CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Gen A. Akamatsu

Project Number
J0501

Project Title
Biomass to Biogas

Abstract

Objectives/Goals
The purpose of this experiment is to figure out which combination of food wastes creates the most biogas. My experiment will lead to making more biogas gasoline or electricity efficiently from biomass wastes in a reusable friendly way.

Methods/Materials
Five 2L bottles are filled with different biomass combinations and labeled. The bottles were stuffed with equal amounts of materials. Bottle A with 1L of cow manure only, bottle B with 1L of cow manure and 100g of food wastes, bottle C with 1L of soil and 100g of food wastes, bottle D with 1L of cow manure and 3 teaspoons of yeast, and bottle E with 1L soil and 3 teaspoons of yeast. These 5 bottles had balloons on the mouth of each bottle to see how much gas each bottle created. The diameter of the balloon was recorded in inches, and was recorded 2 times a day as two different experiments trials experiment 1 was done at 7:00am and experiment 2 was done at 4:00pm. The results were made into two graphs which was recorded for one week.

Results
For experiment 1, Bottle C had the highest average of gas creation. Bottle C seems to increase greatly at the second day and slowly decrease after that. Bottle C showed these results because when food waste is dry it creates more gas than when it is moist. So, for the first few days the waste was dry creating a lot gas, but due to the cold temperature, it created mist inside the bottle which made the soil moist leading to making less gas. For experiment 2, bottle D had the highest average of gas. Bottle D seems to increase slowly the whole time.

Conclusions/Discussion
In my hypothesis, I predicted that bottle D the one with cow manure and yeast will create the most gas because the manure that creates stinky gas and yeast that performs growth if there is food or water. So, if cow manure is food to the yeast, I thought bottle D would create the most gas. The result showed that bottle D had the highest average of gas creation out of two experiments. The yeast has contributed to the result as it needs food or water to perform growth. The yeast in bottle D got both materials to perform growth; water created from coldness and cow manure as food. However, temperatures during my experiments could have played a big role to receive these results. In the future, I would like to investigate how much energy each of these combinations produce and how we can apply in our lives.

Summary Statement
Figureing out which commbinations of materials and biomass makes the most biogas.

Help Received
Mother helped create poster board; little brother helped me cut; Dad helped me fix grammar

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Talia G. Bernstein

Project Number
J0502

Project Title
Sugar Anyone? A Comparison of Natural and Artificial Sweeteners and the Effects on Blood Glucose

Abstract

Objectives/Goals
The purpose of my project is to measure how different sweeteners affect blood glucose and to determine which is the best sweetener to use. This project is important to society because diabetes and obesity are deadly conditions and if it is know which sweeteners are better, it could potentially lower the incidence and prevalence of diabetes and obesity in the world.

Methods/Materials
To conduct this test I used four people, including myself. In the morning, before eating or drinking, I measured glucose levels using a glucometer. Then I mixed 4 oz of water with a packet of Sucralose, Steviol Glycoside, Xylitol, Sugar or Honey. We then drank the mixture, waited 30 minutes and retested glucose levels. I recorded the data over five weeks and graphed the percentage change.

Results
Over the course of five weeks it became evident that Steviol Glycoside had the least affect on glucose levels, on average only 1.3% change. Honey and Xylitol had the most affect on glucose levels,honey on average changed glucose levels 8.4% and Xylitol changed glucose levels 8.3%.

Conclusions/Discussion
In our modern day lives sweeteners are extensivly used, some are better than others. If people know which ones are better to use it can help normal people, diabetics and obese people trying to loose weight. After my testing, Steviol Glycoside was shown to be the best. I conducted this test on four people and more studies are needed for more solid data and numbers.

Summary Statement
A comparison of different sweeteners on Blood Glucose

Help Received

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Morgan P. Buss

Project Number
J0503

Project Title
What Affects the Rate of Enzyme-Catalyzed Reactions?

Abstract

Objectives/Goals
My objective was to determine how variations in temperature would change the rate of an enzyme-catalyzed reaction. I hypothesized that an increase in temperature would speed up the reaction.

Methods/Materials
Using varying temperature water baths, a distilled water and hydrogen peroxide solution, was brought to four different temperatures. Filter disks, soaked in the enzyme catalase, extracted from potatoes, were dropped into the hydrogen peroxide solution. Reaction time was determined by the time it took the disks to float back to the surface of the solution, propelled by the byproduct of the reaction, oxygen bubbles.

