

## INTISARI

### BIODEGRADASI MINYAK NABATI OLEH BIOFILM *PSEUDOMONAS AERUGINOSA* DI PERMUKAAN HIFA *EUPENICILLIUM JAVANICUM* YANG DITUMBUHKAN PADA MATRIKS PADAT

Hanifah Lutfia Nurisnaini

11/318015/PN/12344

Proses biodegradasi melibatkan aktivitas mikroorganisme untuk mendegradasi kontaminan limbah minyak nabati dari lingkungan. Pembentukan *Fungal Bacterial Biofilm* (FBB) oleh bakteri *Pseudomonas aeruginosa* dan jamur *Eupenicillium javanicum* mampu meningkatkan sinergitas bakteri dan jamur untuk mendegradasi minyak nabati. FBB mampu ditingkatkan kestabilannya dengan menumbuhkan hifa sebagai tempat pelekatan biofilm bakteri pada matriks padat. Penelitian ini bertujuan untuk membentuk FBB pada matriks padat yang mampu meningkatkan degradasi minyak nabati.

Penelitian ini menggunakan isolat bakteri *Pseudomonas aeruginosa* dan jamur *Eupenicillium javanicum*. Hifa ditumbuhkan pada matriks padat vermikulit, zeolit, dan pasir pantai. Karakteristik fisika dan kimia matriks diketahui melalui analisis kapasitas lapang, kadar lengas, berat volume, pH, daya hantar listrik, dan kapasitas pertukaran kation. Waktu stabilitas agregasi hifa pada matriks padat diketahui melalui pengukuran bobot kering biomasa jamur. Biofilm bakteri yang terbentuk pada permukaan hifa yang tumbuh di matriks padat dikonfirmasi secara mikroskopis dan diuji pengaruhnya terhadap kondisi fisik matriks melalui uji penetrasi dengan penetrometer sebelum digunakan untuk mendegradasi limbah minyak nabati. Sisa minyak dianalisis dengan metode ekstraksi labu kock dan soxhlet.

Berdasarkan hasil percobaan, diketahui FBB berpengaruh terhadap kondisi fisik matriks dan mampu meningkatkan kemampuan degradasi limbah minyak nabati hingga 80%. FBB yang terbentuk pada vermikulit memiliki jumlah bobot kering biomasa jamur ( $5,22 \pm 0,81$ g) dan kemampuan degradasi minyak nabati (84,71%) yang paling tinggi dibanding pasir pantai dan zeolit.

Kata kunci : Biodegradasi minyak nabati, *Fungal Bacterial Biofilm*, dan matriks padat

## ABSTRACT

### BIODEGRADATION OF VEGETABLE OIL BY BACTERIA BIOFILM *PSEUDOMONAS AERUGINOSA* ON HYPHAE SURFACE *EUPENICILLIM* *JAVANICUM* WHICH GROWN ON SOLID MATRIX

Hanifah Lutfia Nurisnaini  
11/318015/PN/12344

Biodegradation process involves activity of organisms to degrade contaminants like vegetable oil waste from the environment. Formation Fungal Bacterial Biofilms (FBB) by bacteria *Pseudomonas aeruginosa* and fungi *Eupenicillium javanicum* can increase synergy of bacteria and fungi to degrade vegetable oil. Stability of FBB can be improved by growing hyphae as a place of attachment on solid matrix. This study aims to form FBB on solid matrix which can enhance degradation of vegetable oil.

Hyphae were grown on solid matrix (vermiculite, zeolite, and a sand beach). Characteristics of physical and chemical matrix were analyzed such as water holding capacity, bulk density, field of capacity, pH, electrical conductivity, and cation exchange capacity. Time stability aggregation of hyphae on the matrix were measured by biomass of fungal dry weight. Bacterial biofilms that form on the surface of hyphae which grown on the solid matrix were confirmed microscopically and were tested their effects on the physical condition of the matrix through penetration testing with a penetrometer before being used to degrade the vegetable oil. The remaining oil was analyzed by the extraction method of shake flask and soxhlet.

Based on the experimental results, FBB affected physical condition of the matrix and enhanced presentase of degradation vegetable oil till 80%. FBB which were form on vermiculite had a higher number for biomass of fungal ( $5,22 \pm 0,81$ g) and ability to degrade of vegetable oils (84,71%) than sand and zeolite. Form of FBB had higher ability to degrade of vegetable oil than single fungus or bacteria.

Keywords : Biodegradation of vegetable oil, *Fungal Bacterial Biofilm*, and solid matrix