

## **Interdependence of soil and agricultural practice in a two – year phytoremediation in situ experiment**

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A two – year plant – based soil clean – up was carried out at a crude oil spill agricultural site in a Niger Delta community in Nigeria to access further clean – up potentials of *Cymbopogon citratus*. Applied diagnostic ratios identified mixed petrogenic and pyrogenic sources as the main contributors of PAHs. Up to 90.8% sequestration was obtained for carcinogenic PAHs especially Benz (a) pyrene in a 2 – phase manner. A community level approach for assessing patterns of sole carbon source utilization by mixed microbial samples was employed to differentiate spatial and temporal changes in the soil microbial communities. In relation to pollution, soil conditioning notably decreased the lag times and showed mixed effects for colour development rates, maximum absorbance and the overall community pattern. For rate and utilization of different carbon substrates in BIOLOG wells, after day 3, in comparison to control soil communities, contamination with hydrocarbons and associated types increased amines and amides consumption. Consumption of carbohydrates in all polluted and unamended regimes decreased markedly in comparison to those cultivated with *C. citratus*. We found a direct relationship between cellulose breakdown, measurable with B-glucosidase activity, organic matter content and CO<sub>2</sub> release within all soils in the present study. Organic amendment rendered most studied contaminants unavailable for uptake in preference to inorganic fertilizer in both study years. Generally, phytoremediation improved significantly the microbial community activity and thus would promote ecosystem restoration in relation to most patronised techniques. Supplementation with required nutrients, in a long – term design would present many ecological benefits.

Keywords: Agricultural soils; Recovery; Hydrocarbon pollution; Ecology; Management practice.