Results
The reaction that occurred at the highest temperature was faster than the other cooler temperatures in all four trials. On the other hand, the coolest temperature solution finished the slowest in all of the trials.

Conclusions/Discussion
I concluded that the temperature of an enzyme-catalyzed reaction has a large effect on the speed at which the reaction occurs, and that the higher the temperature, the faster the reaction happens.

Summary Statement
My project was designed to test whether temperature affects the rate at which the enzyme, catalase, reacts to a hydrogen peroxide solution, creating oxygen as a by-product.

Help Received
Mother took pictures and helped with timer; Dad got my supplies; Mrs. Darrow loaned me triple-beam balance and filter paper.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Cullen G. Darius

Project Number

J0504

Project Title

Making Healthy Choices: The Impact of Different Foods on Blood Glucose Based on the Glycemic Index

Abstract

Objectives/Goals

The objective was to determine if foods of different glycemic values differentially affect the blood glucose levels of non-diabetic participants. I predict there will be a difference in blood glucose 30 minutes after eating different glycemic foods. Specifically, high glycemic foods such as juice will lead to higher blood glucose than low glycemic foods such as ham.

Methods/Materials

Materials included foods of different glycemic values, blood glucose meters, food scales, participant directions, and data recording sheets. A repeated subjects design with 5 participants was used to allow for the comparison of means for each food, while controlling for individual differences in blood glucose. There are 4 levels of the independent variable, foods with different glycemic indexes (ham, apples, juice, and a snicker#s bar -8 oz. of each). The dependent variable is change in blood sugar. Because mixing food affects the glycemic index, participants tested food in the morning before eating anything else. Each food was tested on a different morning. They tested their blood glucose when they woke up, before eating the food, and 30 minutes after eating the food. The dependent variable was the number of points blood sugar changed. Participants tested their blood sugar using a glucose meter. No blood product was collected or handled by the researcher for this project.

Results

The data did support my hypothesis. The average rise in blood sugar for ham was 1.6 points, apple was 9.4 points, juice was 20.8 points, and snickers was 12.6 points. A comparison of the means across participants suggests meaningful differences by food, these differences are consistent when comparing values within participants. While the snickers bar had more carbohydrates than the juice, the juice had the biggest impact because it is made of fast burning sugar (high glycemic).

Conclusions/Discussion

Findings demonstrate that the higher the glycemic index of the food, the more of an effect it will have on blood sugar. This is important because changes in blood sugar have been related to health problems. In this study the participants did not have diabetes, but there was still an impact on blood sugar. Making healthy food choices includes considerations such as fat and calories. However, this study adds the additional consideration of the glycemic index to help maintain healthy blood glucose levels.

Summary Statement

Foods of different glycemic values differentially affect the blood glucose levels of non-diabetic participants.

Help Received

Mother helped type report and bought supplies.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Max A. Freedman

Project Number
J0505

Project Title
Bean Bean the Magical Fruit: Testing for Glucose with Different Concentrations of Beano

Abstract

Objectives/Goals
My project was to determine if different concentrations in Beano enzymes (Alpha-galactosidase and Sucrase) were effective in breaking down oligosaccharides in a bean solution.

Methods/Materials
I soaked 50 g raw green split peas in 100mL tap water at room temperature for 12 hours. Then I brought the temperature of the bean solution up to 37 C with a water bath. I took a glucose reading, then dropped in 0, 0.5, 1.0, or 2.0 crushed Beano tablets and started the timer. Every 2 minutes for 14 minutes, I tested glucose levels of the sample using a glucometer and recorded the results. I conducted three trials for each sample for a total of 12 trials.

Results
Glucose levels were slightly higher with increased concentrations of Beano. The highest was 2.0 Beano, then 1.0, then 0.5 Beano, and finally 0.0 Beano (control) was the lowest level of glucose recorded. In addition, the rate of the enzyme reaction was faster with increased concentrations of Beano. At 2 minutes 2.0 Beano was the highest (253.2 mg/dL) and 0.5 Beano was the lowest (135.5 mg/dL).

Conclusions/Discussion
Oligosaccharides are chains of complex sugars and some are difficult for humans to digest. Beano was developed to help people digest beans and other gassy foods. It contains two enzymes, Alpha-galactosidase, which comes from a fungus (Aperigillus niger) and Sucrase. When A-galactosidase is added to oligosaccharides and H2O the result is galactose and sucrose. Then the second enzyme Sucrase changes the sucrose into glucose and fructose. Humans can now digest these simpler sugars. Without the enzymes in Beano, the oligosaccharides go through the human body undigested until they get to the large intestine. The bacteria in the gut partially digest the oligosaccharides and create gas. Taking Beano helps humans to break down the parts of the bean that would otherwise produce gas, keeping people from enjoying some vegetables. Understanding glucose and the role it plays in diet and nutrition helps people lead a healthier lifestyle.

