research on the effectiveness and mechanisms of microorganisms in addressing plastic pollution in aquatic environments.

Keywords: Biodegradation, Plastic, Low-Density Polyethylene (LDPE)