PERFORMANCE OF ELEPHANT GRASS AND MAIZE PLANT IN ADMIXTURE OF STABILISED/SOLIDIFIED DRILL CUTTINGS WITH LOAMY SAND SOIL

Bernard B. Dumkhana
Department of Agricultural and Envronmental Engineering/Rivers State University, **NIGERIA**
bdumkhana@gmail.com

Raymond Alex Ekemube
Department of Agricultural and Envronmental Engineering/Rivers State University
NIGERIA
raymond.ekemube@ust.edu.ng

ABSTRACT

The effectiveness of reuse granulated Stabilised/Solidified (S/S) drill-cuttings in forage production. The background value of total petroleum hydrocarbon (TPH) concentrations was 17,125 mg $kg^{-1}$with low metals concentrations. Drill cuttings were Stabilised/Solidified with varying percentages 5%, 10% and 20% of cementitious binder for 28 day before mixing with soil. There was between 60% reduction in TPH levels after S/S. Three treatment options involved elephant grass (*Pennisetum purpureum*) grown in uncontaminated soil amended S/S cement treated-drill cuttings in a ratio of 3:1. A fourth treatment options involved maize (*Zea mays L*) grown in S/S treated drill cuttings-amended soil with 20% cement dosage. Four controls involved each of the aforementioned forages grown in untreated drill cuttings and uncontaminated soil alone. Fertilizer and Spent Mushroom Substrate (SMS) were employed across all eight options. The growth performance of the forages was assessed for up to 8 - 12 weeks using plant parameters such as plant height, leaf length and leaf width. The physicochemical parameters evaluated were TPH, Metals and total Heterotrophic bacterial (THB) counts. The results showed TPH reduction of 81% - 90% at 8 and 12 weeks period. Two-way ANOVA without replication showed no significant differences ($p = 0.14$). Elephant grass heights and leaf lengths were higher in soil-amended untreated and treated with granulated S/S drill cuttings than in uncontaminated soil. Maize plant in the drill-cuttings-soil mixture with and without S/S treatment competes favourably with the uncontaminated soil. The results demonstrate that granulated S/S treatment can be reuse for sustainable plant growth.

Keywords: Cement, Drill cuttings, Elephant grass, Maize plant, Spent mushroom substrate**,** Stabilisation/Solidification.