Summary Statement
I tested how different concentrations of Beano enzymes affect a bean solution.

Help Received
My mom helped me with collecting data and research. My sister helped me with graphs. My dad helped me with standard deviation. Dr. David Bernick helped me understand glucose molecules and my experiment design.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Kuldeep K. Gill

Project Number
J0506

Project Title
What Type of Sugar Leads to the Most Production of CO(2) by Yeast?

Abstract

Objectives/Goals
The objective is to figure out how much carbon dioxide will be produced by yeast fermentation of three different types of sugars.

Methods/Materials
I observed yeast fermenttion by using different flasks for each type of sugar (white table sugar, brown sugar, and a sugar substitute)with a balloon over it to collect the cabon dioxide. Then I calculated the voume in each balloon using the diameter.

Results
The results of my project are that the white sugar produced more carbon dioxide from yeast than the Sweet 'N Low or brown sugar.

Conclusions/Discussion
The resuts of my project are that the white sugar produced more carbon dioxide from yeast than the Sweet 'N Low or brown sugar. If I was to do this projcet again, then I would test yeast fermentation with milk sugar (lactose).

Summary Statement
This project aims to test which type of sugar will be most effectively fermented by yeast.

Help Received
Mrs. Wawock helped me with the calculations.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Lucia Gonzalez

Project Number
J0507

Project Title
See C Stay: The Effect of Preservation Technique on the Amount of Vitamin C in Orange Juice

Abstract

Objectives/Goals
The objective of this experiment was to learn the effect of preservation technique on the amount of vitamin C in orange juice.

Methods/Materials
Orange juice samples were preserved in the freezer, the refrigerator, by pasteurization and by dehydration. Freezing/refrigeration required: plastic bags, orange juice, and a freezer/refrigerator. The pasteurization process required: canning jars, orange juice, a pot to boil the orange juice in, and a small graduated cylinder. The dehydration process required: home dehydrator, orange juice and plastic baggies. The iodine titration method was used to determine the amount of vitamin C in orange juice/standard vitamin C solution. This part of the process involved: burete, Erlenmeyer flask, orange juice, iodine solution, starch indicator solution, and the vitamin C solution.

Results
The frozen samples turned out with the highest concentration of vitamin C with refrigerating in second and dehydration closely behind it. Pasteurization came out with the lowest amount.

Conclusions/Discussion
Based on my data the first three methods had more Vitamin C than what it started out with and I chalk this up to error on my part. I also conclude that I did not test for a long enough period of time be able to get significant results but that it is probable that freezing would preserve the vitamin C in orange juice the best. But with the data that I got, the numbers are not really different because they were only preserved for a week, not long enough to actually have noticeable change.

Summary Statement
My project tests four different home preservation techniques of orange juice to see which one maintains the vitamin C concentration the highest.

Help Received
Dad made me a ring stand out of wood for lack of one and helped me squeeze the orange juice in the begining to make the process go faster.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jacob T. Kartinen

Project Number
J0508

Project Title
The Effect of Enzyme Concentration upon the Catalytic Reaction Rate of a Potato Extract

Abstract

Objectives/Goals
This experiment will show if the amount of catalase enzyme directly affects its reaction rate.

Methods/Materials
Potatoes were cut and peeled and mixed with purified water in a blender. The extract was filtered and poured into a graduated cylinder and kept cool. The enzyme extract was then added to make the percent solutions. The substrate (3% hydrogen peroxide) was put into a 250 mL beaker. A coffee filter was then used to soak up the enzyme extract for 5 seconds. The enzyme soaked coffee filter was then placed into the substrate solution and timed to see how long it took for the coffee filter to rise. The process was repeated for each enzyme solution.

Results
The 100% solution responded with the fastest time. As expected, the 90% solution was the second fastest, and the 80% came in third.

Conclusions/Discussion
My hypothesis was correct. At 100% it had the fastest reaction time. The 90% was the second fastest. This happened because the pH of the water affected the catalase enzyme#s reaction time. The pH of the water has to be at a balance with the enzyme or else one will overpower the other. Since, the amount is large in this test the perfect balance was with the 100% while the 90% and 80% were close behind. With the 80% the balance was slightly off, but with the 90% it was very close. After the 80% the enzyme in the other solutions was being overpowered by the pH of the water.

