

ANALISIS EFEKTIVITAS TANAMAN ECENG GONDOK (*Eichhornia Crassipes*) DALAM MENURUNKAN KADAR COD, BOD, DAN TSS PADA AIR LINDI TPA SAMPAH TROKETON, PEDAN, KLATEN JAWA TENGAH

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ABSTRAK

Tempat Pemrosesan Akhir (TPA) menjadi isu penting dalam pengelolaan limbah padat karena tingginya kadar polutan organik dan anorganik yang berpotensi mencemari lingkungan. Berdasarkan hasil pemeriksaan laboratorium, air lindi di TPA Troketon, Kabupaten Klaten memiliki kadar *Chemical Oxygen Demand* (COD) sebesar 8.000 mg/L, *Biological Oxygen Demand* (BOD) sebesar 1.640 mg/L, dan *Total Suspended Solids* (TSS) sebesar 340 mg/L, yang seluruhnya melebihi baku mutu sesuai Permen LHK No. 59 Tahun 2016. Berdasarkan latar belakang tersebut penelitian ini bertujuan untuk menganalisis perbandingan efektivitas penggunaan eceng gondok (*Eichhornia crassipes*) pada variasi massa yang berbeda terhadap penurunan kadar COD, BOD, dan TSS; menguji signifikansi pengaruh massa tanaman eceng gondok terhadap efektivitas penurunan ketiga parameter tersebut melalui analisis statistik.

Metode penelitian yang digunakan yaitu eksperimen menggunakan pendekatan fitoremediasi. Sampel air lindi diambil dari outlet Instalasi Pengolahan Air Limbah (IPAL) TPA Troketon. Tanaman eceng gondok diambil dari rowo jombor dan dimasukkan ke dalam bak aklimatisasi yang berdiameter 48cm dan tinggi 35cm kemudian sebagian air lindi ditambahkan sedikit demi sedikit selama 7 hari. Selanjutnya eceng gondok yang sudah diaklimatisasi diberi perlakuan dengan variasi massa tanaman eceng gondok sebanyak 500gr, 1000gr, dan 1500gr tanaman pada volume air yang sama sebanyak 20L. Kemudian dilakukan treatment selama 7 hari.

Hasil penelitian menunjukkan bahwa peningkatan massa tanaman eceng gondok berbanding lurus dengan efektivitas penurunan kadar polutan. Perlakuan dengan 1500gr tanaman memberikan efisiensi tertinggi, yaitu $\pm 70,3\%$ untuk COD (menjadi ± 2.376 mg/L), $\pm 68,4\%$ untuk BOD (menjadi ± 518 mg/L), dan $\pm 66,1\%$ untuk TSS (menjadi ± 115 mg/L). Berdasarkan hasil uji ANOVA, variasi massa tanaman memberikan pengaruh signifikan ($p < 0,05$) terhadap penurunan ketiga parameter tersebut, dan analisis regresi sederhana menunjukkan hubungan yang kuat antara massa tanaman dengan efektivitas penurunan polutan. Dapat disimpulkan bahwa penggunaan 1500gr tanaman eceng gondok merupakan arah pengolahan yang paling efektif dan efisien untuk menurunkan kadar COD, BOD, dan TSS pada air lindi TPA Troketon.

Kata kunci: Air Lindi, BOD, COD, Fitoremediasi, TSS

ANALYSIS OF THE EFFECTIVENESS OF WATER HYACINTH (*Eichhornia Crassipes*) IN REDUCING COD, BOD, AND TSS LEVELS IN LEACHATE FROM THE TROKETON LANDFILL, PEDAN, KLATEN, CENTRAL JAVA.

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ABSTRACT

*Final Disposal Sites (TPA) have become an important issue in solid waste management due to the high levels of organic and inorganic pollutants that can potentially contaminate the environment. Based on laboratory examination results, the leachate from Troketon TPA, Klaten Regency, has a Chemical Oxygen Demand (COD) level of 8,000 mg/L, Biological Oxygen Demand (BOD) level of 1,640 mg/L, and Total Suspended Solids (TSS) level of 340 mg/L, all of which exceed quality standards according to the Minister of Environment and Forestry Regulation No. 59 of 2016. Based on this background, this research aims to analyze the comparative effectiveness of using water hyacinth (*Eichhornia crassipes*) with different mass variations on the reduction of COD, BOD, and TSS levels; to test the significance of the effect of the number of water hyacinth plants on the Effectiveness of reducing these three parameters through statistical analysis.*

The research method used is an experiment employing a phytoremediation approach. Leachate samples were taken from the outlet of the Wastewater Treatment Installation (IPAL) of Troketon TPA. Water hyacinth plants were collected from Rowo Jombor and placed in an acclimatization tank, to which a small amount of leachate was gradually added over 7 days. Subsequently, acclimatized water hyacinth plants were treated with different mass of 500g, 1000g, and 1500g of plants in the same water volume of 20L. Treatments were conducted for 7 days.

The research results show that the increase in the number of water hyacinth plants is directly proportional to the effectiveness of pollutant reduction. The treatment using 1500g of plants yielded the highest efficiency, namely $\pm 70.3\%$ for COD (reduced to $\pm 2,376$ mg/L), $\pm 68.4\%$ for BOD (reduced to ± 518 mg/L), and $\pm 66.1\%$ for TSS (reduced to ± 115 mg/L). Based on the ANOVA test results, variations in plant mass significantly affect ($p < 0.05$) the reduction of these three parameters, and simple regression analysis shows a strong relationship between the number of plants and the effectiveness of pollutant reduction. It can be concluded that the use of 1500g of water hyacinth plants is the most effective and efficient treatment direction for reducing COD, BOD, and TSS levels in leachate at Troketon TPA.

Keywords: *Leachate, BOD, COD, Phytoremediation, TSS*