CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Colton Allen; Gabriel Sigala

Project Number

36509

Project Title

Let's Talk Trash: A Water Conservation Alternative for Landfill Management

Abstract

Objectives/Goals

Since we have been living in a drought ridden state for the past half decade, we understand how important the precious resource, water, is for us to maintain our lives and economy. In order to preserve this limited resource, we need to adjust our current usage. For instance, are there alternatives to using potable water for dust control at landfills?

As trash disposal will always be a need of any civilization; we decided to test if non-potable water could substitute potable water for dust control at landfills. We hypothesized that if using non-potable water instead of potable water, then the difference in the discharge water of the two water sources would not be significantly different as measured by pH, turbidity, conductivity and bacteria since non-potable water meets many of the same water safety guidelines as potable water, thus providing alternatives for water resource management.

Methods/Materials

To test our hypothesis, we collected potable water from a faucet source, non-potable water from the Clovis Water Treatment Plant, and earth dirt samples from a vacant lot. We developed a simulated landfill using six inches of soil. We placed the dirt in clear plastic columns, with weed paper at the bottom to trap large particles, and placed clear plastic collection vessels at the bottom of the column. We ran both types of water twice in the columns and tested our samples to our expert#s lab for pH, turbidity, conductivity, and bacteria.

Results

Turbidity: Higher values in the non-potable control and sample versus the potable control and sample.

PH: All tests averaged in the neutral to slightly acidic range.

Conductivity: We converted for salinity percentages. The non-potable water retained a higher percentage of salt.

Bacteria: Both the non potable water controls and samples had more bacteria than the potable water.

Conclusions/Discussion

In conclusion, the results of pH and conductivity were similar in potable and non-potable samples. The test of turbidity and bacteria resulted in differences, but were not significant enough to limit usage of non-potable water in landfills. In fact, a higher bacteria count may be more advantageous as bacteria can assist in degradation of trash. This experiment has beneficial implications to California, and globally. The application can provide an ecological alternative to landfills located in drought ridden areas and landfills that don't have sophisticated systems.

Summary Statement

Our project to test potable and non-potable water in a simulated landfill determined that non-potable water is a viable alternative for resource management in landfills.

Help Received

We designed the project, experiment, and simulated landfill ourselves. We used the lab at Clovis Community College Chemistry Dept. under the direction of Shawn Fleming, PhD, who also assisted with statistical analysis.

Preliminary