CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Amanda G. Arst

Project Number
S1103

Project Title
Remediation of Hydrocarbon-Contaminated Soil Using Polypropylene Glycol to Restore Plant Growth

Abstract

Objectives/Goals
The purpose of this experiment was to determine whether polypropylene glycol can remediate hydrocarbon-contaminated soil to restore plant growth. If so, will a higher concentration of polypropylene glycol be more effective in restoring plant growth relative to lower concentrations.

Methods/Materials
Phaseolus limensis (Lima Beans) seeds were planted into five containers with varying soil content. Samples compared were; seed starting soil, seed starting soil contaminated by 200 mL motor oil, seed starting soil contaminated with 200 mL motor oil but treated with 200 mL, 300 mL, and 400 mL of polypropylene glycol respectively. Soil and plant growth were observed for 50 days and were later analyzed. The soil content of nitrogen (N), phosphorous (P), potash (K), and pH balance levels were tested. The physical characteristics of the plant structure such as the leaves and roots were measured and observed at 50-times magnification using a microscope.

Results
Equal parts of polypropylene concentration added to the soil contaminated with motor oil (200 mL) worked to remediate the soil. However, higher concentrations of polypropylene glycol (300mL and 400mL) were not effective in remediating the soil. Tests showed that hydrocarbon oil did contaminate the soil. The soil with no hydrocarbon contamination was healthy with pH, N, P and K balance within normal range. The soil with the oil contamination, not treated with polypropylene glycol resulted in abnormal N, P, and K levels, and the pH balance was 6.0, acidic. The soil containing equal amounts of polypropylene glycol and oil (200ml) was slightly acidic. The higher concentration of polypropylene glycol (400 mL) affected the soil in a negative manner. The pH level of the soil with the higher concentration of polypropylene glycol (400 mL) was 7.5, Alkaline.

Conclusions/Discussion
My first hypothesis stating polypropylene glycol would remediate hydrocarbon contaminated soil leading to healthier plant growth was correct. The seeds in the soil containing 200 mL oil and treated with the 200 mL of polypropylene glycol had more plant germination than soil containing 200 mL oil that was not treated with polypropylene glycol. My second hypothesis was rejected because the higher concentrations of polypropylene glycol (300mL and 400mL) were too much to support plant growth. I would like to conduct future research during the summer time at an oil spill site.

Summary Statement
The purpose of this experiment was to determine whether polypropylene glycol can remediate hydrocarbon-contaminated soil to restore plant growth.

Help Received
Mother took some photographs and guided me on safety procedures.