

FITOREMEDIASI TANAH TERCEMAR LIMBAH LUMPUR PENGEBORAN MINYAK BUMI DENGAN AKAR WANGI (*Chrysopogon zizanioides* L.)

Hendy Dwi Warmiko

11/315993/BI/08695

INTISARI

Limbah lumpur pengeboran minyak bumi adalah salah satu sumber kontaminasi lingkungan yang berbahaya bagi tumbuhan, hewan, dan manusia. Fitoremediasi merupakan suatu metode alternatif untuk meremediasi media yang tercemar limbah. Tumbuhan akar wangi (*Chrysopogon zizanioides* L.) telah diketahui memiliki kemampuan untuk meremediasi tanah yang tercemar. Penelitian ini bertujuan untuk mempelajari kemampuan tumbuhan akar wangi dalam meremediasi tanah tercemar limbah lumpur pengeboran minyak bumi serta mempelajari efek limbah tersebut pada pertumbuhan, morfologi, dan anatomi tumbuhan akar wangi. Penelitian ini dilakukan dengan menggunakan Rancangan Acak Lengkap (RAL) pola faktorial dengan variabel konsentrasi limbah dan penggunaan tanaman. Konsentrasi limbah lumpur pengeboran minyak bumi yang digunakan adalah 0, 25, 50, 75, dan 100% dengan tiga ulangan. Parameter yang diukur meliputi: kadar Cd dan Pb pada medium limbah, kadar Cd dan Pb pada tanaman, berat kering akar, berat kering tajuk, berat kering total, nisbah akar-tajuk, panjang akar, panjang tajuk, panjang tanaman, anatomi akar, pH tanah, temperatur tanah. Data yang diperoleh dianalisis secara statistik dengan Analisis Varian (ANOVA) dan uji lanjut dengan DMRT dan LSD dengan taraf signifikansi ($p \leq 0,05$). Anatomi akar yang telah diperoleh, dianalisis secara deskriptif. Hasil penelitian menunjukkan tanaman akar wangi mampu mengakumulasi Cd dan Pb serta dapat menurunkan konsentrasi Cd dan Pb pada medium limbah. Perlakuan limbah menurunkan panjang tanaman secara signifikan, tetapi tidak berpengaruh pada berat kering akar dan tajuk tanaman. Konsentrasi limbah lumpur pengeboran minyak bumi 25, 50, 75, dan 100% menyebabkan perubahan struktur anatomi akar tanaman akar wangi berupa penurunan diameter akar, tebal korteks, diameter stele, dan kenaikan diameter trakea.

Kata kunci : fitoremediasi, *Chrysopogon zizanioides*, limbah lumpur pengeboran minyak bumi

PHYTOREMEDIATION OF PETROLEUM DRILLING MUD WASTE-CONTAMINATED SOIL USING VETIVER GRASS (*Chrysopogon zizanioides* L.)

Hendy Dwi Warmiko
11/315993/BI/08695

ABSTRACT

Petroleum drilling mud waste is one of the most important sources of contamination in the environment. It is harmful to plants, animals, and humans. Phytoremediation is an alternative method to remediate waste-contaminated media. Vetiver grass (*Chrysopogon zizanioides* L.) has been known to have the ability to remediate waste-contaminated soil. The aims of this research were to find out the capability of vetiver grass in remediation of petroleum drilling mud waste contaminated soil and to study the effects of exposure of that waste with various concentrations on the growth, morphology and anatomy of vetiver grass. This research used complete random design (CRD) factorial design with concentration of the waste and plant use as variables. The concentration of petroleum waste drilling mud used were 0, 25, 50, 75, and 100% with three replications. Parameters measured include: the concentration of Cd and Pb in waste medium, the concentration of Cd and Pb in plants, root dry weight, shoot dry weight, total dry weight, root-shoot ratio, the length of the root, the length of the shoot, the length of the plant, root anatomy, soil pH, and soil temperature. The data were analyzed statistically by analysis of variance (ANOVA) and was further tested with DMRT and LSD with a significance level ($p \leq 0.05$). The root anatomy was analyzed using descriptive analysis. The results showed that vetiver grass was able to accumulate Cd and Pb, and the concentration of Cd and Pb in the waste medium was decreased. The plant length was significantly decreased when the petroleum drilling mud waste was increased, but has no significant difference to the dry weight of the roots and shoots of the plant. The high concentration of petroleum drilling mud waste 25, 50, 75, and 100% caused structural changes in the root anatomy of vetiver grass. Root diameter, cortical thickness, and stele diameter were decreased, in contrast, tracheal diameter was increased.

Keywords : phytoremediation, *Chrysopogon zizanioides*, petroleum drilling mud waste