Summary Statement
This experiment will show if the amount of catalase enzyme directly affects its reaction rate.

Help Received
No help received for project.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Kendyl M. Lassley

Project Number
J0509

Project Title
What Effect Do Different Cooking Methods Have on the Nutritional Value of Vegetables?

Abstract

Objectives/Goals
The purpose of my science project is to determine what affect different cooking methods have on the nutritional value of vegetables.The reason I am doing this investigation is to find the healthiest way to prepare vegetables.If we are going to eat vegetables to keep us healthy we should try to maintain its nutritional benefits.I am using boiling and steaming as my methods to cook vegetables.

Methods/Materials
I am using the vitamin c testing solution and liquid vitamin c as my control. I will boil vegetables for 5 minutes on the stove in a pot of water. I will then test it with a food nutrient kit and record the result. Next I will boil vegetables for 10 minutes on the stove in a pot of water of water. I will then test it with a food nutrient kit and record the results. I will repeat my experiment using a steaming basket on the stove for 5 and 10 minutes. I will then test it with a food nutrient kit and record the results.The experiential test variables that I am using in my science project are Asparagus, Broccoli, Carrots, and Zucchini.

Results
*Boiling asparagus 5 and 10 minutes took an average of 1 drop of vitamin C testing solution to turn blue.*Steaming asparagus 5 and 10 minutes took an average of 1-2 drops of vitamin C testing solution to turn water blue.*Boiling carrots 5 minutes took an average of 1.9 drops and boiling for 10 minutes took an average of 2.2 drops of vitamin C testing solution to turn water blue *Steaming carrots for 5 minutes took an average of 1.8 drops and steaming 10 minutes took an average of 1.3 drops of vitamin C testing solution to turn water blue.*Boiling zucchini 5 minutes took an average of 2.8 drops and boiling 10 minutes took average of 2.6 drops of vitamin C testing solution to turn water blue.*Steaming zucchini 5 minutes took an average of 2.4 drops and steaming 10 minutes took an average of 2.8 drops of vitamin c testing solution to turn water blue.*Boiling broccoli 5 minutes took an average of 3.2 drops and boiling 10 minutes took an average of 4.7 drops of vitamin c testing solution to turn water blue.*Steaming broccoli 5 minutes took an average of 9.3 drops and steaming 10 minutes took an average of 19.3 drops of vitamin c testing solution to turn water blue.

Conclusions/Discussion
After completing my project, I have found that steaming broccoli for only 10 minutes allowed the broccoli to maintain and supply the most vitamin C.

Summary Statement
Selecting the right vegetables, prepared the right way will allow us to get the most nutritional benefits.

Help Received
Parents helped with supplies, photos, and typing.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Nikhil A. Madan

Project Number
J0510

Project Title
Is the Reishi Mushroom Mutagenic?

Abstract

Objectives/Goals
The objective of this experiment was to determine if Reishi Mushroom preparations mutate bacterial DNA.

Methods/Materials
Dilution 1 (1x) of Reishi Mushroom, Capsules, Tea Leaves, and Tea Extract were mixed in DMSO (water for the tea extract). Dilution 1 was serially diluted to make Dilutions 2, 3, and 4. The bacteria were incubated the day before the experiment. The reaction mixture containing Davis Mingioli salts, D-glucose, bromocresol purple, D-biotin, and L-histidine was made. Negative controls (DMSO or Water), positive control mutagens, and each Reishi preparation were added to the reaction mixture with or without metabolic activation system (S-9) mix. Each sample was mixed with TA98 or TA100. The sample were added to 96 well plates and incubated at 37°C for 5-6 days. If bromocresol purple turned yellow, it meant the bacteria had been mutated.

Results
Without metabolic activation in TA100, the Reishi Tea Extract Dilutions 1, 2 and 3 showed a significant increase in yellow wells compared to the Background. With metabolic activation in TA100, the Dilution 1 and 2 showed a significant amount of wells compared to the Background. These changes were concentration-dependent. However, Tea Extract did not show an increase in yellow wells for TA98. The Reishi Capsules Dilutions 1 and 4 showed an increase in yellow wells in TA98 with metabolic activation (compared with DMSO). However, these changes were not concentration-dependent. Reishi Capsules did not show an increase in yellow wells in TA100 or in TA98 without metabolic activation. The Reishi Mushroom and Tea Leaves did not show a significant amount of positive wells compared to the DMSO control.

