Bioremediasi lahan tercemar hidrokarbon minyak bumi menggunakan konsorsium bakteri lokal = Bioremediation of petroleum hydrocarbons contaminated soil using local bacterial consortium

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Abstrak

Konsorsium bakteri lokal (gabungan Salipiger bermudensis DQ 178660, Alterierythrobacter evoxidivorans DQ 304436, Alteromonas macleodii Y 18228 dan Vibrio harveyi DQ 146936) pendegradasi senyawa hidrokarbon kontaminan yang diisolasi dari kawasan eksplorasi minyak Cepu Jawa Tengah diuji kemampuannya dalam merombak senyawa hidrokarbon minyak bumi yang mencemari tanah di kawasan industri Krakatau Steel Cilegon.
Dalam penelitian ini, karakterisasi produksi biosurfaktan yang dihasilkan konsorsium bakteri dilakukan dengan mengevaluasi pola pertumbuhan, analisis tegangan permukaan, analisis tegangan antarmuka, analisis komposisi kimia dan uji aktivitas emulsifikasi. Pengujian selama 30 hari pengamatan meliputi pH, suhu, tekstur tanah empat fraksi (berpasir, liat kasar, liat halus, berdebu), karbon organik, nitrogen organik, rasio karbon/nitrogen organik, fosfor dan kalium serta analisis sampel tanah tercemar hidrokarbon menggunakan Gas Chromatography-Mass Sphectroscopy (GC-MS).
Hasil penelitian menunjukkan bahwa biosurfaktan yang dihasilkan konsorsium bakteri memiliki kemampuan menurunkan tegangan permukaan air lebih tinggi dibanding dengan bakteri tunggal (51 dynes/cm dari 72 dyns/cm), reduksi nilai tegangan antarmuka air dengan minyak paling tinggi dihasilkan konsorsium bakteri (10 dynes/cm), nilai indeks emulsifikasi (93,75%) paling tinggi dihasilkan oleh konsorsium bakteri. Analisis komposisi kimia biosurfaktan yang dihasilkan konsorsium bakteri menunjukkan bahwa biosurfaktan merupakan senyawa kompleks terdiri dari karbohidrat, protein dan lipid. Setelah 30 hari massa inkubasi, hasil analisis GC-MS menunjukkan bahwa bakteri dan konsorsium bakteri mampu merombak senyawa hidrokarbon tersisa yang mencemari tanah di kawasan PT Krakatau Steel Cilegon Banten.;
<hr><i>Local bacterial consortium (combined of Salipiger bermudensis DQ 178 660, Alterierythrobacter evoxidivorans DQ 304 436, Alteromonas macleodii Y 146 936 and Vibrio harveyi DQ 18228) hydrocarbons degrading contaminants that isolated from oil exploration areas in Cepu Central Java was analyzed for its ability to degrade petroleum hydrocarbons that polluted the soil in industrial area of PT. Krakatau Steel Cilegon.
In this study, characterization of biosurfactant produced by bacterial consortium conducted to evaluate growth patterns, analysis of surface tension, interfacial tension, chemical composition and emulsification activity assay. Analysis for 30 days of observation include pH, temperature, soil texture four fractions (sandy, dusty, rough clayey, smooth clayey), organic carbon, organic nitrogen, the ratio of carbon/nitrogen organic, phosphorus and potassium as well as analysis of hydrocarbon contaminated soil samples using Gas Chromatography -Mass Sphectroscopy (GC-MS).
The results showed that the biosurfactants produced by bacterial consortium have the ability to lower the surface tension of water is higher than with a single bacterium (51 dynes/cm from 72 dyns/cm), the reduction of the highest values of water interfacial tension with oil produced by bacterial consortium (10

dynes/cm), the highest value of emulsification index (93.75%) produced by bacterial consortium. Analysis of the chemical composition of biosurfactants produced by bacterial consortium showed that biosurfactants are complex compounds composed of carbohydrates, proteins and lipids. After 30 days of incubation time, the results of GC-MS analysis showed that bacteria and bacterial consortium are capable of overhauling the remaining hydrocarbon compounds that polluted the soil in the area of PT Krakatau Steel Cilegon Banten.</i>