CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35123

Project Title

Anaerobes to Power? A Scientific Approach in Creating Methane from Manure and Trash

Abstract

Objectives/Goals

Cow manure has Obligate Anaerobes present which decomposes and converts cow manure to gas with the right environment. What is added to the cow manure can cause a variation in the fermentation. Bananas, for example will break down into sugar, hydrogen, carbon, ethylene, and other nutrients. These components can speed up or increase the production of methane gas. The benefits of this experiment is to think about how a waste product can be use to support our need of natural resources so our country will not depend on fossil fuel. The objective of this experiment is to prove that with an environment that is oxygen free, added decomposing table scraps, and a heat lamp to maintain a warm temperature, methane gas can be formed at an increased rate.

Methods/Materials

Using a scale measure out 20 g of cow manure and 20g of mashed bananas and scoop it inside the water bottles. Place half the water bottles in the heated box and the rest of the bottles outside of the heated box. Record your results for 8 days. Measure the girth of the balloon three times per day for 8 days. Also record the temperature inside and out side the heated environment for the 8 days. Math formula V=4/3(pi)(radius cubed), was used to solve for the volumes gathered.

Results

The data collected below shows the rate of growth of three trials. It clearly shows the banana and manure mixture can make the most gas with warmer temperatures. The average temperature during experiment was 69.3°F in the morning, 73.08F in the afternoon, and 67.11ºF during the evening in the heated area. The average temperature outside of the heated area was 46.75°F in the morning, 55.3°F in the afternoon, and 44.08°F in the evening. The average temperature was used to show results on graphs.

Conclusions/Discussion

In conclusion, bananas, manure and an added heat source produced the highest amount of gas. This was evident because the balloon circumference of the banana, manure with added heat was the largest for each trial. During fermentation bananas tend to produce high levels of glucose and hydrogen which helps the anaerobes produce more methane gases. This cannot occur without heat which allows the microbes to become more active. I would also like to conclude that temperature has an affect on anaerobes and the fermentation process.

Summary Statement

This project is focused on anaerobic microbes used to create methane gas.

Help Received

I did my research independently of any outside help other than insight from my high school teachers. My parents assisted in buying supplies and proofreading my research.