



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Andrew W. Troxell	Project Number J0524
Project Title Can I Create Gas from Trash? A Scientific Approach Creating Methane from Manure and Biomass	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment is to prove that with an environment that is oxygen free, added biomass, and a warm environment for the microbes, methane gas can be formed at an increased rate. The benefits of this experiment is to prove that waste products such as manure and biomass can replenish our natural resources and reduce our need for fossil fuels. Cow manure houses Obligate Anaerobes which converts cow manure to methane in the right environment. This environment must be depleted of Oxygen, have a catalyst or biomass source, and must maintain warm temperatures. The biomass added to the cow manure can cause a variation in the fermentation process. Bananas, for example, will break down into sugar, hydrogen, carbon. This type of chemical breakdown releases chemicals the Obligate Anaerobes can use to speed up the production of methane gas.</p> <p>Methods/Materials 20g of cow manure, bananas, and vegetables was used. Bottles were labeled manure, manure with bananas, and manure with vegetables. balloons were placed on the top to contain the newly produced methane gas. The bottles were all placed in a heat box with a 100 watt light bulb used as a heat source. Information was gathered for 10 days. The girth of the balloon measured and recorded along with the temperature inside the heat box. Math formula $V=4/3(\pi)(\text{radius cubed})$ was used to equate how much methane was actually produced.</p> <p>Results The data collected form this experiment clearly demonstrates the rate of growth for three trials. It demonstrates the bananas and manure biomass mixture with the ability to produce the most methane in the right environment. The rate of growth for the banana and manure biomass was greater by 2 days and approximately 50% in girth.</p> <p>Conclusions/Discussion In conclusion, bananas and manure produced the most methane gas. During fermentation bananas produce high levels of hydrogen which helps the anaerobes produce methane. The average temperature during experiment was 80-90°F. The manure bottles produced the least amount of gas followed by the manure and vegetable biomass mixture. This demonstrates that my hypothesis was correct, bananas and methane biomass will in fact create the most methane gas in the proper environment for the Obligate Anaerobes which was constant for all three different scenarios.</p>	
Summary Statement This project is focused on anaerobic microbes and biomass used to create methane gas.	
Help Received I did my research independently of any outside help other than my math teacher and my parents who took me to the farm to gather supplies.	