

Muhammad Iqbal Filayani, 2015, Eksplorasi Bakteri Indigenus *Oil Sludge* Kalimantan Timur dan Kemampuannya dalam Mendegradasi Plastik Jenis Polietilen, TESIS ini di bawah bimbingan Dr. Ni'matuzahroh dan Dr.rer.nat. Ganden S., M.Sc., Departemen Biologi, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

ABSTRAK

Penelitian mengenai eksplorasi bakteri indigenus *oil sludge* Kalimantan Timur dilakukan untuk mendapatkan isolat bakteri indigenus yang memiliki kemampuan untuk mendegradasi plastik jenis polietilen. Isolasi dilakukan dengan teknik kultur, skrining dilakukan dengan melihat kelimpahan bakteri dengan metode *pour plate* dan selisih berat dari substrat polietilen, dan uji biodegradasi bersifat eksperimental laboratoris yang menggunakan rancangan acak lengkap dengan variasi substrat polietilen dengan dan tanpa perlakuan fisik dan waktu inkubasi. Hasil isolasi didapatkan empat isolat dengan kode isolat PES231b, PES142b, PES241b, PES244b. Hasil skrining didapatkan isolat dengan nilai log TPC (CFU/mL) dan persentase degradasi polietilen tertinggi dengan kode isolat PES142b. Isolat terbaik dari tahap skrining dijadikan isolat untuk uji biodegradasi. Substrat polietilen diperlakukan fisik yaitu disinari dengan sinar UV dan pemanasan menggunakan oven. Karakteristik perubahan substrat polietilen sebelum dan sesudah biodegradasi dianalisis menggunakan FT-IR dan SEM. Persentase degradasi dideteksi dengan gravimetri, Data TPC (*Total Plate Count*) yang diperoleh dianalisis menggunakan *Brown-Forsythe* dan dilanjutkan dengan uji *Games-howell* ($p=0,05$). Sedangkan persentase degradasi dianalisis menggunakan *Kruskall-Wallis* dan uji lanjutan *Mann-Whitney* ($p=0,05$). Hasil penelitian menunjukkan bahwa perlakuan fisik polietilen serta waktu inkubasi berpengaruh terhadap TPC (*Total Plate Count*) dan persentase degradasi. Nilai log TPC CFU/mL isolat bakteri pada uji biodegradasi mencapai 7,74 CFU/mL pada 15 hari waktu inkubasi dan persentase degradasi sebesar 4,25 % pada 25 hari waktu inkubasi. Hasil analisis FT-IR menunjukkan adanya penambahan atau pengurangan gugus fungsi karbonil sedangkan analisis SEM menunjukkan adanya *cracking* pada substrat polietilen setelah biodegradasi. Nama spesies isolat bakteri terpilih dengan kode PES142b yang mempunyai potensi dalam mendegradasi polietilen yaitu *Moraxella* sp.

Kata kunci: Polietilen, bakteri indigenus, *oil sludge*, perlakuan fisik, waktu inkubasi, *total plate count* (TPC), persentase degradasi, *Moraxella* sp.

Muhammad Iqbal Filayani, 2015, Exploration of Indigenous Bacteria from Oil Sludge in East Kalimantan and Their ability to Degraded Polyethylene Plastic, This Thesis was under the guidance of Dr. Ni'matuzahroh and Dr.rer.nat. Ganden S., M.Sc., Department of Biology, Faculty of Science and Technology, University of Airlangga, Surabaya.

ABSTRACT

Research on the exploration of East Kalimantan oil sludge indigenous bacteria was done in order to get polyethylene-degrading bacterial. Isolation was done with culture techniques method, screening was done by looking at the abundance of bacteria by pour plate method and the difference weight of the polyethylene substrate, and an experimental laboratory biodegradation test was carried out b using a completely randomized design with a variation polyethylene substrate with and without physical treatment and incubation time. Isolation results obtained four isolates with isolates code: PES231b, PES142b, PES241b, PES244b. Screening results obtained isolates with value of TPC log (CFU/mL) and the highest percentage of polyethylene degradation was PES142b isolates code. Best isolates from screening was used as isolate for biodegradation test. Polyethylene susbtrat was treated physicaly by irradiation with UV light and heating using an oven. Characteristic changes in the polyethylene substrate before and after biodegradation was analyzed using FT-IR and SEM. The percentage of degradation was detected by using gravimetry. TPC (Total Plate Count) were analyzed using the Brown-Forsythe and continued to Games-howell test ($p = 0.05$). While the percentage of degradation were analyzed using Kruskal-Wallis and Mann-Whitney's advanced test ($p = 0.05$). The results showed that the physical treatment of polyethylene and incubation time influence the TPC (Total Plate Count) and the percentage of degradation. Value TPC log (CFU/mL) bacteria in biodegradation test reached 7.74 CFU/mL at 15 days of incubation time and the percentage of degradation of 4.25% on 25 days incubation time. FT-IR analysis results indicate the addition or reduction of carbonyl functional group while the SEM analysis showed cracking in polyethylene substrate after biodegradation. The species name of chosen bacterial isolates with PES142b code that has the potential to degrade polyethylene was *Moraxella* sp.

Keywords: Polyethylene, indigenous bacteria, oil sludge, physical treatment, the time of incubation, total plate count (TPC), the percentage of degradation, *Moraxella* sp.