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COMPOSTAJE Y BIOESTIMULACION COMO ESTRATEGIAS DE RECUPERACION DE UN SUELO CRONICAMENTE CONTAMINADO CON HIDROCARBUROS

COMPOSTING AND BIOSTIMULATION AS STRATEGIES FOR CHRONICALLY HYDROCARBON CONTAMINATED SOIL RECOVERY

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The concept of treating PAH-contaminated soil by means of co-composting with organic materials or by mixing soil with mature compost has proved to be effective in the degradation of PAHs at the laboratory and/or field-scales.
A contaminated soil was collected from a petrochemical area, near La Plata. It was characterized by a very low biological activity, probably due to the hydrocarbon content (4000ppm of aliphatic and 300ppm of PAH). The microbial populations were similar to those determined in pristine soils near of the area.
The goals of our study were to investigate the potential of composting related practices in the biological recovery of the contaminated soil.
Composting treatment (CT). A sample of soil was treated with amendment in ratio 0,7: 0,3 (w/w) and the resulting material was mixed with bulking agent. It was incubated at room temperature in reactors of 34L during 4 months. The moisture was adjusted to 45%.
Biostimulation treatment (BT). A sample of soil was mixed with compost (prepared 30 days before use) in ratio 0,7: 0,3 (w/w) and it was incubated during 1 month at 25°C. This experiment was carried out in triplicate trays. The moisture was adjusted to 45%. Control reactors (S). Contaminated soil microcosm with any additive was used as control system.
Microbial population densities. Viable heterotrophic bacterial count was performed using R2-Agar. The value for CT was higher than for S whereas the BT did not show differences with S. Fungi were enumerated on Rose Bengal Agar. For both treatments the counts were higher than for S. Phosphorus solubilising bacteria was enumerated on PIM media: the count in CT was higher than in S while BT did not show any difference. The most probable number of aromatic hydrocarbon-degrading bacteria was determined using mineral salts medium with the addition of a mix of PAHs. No differences were detected after both treatments in the hydrocarbon degrading bacteria counts.
Biological Activity. Dehydrogenase assays were performed using soluble tetrazolium salt as an artificial acceptor. Both treatments produced significant increase in the dehydrogenase activity that was higher than those determined in S, during all the incubation time.
Toxicity assays. Seed germination test using *Lactuca sativa* was performed on water extracts. Only the CT increased significantly the germination.
Hydrocarbons concentrations. The extracts were analyzed by GC-FID. No significant decrease was detected after 1 and 4 months respectively.
Molecular analysis. PCR-DGGE analysis was performed. Both treatments produced a significant diversity increase of the populations.
A successful composting treatment was evidenced by the visible changes in the matrix aspect in the CT treatment, in agreement with the higher bacterial counts, biological activity and percentage of seed germination. Although this treatment did not reduce significantly the hydrocarbon concentration, it was able to improve the soil quality in the experiment time.