CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

S1121

Project Title

The Effectiveness of Bioremediation with Different and Varying Concentrations of Nutrients

Abstract

Objectives/Goals

The purpose of this project is to investigate the effects of different essential nutrients and their concentrations on the rate of bioremediation

Methods/Materials

Obtain necessary materials: Magnesium, Calcium, Sulfur, Fertilizer, Zinc, and Sodium Chloride. From the previous project, the optimum concentrations of nutrients were 0.4 grams of Sodium Chloride, 0.15 grams of Zinc, and 8 grams of garden fertilizer. Use five different amounts of Magnesium (0.25, 0.50, 0.75, 1, 1.5 grams) (In addition to Fertilizer, Zinc, Sodium Chloride) in 200mL sea water and 20 mL of oil. Leave each sample for 1 week and perform various filtration techniques to determine the amount of Magnesium which resulted in highest oil reduction (Experiment 1). Repeat the process using the optimal Magnesium found in experiment 1 and five different amounts of Calcium (0.3, 0.6, 0.9, 1.2, 1.8 grams) (In addition to Fertilizer, Zinc, Sodium Chloride) (Experiment 2). As a last step, repeat the process and use optimal amounts of Magnesium and Calcium with 5 different amounts of Sulfur (0.5, 1, 1.5, 2, 3 grams) (In addition to Fertilizer, Zinc, Sodium Chloride) (Experiment 3).

Results

In Experiment 1, 1.5 grams of Magnesium showed the greatest oil reduction (28.17%). In Experiment 2, 1.5 grams of Magnesium and 0.6 grams of Calcium showed greatest oil reduction (33.00%). In the Experiment 3, 1.5 grams of Magnesium, 0.6 grams of Calcium, and 3 grams of Sulfur showed optimum oil reduction (38.67%).

Conclusions/Discussion

The rate of bioremediation varied when using different nutrients in varying concentrations. The maximum amount of bioremediation obtained from this project was with the combination of the following nutrients: 1.5 grams of Magnesium, 0.6 grams of Calcium, and 3 grams of Sulfur. Bioremediation provides a cost effective and environmentally friendly method to clean up an oil spill and can be enhanced with the addition of various nutrients.

Summary Statement

Testing the effect of Bioremediation using various Nutrients

Help Received

Father helped supervise the project