



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

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Project Title From Waste to Energy- Cellulosic Ethanol Production from Chaparral: Comparison of Two Pretreatment Conditions	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to create a process that converts chaparral, a plant that is currently being removed under the California Fire Mitigation Plan, into ethanol, a biofuel. The objective was also to compare overall results between samples that were pretreated under room temperatures and samples that were pretreated in a greenhouse.</p> <p>Methods/Materials 5 grams of chaparral were pretreated in a 2 percent sodium hydroxide 12 percent urea, 100ml solution. Half of the tests were pretreated in the greenhouse and half of them were pretreated at room temperature. After the solution was rinsed and buffered, the solution was raised to 200ml and treated with 0.5mL cellulase and 0.5mL of cellobiase. Each day of the 6-7 day cellulase treatment the glucose concentrations were measured with a glucometer. At the end of cellulase treatment, glucose was measured twice in a 150 ml solution. Then, 1 mL of Saccharomyces, 1mL of Brettanomyces, both of which are yeasts, and 0.2 grams of yeast nutrient were added. The fermentation process occurred for seven days.</p> <p>Results The results showed that on average, nearly 44.1mg of glucose per gram of chaparral under room temperature conditions was produced during this experiment, and about 50.5mg of glucose per gram of chaparral under greenhouse conditions. However, the difference in glucose measurements between the two categories was shown to be not statistically significant.</p> <p>Conclusions/Discussion The results showed the hypothesis was incorrect, as the amount of glucose produced was not the same as predicted. Also, even though there was more glucose production in the greenhouse condition, that was not statistically significant, and therefore no conclusions can be made from those differences. However, this experiment still showed the process to be possible, and therefore may be viable in industry.</p>	
Summary Statement This experiment studied the conversion of chaparral, a potential waste product, into ethanol.	
Help Received Father handled Sodium Hydroxide and Hydrochloric Acid; teacher provided some equipment; Chris Takeuchi, PhD, answered questions.	