CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35481

Project Title

Oil, They Will Find You and They Will Degrade You

Abstract

Objectives/Goals

The goal is to maximize the degradation of toxic petroleum hydrocarbon brought by water oil spills through the implementation of a combination of bioremediation techniques (biostimulation and bioaugmentation).

Methods/Materials

We tested two oil degrading bacteria (pseudomonas sp. and acinetobacter calcoaceticus) and a bacteria known for its heat production capabilities (pseudomonas putinda). We grew the bacteria on agar plates enhanced by nitrogen and phosphorous rich, fish emulsion fertilizer to simulate biostimulation. For the experimental group, we streaked the oil degrading bacteria alongside the heat producing bacteria to simulate bioaugmentation. There were ten samples for each experimental group. We streaked each type of bacteria on its own for our control group.

Results

After a twenty four hour period, the oil degrading bacteria grown next to heat producing bacteria grew more efficiently. It showed more bacterial activity as zones of degradation appeared on the outer area of the oil degrading bacteria, which indicated that the presence of heat producing bacteria allowed for the oil degrading bacteria to consume the fertilizer and grow at a much faster rate. Meanwhile, the control groups where the different bacteria strains were streaked separately did not show the same zones of degradation until the following twenty-four hours.

Conclusions/Discussion

The combination of bioaugmentation (adding heat producing bacteria) and biostimulation (enhancing the agar plates with fertilizer) contributed to a faster and more efficient growth rate of the oil degrading bacteria that we tested. Because it also increase the bacterial activity rates, we conclude that the addition of heat producing bacteria along with the supplementation of phosphorous and nitrogen rich fertilizer would greatly contribute to a faster and more efficient water oil spill clean up process.

Summary Statement

In this project, we use a combination of bioremediation techniques (bioaugmentation and biostimulation) to maximize the degradation of toxic hydrocarbons from water oil spills and thus accelerate the natural restoration of the environment.

Help Received

Our advisor, Mrs. Ibarra, provided most of the lab materials and allowed us to work in California State University Bakersfield's science laboratory. She taught us how to make the agar plates and gave us suggestions on how we could conduct the tests in our experiment as well.