



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

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Project Title
Investigating the Inhibitory Effect of Psidium guajava Leaf Extract on Carbohydrate Digestive Enzymes

Abstract

Objectives

The objective of this experiment is to determine if the extract from *Psidium guajava* leaves inhibits the activity of invertase, lactase, amylase, and amyloglucosidase (enzymes that act on carbohydrates). My hypothesis is that if the guava leaf extract (derived by making a decoction) is mixed with a carbohydrate digestive enzyme plus its corresponding substrate, then it will result in a lower rate of increase in glucose amount than the control (water).

Methods

The materials used in this investigation are guava leaves, water, invertase, sugar, lactase, whole milk (untreated with lactase), amylase, amyloglucosidase, bread flour, cornstarch, potato flakes, rice flour, and tapioca starch. To conduct this experiment, identical volumes of guava leaf decoction and water are put into cups. Equal amounts of an enzyme plus the carbohydrate it acts on are added to each cup to make a solution. The control and guava leaf decoction experiments are run simultaneously. A glucose meter measures the glucose content after specific time intervals have passed.

The data points from 8 trials were averaged, then the rates of increase was computed for both solutions. From there, the percentage of inhibition was calculated.

Results

For invertase, there was no significant inhibitory effect since the percentage of inhibition was only 3.71%. For lactase, there was also no inhibitory effect since the percentage of inhibition was -0.67%. For amylase, there was an inhibitory effect since the percentage of inhibition was 80.80% for bread flour and a range of 78.26% - 98.03% for other starches. For amyloglucosidase, the results are still pending since the experiment is ongoing.

Conclusions

The findings of this experiment are promising. The guava leaf decoction did not significantly inhibit the effect of invertase and lactase, but it inhibited amylase. However, further studies are needed, since I am still in the process of testing amyloglucosidase. Also, I did not yet test (I will attempt to if I have enough time) if the inhibitory effects of the guava leaf will be the same if my setup is tested at stomach acidity (a pH of 1.5 - 3.5) and at the human body temperature (37 degrees Centigrade). If the inhibitory effects stay the same, then this would help people with diabetes/prediabetes, and obesity.

Summary Statement
I found out that the guava leaf extract inhibits the activity of amylase, but neither invertase nor lactase (amyloglucosidase is pending).

Help Received
Arthur Levine and Maria Teresa Alonso from Huerta del Valle let me pick fresh organic guava leaves from their community garden. My sister helped me understand the scientific studies on guava leaves and my mom is my lab partner when things needed to be done simultaneously. I did everything else myself.