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OPTIMIZING BIOREMEDIATION OF HYDROCARBON POLLUTED SOIL BY LIFE CYCLE ASSESSMENT (LCA) APPROACH

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Abstract

In the former Carbochimica site of Fidenza, a bioremediation approach was developed using the technique of biodegradation of pollutants thanks to a selected autochthonous bacterial-fungal consortium. The soil was heavily polluted up to values of total hydrocarbon equal to 1800 mg/kg. The consortium was selected from the microorganism living in the Fidenza soil, bioaugmented and finally reinoculated in the bio-pile for soil treatment. The approach is absolutely innovative, due to the presence not only of bacterial strains but also for the use of fungal strains operating in synergy with the bacteria. The first data from the trials show an effective soil remediation performance. The LCA analysis allowed to make a global assessment of the environmental impacts of the bio-pile remediation treatment scenario compared to the no-action scenario. Impacts were assessed on 18 impact categories at the midpoint level according to the ReCiPe method. For the bio-augmented bio-pile remediation, the results showed a value in the climate change category of 10 kg CO₂ for each ton of remediated soil, and at the same time improvement in the categories relating to the toxicity at the local level.

Key words: bio-augmentation, bio-remediation, hydrocarbon, LCA

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