



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Anchit Narain	Project Number J0517
Project Title Preparing For Biofuels: Finding Alternative Sources for Cellulosic Ethanol by Calculating Glucose Creation in Substrates	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The Objective of this experiment is to study the optimum conditions under which the enzyme cellobiase cleaves the control substrate p-Nitrophenyl Glucopyranoside and the most product (glucose + p-Nitrophenol) is produced. Then, these parameters will be tested on Almond husk, an alternate substrate.</p> <p>Methods/Materials Materials:Bio-Rad Biofuel Enzyme Kit(enzyme, artificialsubstrate, and Resuspension and Stop Buffers),Spectrophotometer-GENESYS 20 ThermoFisher Scientific Spectrophotometer was used(reactions at 410nm),Almond Husk was the alternate substrate used. Methods:there were 6 experiments with the artificial, control substrate p-Nitrophenyl Glucopyranoside, and an experiment conducted on the alternate substrate almond husk to identify its use in glucose for biofuel production. The experiments tested on the control substrate were used to find the optimum parameters under which the enzyme reacted best with its substrate.These parameters were then tested on Almond Husk.Parameters were plotting Standard Curve, finding optimum temperaturea and pH for product production, and optimum enzyme and substrate concentrations for product production.</p> <p>Results The optimum temperature for enzyme activity was found to be 37 degrees celcius, and the optimum pH for product production was pH 5.0. The optimum concentration of enzyme was the Low Concentration Enzyme and optimum substrate concentration was the High Concentration.When testing the alternate substrate Almond Husk, no results were obtained with a Spectrophotometer as no 'color' was being produced in equal ratio with increasing glucose production.</p> <p>Conclusions/Discussion The root cause for failure in gathering experimental data is that the Almond Husk substrate solution post enzymatic reaction contained no colored substance whose color intensity would increase as the amount of glucose produced would increase. The maximum absorbance wavelength for glucose is in the visible spectrum, so using a spectrophotometer;one cannot determine the amount of glucose formed because it is colorless and virtually invisible in the visible spectrum.Artificial substrates(used as controlhave a glucose molecule and colored substance (p-Nitrophenol).As the intensity of color increases, so does the amount of glucose produced. Further continuation of the Project will occur in a lab environment with a Mass Spectrometer and High Pressure Liquid Chromatographer to test the hypothesis.</p>	
Summary Statement This project tries to identify an alternatice source for cellulosic ethanol, thus reducing dependence on food crops (esp. corn) for biofuel production.	
Help Received Bio-Rad provided enzyme and artificial substrate for experiment; Father helped make project board; Mr. Siva Subramanian supervised all experimentation at OLAM Spices and Vegetables Innovation Center in Lemoore, CA.	