CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
J0412

Project Title
How to Get the Most Juice from Your Apples: How Pectinase Enzymes Affect Apples

Abstract

Objectives/Goals
My objective was to research how enzymes such as Pectinase and Cellulase increased the amount of apple juice produced, and to find a way to produce the most amount of apple juice possible.

Methods/Materials
For my tests, I used the same type of apple that weighed 50g. Lab materials such as beakers, syringes, cylinders, etc. were used. Pectinase and Cellulase was used depending on the test. For example, in one of my tests, I weighed and cut an apple. Then I added Pectinase and /or Cellulase using syringes. I then incubated the mixture and recorded the amount of juice produced after a certain amount of time. My tests showed that there was an increase in apple juice when Pectinase and/or Cellulase were added in certain conditions.

Results
After a series of tests, there was a significant increase in apple juice when enzymes such as Pectinase and/or Cellulase were added. Unusable leftovers from the squeezed apple produced even more juice when Pectinase was added in certain conditions.

Conclusions/Discussion
The cell wall of a fruit (apple) contains pectin (found in the middle lamella). Small amounts of Pectinase form in the apple when ripening. Adding more Pectinase can speed up the process of breaking down the pectin molecules in the cell wall therefore releasing more juice. Since there is also cellulose in the plant cell wall, Cellulase can break down the cellulose in the cell wall therefore releasing more juice. Even the apple leftovers from squeezing can produce more juice when Pectinase is added, although it doesn't look like it will produce any more juice. If Pectinase can produce juice from unusable leftovers, maybe Pectinase or other enzymes can produce something useful from other types of waste.

Summary Statement
How to get the most apple juice by using Pectinase enzymes.

Help Received
Parents helped retrieve supplies necessary.