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Optimization of biomass production by autochthonous *Pseudomonas* sp . MT1A3 as strategy to apply bioremediation in situ in a chronically hydrocarbon-contaminated soil

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Abstract

These days, petroleum hydrocarbon pollution has become a global problem, because of this, bioremediation is presented as a strategy for cleaning up sites contaminated with organic pollutants, and it has an increasing role in relation to the potential it presents as a non-invasive and cost-effective technology. The aim of this study is to optimize the biomass production of *Pseudomonas* sp. MT1A3 strain as a soil bioremediation approach for petroleum hydrocarbon polluted environments. Factorial experimental designs were employed to study the effect of several factors of composition medium and incubation conditions on biomass production. Agro-industrial wastes such as peanut oil as carbon source, $NaNO_3$ as nitrogen source and incubation temperature were found to be significant independent variables. These factors were further optimized using Box-Behnken design. Combination of peanut oil 18.69 g/L, $NaNO_3$ 2.39 g/L and 26.06 °C incubation temperature was optimum for maximum biomass production of MT1A3 and the model validated in a bioreactor allowed to obtain 9.67 g/L. Based on these results, this autochthonous strain was applied in bioaugmentation as a bioremediation strategy through microcosm designs, reaching 93.52% of total hydrocarbon removal at 60 days. This constitutes a promising alternative for hydrocarbon-contaminated soil.

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Keywords: Biomass; Bioremediation; Hydrocarbon-contaminated soil; Microcosms; Optimization; Pseudomonas sp..