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WASTE ENGINE OIL CONTAMINATION OF SOIL AND ITS BIOREMEDIATION

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Abstract

Waste engine oil contains hydrocarbons which are potentially carcinogenic. The objective of this study was to determine if organic wastes, specifically cow dung (T_1) and poultry manure (T_2) can improve the microbial degradation of the hydrocarbons. A questionnaire survey to determine generation, management and disposal of waste engine oil was carried out. A Complete Randomized Design, with two treatments and three replications was used to set up plots at Makerere University Agricultural Research Institute Kabanyolo (Uganda). Plots were intentionally contaminated with 2 Litres (L) of waste oil and after seven days the treatments were applied at a rate of 50 tons/ha each. The control plots (T_0) were not treated. Soil samples (0–30 cm) were collected after 30 days and analyzed for pH, nitrogen, phosphorous, potassium, organic carbon, bacterial characterization and the residual total hydrocarbon content. The obtained results showed that waste engine oil was poorly managed and disposed off to the environment. There was an increase in soil pH, carbon, phosphorous, potassium and a decreased in nitrogen in the order $T_2 > T_1 > T_0$. There was no significant difference ($p \leq 0.05$) between T_1 and T_2 which recorded average bacterial count of 7.62×10^7 cfu/g and 6.51×10^7 cfu/g respectively as compared to T_0 with a count of 3.24×10^7 cfu/g. This implied that the organic wastes increased the degradation of the hydrocarbons as compared to the control. Based on the results of this study, T_1 and/or T_2 may be considered by regulatory agencies as treatment methods for waste oil pollutions.

Key words: bioremediation, microbial degradation, organic wastes, waste engine oil

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