

## ABSTRAK

Andini Kuswoyo Putri. 24020121120046. **Isolasi dan Identifikasi Bakteri Potensial Pendegradasi Polietilena dari Perairan Batang secara Morfologi dan Molekuler dengan Marka 16S rRNA.** Di bawah bimbingan Hermin Pancasakti Kusumaningrum dan Arifa Rizqi Nafisa.

Plastik merupakan polimer sintesis berbahan dasar hidrokarbon yang memiliki sifat sulit terdegradasi di lingkungan. Plastik di ekosistem perairan akan terfragmentasi menjadi mikroplastik yang berbahaya bagi biota perairan. Degradasi dengan agen mikroba menjadi studi yang perlu ditingkatkan untuk mengatasi pencemaran plastik. Penelitian ini bertujuan untuk menguji kemampuan bakteri yang diisolasi dari Perairan Batang dalam mendegradasi polietilena serta mengidentifikasinya secara morfologi dan molekuler. Metode isolasi dilakukan dengan mengkulturkan sampel air pada media selektif BHA yang ditambahkan PEG 2%. Uji degradasi polietilena dilakukan dengan menginokulasikan isolat bakteri pada media BHB yang ditambahkan PE. Identifikasi secara morfologi dilakukan dengan pengamatan morfologi koloni dan pewarnaan Gram. Identifikasi molekuler dilakukan dengan gen penanda 16S rRNA. Berdasarkan hasil penelitian diperoleh lima isolat bakteri yang berpotensi mendegradasi PE. Isolat AL.3 menunjukkan kemampuan degradasi tertinggi dengan penurunan berat PE sebesar 2.5371% selama 18 hari inkubasi, laju degradasi 0.0014 g/hari, dan waktu paruh selama 499 hari. Hasil identifikasi menunjukkan bahwa isolat AL.3 termasuk dalam genus *Bacillus* dan berkerabat dekat dengan *Bacillus pumilus* strain GI-19, dengan morfologi sel berbentuk batang, Gram positif, morfologi koloni berbentuk bulat, berwarna putih susu, tepi bergelombang, dan elevasi cembung.

*Kata kunci: biodegradasi, polietilena, perairan Batang, 16S rRNA*

## ABSTRACT

Andini Kuswoyo Putri. 24020121120046. **Isolation and Identification of Potential Polyethylene Degrading Bacteria from Batang Aquatic on Morphological and Molecular Using the 16S rRNA Marker.** Supervised by Hermin Pancasakti Kusumaningrum and Arifa Rizqi Nafisa.

Plastics are synthetic polymer made up of hydrocarbon that has durability against degradation in nature. Plastics in aquatic ecosystem would be fragmented become microplastics which hazardous for the aquatic organisms. Degradation utilise bacteria become a crucial study to investigate in order to overcome plastics pollution. This study aims to examine the ability of bacteria isolated from Batang aquatic environment to degrade polyethylene as well as to identify the bacteria morphologically and molecularly. Isolation method was done by culturing the water samples into BHA selective medium which was added by PEG 2%. Degradation test was conducted by inoculating bacteria isolates into BHB medium which was added by PE. Bacteria morphology identification was carried out by observing the colony morphology and through Gram staining. Molecular identification was performed with 16S rRNA gene as a marker. According to the research results, five bacterial isolates demonstrated potential capability to degrade PE. Among them, AL.3 isolate exhibited the highest degradation activity, as evidenced by a 2.5371% reduction in PE weight within 18 days incubation, reduction rate 0.0014 g/day, and half life in 499 days. Identification analysis revealed that AL.3 isolate belongs to the *Bacillus* genus and closely related to *Bacillus pumilus* strain GI-19. Morphologically, it is a rod-shaped bacterium, Gram positive, characterized by circular colony, milky white colour, wavy edges, and convex elevation.

*Keywords: biodegradation, polyethylene, Batang aquatic, 16S rRNA*