CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
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Project Number
S0815

Project Title
The Effect of Pseudomonas putida Bacteria in Promoting the Rhizosphere Biodegradation of Oil-Contaminated Soil

Abstract

Objectives/Goals
The objective of my experiment is to determine if Pseudomonas putida bacteria can enhance the natural phytoremediation of oil-hydrocarbon contaminated soil by increasing the microbial population in the rhizosphere.

Methods/Materials
Prepare 10 pots containing 1kg of potting soil, gravel, & fertilizer each. Add 1500 mg of refined oil to each pot. Separate the pots as follows:
> 2 pots with tomato plants in oil contaminated soil (control)
> 2 pots with alfalfa plants in oil contaminated soil (control)
> 3 pots with tomato plants in oil-contaminated soil inoculated with 40 ml of Pseudomonas putida bacteria culture
> 3 pots with alfalfa plants in oil-contaminated soil inoculated with 40 ml of Pseudomonas putida bacteria culture

Measure the pH of each soil sample 5 times during the investigation. Count the bacterial population in each soil sample 3 times during the experiment by using dilution and plating-out procedures In week four, add previously weighed earthworms in groups of five to each pot to test the toxicity of the soil. At the end of week six, measure the weight of the earthworms and test the concentration of oil in the samples using method 418.1.

Results
All the measurements indicate that hydrocarbon concentrations were lower by the end of the experiment in the pots containing plants and soil inoculated with Pseudomonas putida when compared to the controls. The Alfalfa sample with Pseudomonas worked best at removing hydrocarbons from the soil.

Conclusions/Discussion
The results support the hypothesis that the bacteria Pseudomonas putida promotes the rhizosphere bioremediation of oil contaminated soil by increasing the composition of the microbial community. The symbiotic relationship between the soil microbes and Pseudomonas may be responsible for the degradation of oil contaminants.

Summary Statement
My project tests the effect of Pseudomonas putida bacteria on the rhizosphere bioremediation of oil-contaminated soil.

Help Received
My parents helped me obtain the necessary materials. Many thanks to Mr. Richard Fosyth of Sierra Analytical for testing the oil concentration in my samples without charge using method 418.1.