

**Dita Artanti, 2015. Bioremediasi Limbah Lumpur Minyak Bumi (*Oil Sludge*) dengan Penambahan Jenis Konsorsium Bakteri dan Waktu Inkubasi Menggunakan Metode *Composting*. Tesis ini di bawah bimbingan Dr. Ni'matuzahroh dan Prof. Dr. Ir. Tini Surtiningsih, DEA. Departemen Biologi, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.**

---

### ABSTRAK

Penelitian ini bertujuan untuk mengetahui pengaruh penambahan jenis konsorsium bakteri, waktu inkubasi, interaksi antara jenis konsorsium bakteri dan waktu inkubasi terhadap jumlah bakteri (CFU/g-tanah), kadar residu minyak (*oil sludge*) (g/g-tanah), persentase degradasi *oil sludge* pada perlakuan terbaik, rasio C/N pada minggu ke-6, dan komponen hidrokarbon yang dapat terdegradasi pada perlakuan terbaik di minggu ke-6. Penelitian ini bersifat eksperimental laboratoris menggunakan rancangan acak lengkap pola faktorial 8x4 dengan dua kali ulangan. Jenis konsorsium bakteri adalah 4 bakteri hidrokarbonoklastik, 4 bakteri penghasil biosurfaktan dan 2 bakteri *indigenous oil sludge* yang diperoleh dari penelitian sebelumnya dengan konsentrasi 5% (v/b). Lumpur minyak bumi (*oil sludge*) yang digunakan sebanyak 10% (g/g). Penelitian dilakukan selama 6 minggu. Data logaritma *Total Plate Count* bakteri (CFU/g-tanah), hasil gravimetri kadar residu lumpur minyak (*oil sludge*) (g/g-tanah) serta persentase degradasi dianalisis secara deskriptif dan statistik. Analisis yang digunakan adalah *Brown-Forsythe* yang dilanjutkan dengan uji *Games-Howell* ( $p=0,05$ ). Hasil penelitian menunjukkan ada pengaruh jenis konsorsium bakteri, waktu inkubasi dan interaksi antara jenis konsorsium bakteri dan waktu inkubasi terhadap peningkatan jumlah bakteri (CFU/g-tanah) dan penurunan residu minyak (*oil sludge*) (g/g-tanah). Persentase degradasi pada perlakuan terbaik yaitu perlakuan jenis konsorsium bakteri penghasil biosurfaktan (B) sebesar 77,8% setelah 6 minggu inkubasi. Rasio C/N di akhir masa inkubasi 6 minggu berkisar antara 70,5 – 102,1. Komponen hidrokarbon yang dapat terdegradasi pada perlakuan terbaik yaitu jenis konsorsium bakteri penghasil biosurfaktan (B) adalah alifatik dan poliaromatik (*Naphthalene, 2,3,6-trimethyl, Naphthalene, 1,4,6-trimethyl dan Naphthalene, 1,6,7-trimethyl*).

Kata kunci : Lumpur minyak bumi (*oil sludge*), jenis konsorsium bakteri, waktu inkubasi, *composting*, gravimetri

**Dita Artanti, 2015. Bioremediation of Oil Sludge with Addition of Bacterial Consortium type and Incubation Time Using Composting Methods. This Thesis under supervised by Dr. Ni'matuzahroh and Prof. Dr. Ir. Tini Surtiningsih, DEA. Department of Biology, Faculty of Science and Technology, University of Airlangga, Surabaya.**

---

### ABSTRACT

This research aimed to know the influence of the addition of the type of bacterial consortium, incubation time, the interaction between the types of bacterial consortium and incubation time on the number of bacteria (CFU/g-soil) and levels of residual oil sludge (g/g-soil), the percentage of degradation of oil sludge on the best treatment, the ratio C/N in sixth week, and hydrocarbon components that can be degraded at the best treatment in the sixth week. This research is experimental laboratory using completely randomized factorial design 8x4 with two replicates. Types of bacterial consortium were hydrocarbonoclastic bacteria, biosurfactant-producing bacteria and indigenous bacteria oil sludge obtained from previous studies with 5% concentration (v/w). Oil sludge used 10% (g/g). Research was carried out for six weeks. Logarithmic Total Plate Count bacteria (CFU/g-soil), the result of levels residual oil gravimetry (g/g-soil) as well as the percentage degradation was analyzed in a descriptively and statistically. The analysis used was the Brown-Forsythe test followed by Games-Howell ( $p= 0,05$ ). The results showed there was influence of the type of bacterial consortium, incubation time and interaction between the types of bacterial consortium and incubation time for the number of bacteria (CFU/g-soil) and the levels of residual oil (oil sludge) (g/g-soil). The percentage degradation at the best treatment that was the kind of treatment the consortium biosurfactant-producing bacteria (B) of 77,8% after 6 weeks of incubation. The ratio C/N at the end of the incubation period of 6 weeks ranged from 70.5-102,1. The hydrocarbon component that can be degraded at the best treatment that was kind of the consortium biosurfactant-producing bacteria (B) was an aliphatic and polyaromatic (Naphthalene, 2, 3, 4-trimethyl, Naphthalene, 1, 4, 5-trimethyl and Naphthalene, 1, 6, 7-

Key words: Oil sludge, a type of bacterial consortium, incubation time, composting, gravimetry