BIOREMEDIASI TANAH TERCEMAR LIMBAH MINYAK BUMI DARI CEPU JAWA TENGAH SECARA *EX-SITU* MENGGUNAKAN METODE *COMPOSTING*

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ABSTRAK

Kegiatan eksploitasi dan eksplorasi minyak bumi yang semakin tinggi menghasilkan residu yang mencemari lingkungan. Salah satu upaya pemulihan tanah terkontaminasi minyak bumi dapat dilakukan dengan pengolahan biologis yaitu bioremediasi secara *ex-situ* menggunakan metode *composting*. Penelitian ini bertujuan untuk mengetahui pengaruh kadar kontaminan terhadap aktivitas mikroba pada perombakan *Total Petroleum Hidrokarbon* (TPH), penambahan pupuk kandang sapi dan pupuk kompos daun bambu terhadap perombakan TPH, dan interaksi antara kadar kontaminan dengan penambahan jenis pupuk terhadap perombakan TPH. Penelitian dilakukan menggunakan rancangan penelitian Rancangan Acak Lengkap (RAL) dua faktor. Faktor pertama kadar minyak bumi atau kontaminan pada konsentrasi TPH 0%; 4,3%, dan 9%. Faktor kedua jenis bahan organik yaitu pupuk kandang sapi dan pupuk kompos daun bambu. Penelitian dilakukan menggunakan wadah yang diisi dengan 1 kg bahan dengan waktu inkubasi selama 30 hari. Parameter yang diamati berupa TPH, pH, C/N Rasio, kadar C-Organik, kadar N-Total, dan evolusi CO_2. Data dianalisis menggunakan *Analysis of Variance* (ANOVA) dan untuk mengetahui beda nyata antara perlakuan digunakan *Duncant Multiple Range Test* (DMRT) pada taraf 5%. Hasil penelitian menunjukkan bahwa kadar kontaminan berpengaruh nyata terhadap aktivitas mikroba pada perombakan TPH. Kadar kontaminan 9% menunjukkan aktivitas mikroba yang tinggi dengan hasil evolusi CO_2 sebesar 31,33 mg/25 g/3 hari. Penambahan pupuk kandang sapi dan pupuk kompos daun berpengaruh nyata terhadap perombakan TPH, pupuk kandang sapi menunjukkan hasil perombakan yang lebih baik. Terjadi interaksi antara kadar kontaminan dengan penambahan jenis pupuk terhadap perombakan TPH. Perlakuan tanah tercemar 9% dan pupuk kandang sapi (C2P1) memberikan hasil terbaik dengan persentase penurunan TPH 71,78 % dengan kadar awal TPH sebesar 9% menjadi 2,5%.

Kata kunci: tanah tercemar minyak bumi, bioremediasi, *composting*, *Total Petroleum Hidrokarbon* (TPH)

BIOREMEDIATION OF SOIL CONTAMINATED OIL WASTE FROM CEPU CENTRAL JAVA WITH EX-SITU USING COMPOSTING METHOD

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ABSTRACT

Increasinly exploitation and exploration activities of petroleum can produce residues which pollute the environment. One of the efforts to restore oil-contaminated soil can be conducted by biological treatment that is ex-situ bioremediation using the composting method. The aim of this study was to determine the effect of contaminant levels on microbial activity in to decrease the Total Petroleum Hydrocarbons (TPH), addition of cow manure and bamboo leaf compost to decrease the TPH, and the interaction between contaminant levels and the addition of fertilizer types to decrease the TPH. Furthermore, the study was conducted by using a two-factor Completely Randomized Design (CRD) research design. The first factor was the level of petroleum or contaminants at a TPH concentration of 0%; 4.3%, and 9%. Meanwhile, the second factor was the type of organic matter that were cow manure and bamboo leaf compost. The study was conducted by using a container filled with 1 kg of material with 30 days of incubation time. Parameters observed were TPH, pH, C-Organic, N-Total, C/N Ratio and CO_2 evolution. Data were analyzed by using analysis of variance (ANOVA) while in order to determine the significant difference between treatments, Duncant Multiple Range Test (DMRT) was used at the 5% level. The results showed that the level of contaminants had a significant effect on microbial activity in the decomposition of TPH. Contaminant levels of 9% showed high microbial activity with CO_2 evolution of 31.33 mg/25 g/3 days. The addition of cow manure and leaf compost had a significant effect on the decomposition of TPH, cow manure shows better results. There was interaction between the levels of contaminants and the addition of fertilizers to the TPH decomposition. Combination treatment between 9% contaminated soil and cow manure (C2P1) had the best results with a decrease in TPH percentage of 71.78% with an initial TPH content of 9% to 2.5%.

Keywords: petroleum contaminated soil, bioremediation, composting, Total Petroleum Hydrocarbons (TPH)