Isolation, Characterization and Identification of Microorganisms with Hydrocarbon Degradation Activity for Bioremediation in Polluted Soils

Colon Rodriguez, Jose

Vazquez Barreto, Angelo

Soil contamination by hydrocarbons is a common occurrence in developed countries, showing damaging effects on the environment. There are microorganisms that can degrade toxic substances, reducing their harmful effects. Bioremediation can be a green technology for the remediation of such hydrocarbon-contaminated soils. The objective of this research was to isolate, characterize and identify soil microorganisms capable of biodegrading hydrocarbon fractions to be used as a tool for environmental management of soil polluted with used motor oil. The hypothesis was that novel microorganisms isolated from soils contaminated with used motor oil would present hydrocarbon degradation properties appropriate for bioremediation. To collect the soil samples, an area polluted with used motor oil was identified. Twenty-five samples were taken from a 225 square foot quadrant. Samples were cultured in nutrient agar and colonies were purified. The purified microorganisms were inoculated in used motor oil agar to determine which microorganisms had greater growth. Five bacteria were able to grow on the used motor oil agar. These bacteria were purified and characterized by Gram Staining, colony morphology, and scanning electron microscopy. Genomic DNA was purified and PCR was used to amplify 16S rRNA specific products for sequence analysis and species identification. A gram-negative coccus, four gram-positive bacilli including one with a fluorescence pigment were obtained. Maybe a mutant or novel species were found. Oil degradation by the isolated bacteria resulted in less complex hydrocarbon fractions as demonstrated using gas chromatography, proving their biodegradation properties. These isolated microorganisms can be used in bioremediation pilot projects.

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