



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Jane Y. Suh	Project Number J0413
Project Title Converting Fruit Waste into Energy: The Effects of Pectinase on the Degradation of Fruits	
Abstract Objectives/Goals The purpose of my project is to find the most efficient way to minimize fruit waste using enzymes, pectinase and cellulase. Many industries around the world process and sell fruits to consumers, but no attention is being given to the millions of fruits that are being wasted causing harmful problems to our environment. The ultimate goal is to develop a method for converting fruit waste into an energy source. Methods/Materials For my experiments, I first tried to degrade the fruit wastes of the fruits of oranges, apples, lemons, limes, and tomatoes by adding Pectinase and/or Cellulase to the fruit waste, incubating them in a mixture of enzyme and water, then after two hours, measuring the percent decrease from the original mass of the waste. I also conducted similar experiments to determine if changing the concentration of the enzyme and the length of incubation would result in important factors in decreasing the amount of fruit waste. Results Pectinase was found to be the most efficient enzyme in degrading the fruit waste and had an average of 53.6% decrease from the waste's original mass while cellulase had an average of 26.4% decrease from the original mass. In addition, as the length of time and the amount of concentration of the enzyme increased, I found that those factors contributed in degrading a higher percentage of the fruit waste. Conclusions/Discussion My conclusion is that by using pectinase, increasing the amount of concentration of the enzymes, and prolonging the incubation time, large amounts of fruit waste can be degraded. The minimized waste can be converted into ethanol by attacking the cellulose using enzymes to make sugar and to ferment those sugars and convert it into ethanol.	
Summary Statement My project is about minimizing fruit waste using enzymes, so that from the minimized waste, I could convert unnecessary waste into ethanol.	
Help Received Parents helped obtain materials for the experiments.	