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EXTENDED ABSTRACTS

Evaluation of Cow-Dung Effectiveness for Bioremediation in Petroleum Polluted Loamy Soil Site

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ABSTRACT

Environmental pollution perturbation problems are obvious due to man-machine interactions in a system development by the application of chemical, physical and biological sciences including social sciences resulting to formation of products for human survival To this end environmental pollution has been discovered to be a major challenge to the development of the society. One of the major environmental pollution is caused by oil spillage due to the exploration and exploitation of crude oil. The discharge of Petroleum spills into the environment is usually by the action of intentional or unintentional. The consequences resulting in the releasing, spilling, pumping, pouring, emitting, emptying and dumping of Petroleum into the waters or unto lands engineered deleterious effect to aquatic and terrestrial lives. This phenomenon is a key problem in the petroleum rich Niger Delta region of Nigeria. Various researchers have dealt into nutrient applications for bioremediation of petroleum polluted sites, Omogoye and Adewale works on the efficacy of NPK and cow dung combinations on performance influence on soil properties. These works are limited to non-petroleum polluted site although it gives a prelude to the nutrients effectiveness to curb environmental perturbation problems. The works of Benson et al. is very scarce and limited to the enhancement of crude oil polluted soil by applying single and combined cow dung and hydrogen peroxide as remediating agents. These results will show that addition of cow dung and hydrogen peroxide enhanced remediation of the polluted soil especially in treatment A and C with significant increase (P=0.05) in soil conductivity, pH and nutrients when compared to the un-amended soil. Reduction in total hydrocarbon content of A (79.48%)>C (77.95%)>B (75.75%)>D (46%) with significant increase in hydrocarbon degrading microbes in the amended soil. The amendments have the capacities to enhance remediation of crude oil polluted soil. Also, the combined treatments did not have any advantage over the single treatment options as the use of cow dung single treatment performed best in terms of its remediation potential. This study was carried out in a clay and alluvial soil environment in Port-Harcourt Ofoegbu et al. reported on bioremediation of crude oil contaminated soil using organic and inorganic fertilizers. Dimensional analysis method is exploited in the development of predictive models for the simulation of Total Hydrocarbon concentration (CTPH) dependency as a function of Petroleum quantity and associated physical property variables discharged, impacted soil properties particularly the soil conductivity and exposure time frame with nutrient (NN) and with no Nutrient (NN). The following assumptions here made to arrive at the predictive models, thus: Extent diffusion of petroleum into the soil is constant due to the adoption of manual mixing to obtain homogeneity, Temperature is considered constant as the study was carried at ambient condition, Mixing velocity is constant as the mixing was done manually, Effect of heat capacity is constant and negligible, Impacted loamy soil density is considered constant In this section, results of the experimental work are discussed in line with the research scope. Therefore, synopsis for discussion includes but not limited to the following: Total petroleum hydrocarbon concentration (CTPH) effect as a function of petroleum quantity discharged and exposure time with no cow dung nutrient (NN).

Evaluation of cow dung effectiveness for bioremediation in petroleum polluted loamy soil site is studied. The results obtained showed that cow dung nutrient is ideally effective for bioremediation of petroleum polluted site. In addition to this these models for the simulation of Total petroleum Hydrocarbon concentration is developed. The developed equation was expressed for CTPH as a function of petroleum physical properties, soil conductivity, and quantity of cow dung. The predictive models show that CTPH is independent of petroleum density for polluted site with no nutrient but density dependency with polluted site with nutrient.

Keywords: Development; Cow-dung nutrient; Effectiveness; Bioremediation; Petroleum polluted; Loamy soil; Environment

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