

Assessment of Soils Microbiota and Their Adaptation to Low-Temperature Degradation of Diesel Hydrocarbons in Antarctica

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The omnipresence of recalcitrant petrogenic hydrocarbons in Antarctica is generally associated to extreme conditions that impede the natural attenuation of hydrocarbon components. These have caused major perturbation in Antarctic ecosystem, suggesting that conventional bioremediation approaches are largely ineffective at present. However, several studies have reported that indigenous psychrotolerants isolated from hydrocarbon-polluted Antarctic soils have demonstrated exceptional biodegradative capability towards petrogenic pollutants. The current study assessed the ability of the soil consortium BS24 to assimilate diesel fuel as its sole carbon source. This study was also set out to optimise the conditions required to support maximal growth and biodegradation activities by applying conventional one-factor-at-a-time (OFAT) and multifactorial response surface methodology (RSM) approaches. Factors expected to influence the efficiency of diesel degradation namely initial diesel concentration, nitrogen source type and concentration, temperature, pH and salinity were studied. Consortium BS24 displayed an optimal biodegradation activity at 85% of 2.0% v/v initial diesel during OFAT analysis and 95% of 1.75% v/v diesel during RSM analysis.

References

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