Conclusions/Discussion
Reishi Tea Extract had chemicals that were mutagenic to TA100 in a concentration-dependent manner. Reishi Capsules are possibly mutagenic to TA98, but this effect was not concentration-dependent. The hypothesis of this experiment was that at least one out of four of the Reishi preparations would be mutagenic. According to the results of this experiment, two of the four Reishi preparations (Reishi Tea Extract and the Reishi Capsules) were mutagenic. Therefore, the hypothesis was correct. However, one cannot conclude that Reishi Mushroom can cause cancer because this test only detects mutations, which may have no effect (silent mutation), harmful effect (causes cancer or loss of function), or a beneficial effect (improvement in a function).

Summary Statement
The Reishi Tea Extract with and without metabolic activation was mutagenic to TA100 and the Reishi Capsules with metabolic activation was mutagenic to TA98.

Help Received
Used lab equipment in Neurocrine Biosciences, dad provided training with experimental methods, EBPI supplied reagents for this experiment.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Amanda M. Madden

Project Number

J0511

Project Title

Sweet Surprise: A Study of How Sugar Grain Size Affects Baking Time of Cookies

Abstract

Objectives/Goals

The purpose of my experiment was twofold. My first objective was to learn if the baking times of sugar cookies are affected by sugar grain size. Secondly, I wanted to learn if the appeal of the cookies is affected by color and familiarity.

Methods/Materials

In my project I tested eight sugars; granulated, evaporated cane, organic whole cane, powdered, baker's, caster, raw cane, and natural cane turbinado sugar. I used a standard sugar cookie recipe and varied the type of sugar. In the first section, I determined the baking time of the sugar cookies using the toothpick test. For the second section, I baked all the cookies at the same standard time and had test subjects complete a blind taste test survey.

Results

Out of 240 cookies, the cookie containing powdered sugar baked the fastest at 6 minutes and 44 seconds. The natural cane turbinado baked the slowest at 10 minutes and 33 seconds. Out of 240 cookies, the one that appealed the most to the test subjects was granulated sugar. The cookie that appealed the least to the test subjects was organic whole cane sugar.

Conclusions/Discussion

The finest grained sugar baked the fastest and the coarsest grained sugar baked the slowest. The most commonly used sugar was the most popular sugar, and the least common sugar with an unusual color was the least popular.

Summary Statement

My project was a study of how particle size affects the rate of a chemical reaction.

Help Received

Mother helped make the cookie dough and design board; Mr. Hobbs helped design my experiment.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Nathan J. Matalavage

Project Number
J0512

Project Title
Spin That Wheel

Abstract

Objectives/Goals
There is a lot of talk these days about high protien versus no protien, and high carbohydrate diets versus low carb diets. I wanted to see which one of these diets would produce more energy if eaten exclusively.

Methods/Materials
I obtained 2 mice from the local pet store. I seperated each mouse in it's own self contained tank. In that tank the mouse was give bedding, water, and a seperate bowl of food. I took a hampster wheel and a bicycle pedemoter and hooked the pedemoter up to the hampster wheel so that it would register and count each rotation on the wheel. 1 mouse was fed only carbohydrates, (different carbohydrates were switched in and out of his diet on a dialy basis). The other mouse was fed only protiens (again, a wide range of high protien foods were switched in and out daily). The mice were fed in the morning and in the evening. In the evening each mouse was given the food, then allowed a 2 hour span to excercise on the wheel. This is the only time that the wheel was left inside of the cage. The number of rotations during that 2 hour period were counted and noted on the chart. This was done for a period for 30 days. We then waited about 1 month and swithed the mice, testing each mouse with the opposite food source. We did this in order to make sure that the energy was not just from the mouse itself, but from the source of food.

Results
In testing the mice, it was my opinion that the mouse with the high carbohydrate diet would produce more energy than the mouse with the high protien diet. In my research I found it to be just the opposit. In my testing I found that the mouse that was tested, eating only high protien, was much more active than the mouse that consumed only carbohydrates. This also rang true when the mice were switched and re-tested using the oposite source of food.

Conclusions/Discussion
In my conclusion I found that although carbohydrates are a great sounce of energy, it is the protien, and protiens ability to sustain that energy, that made it the winner in this experiment.

Summary Statement
Comparing a high protien diet to a high carbohydrate diet, and discovering which one of these will produce the most energy.

Help Received
My mother helped me with the layout of the poster board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Erin L. Matsutsuyu

Project Number
J0513

Project Title
The Rising Effects of Baking Powder, Baking Soda, and No Riser on Blueberry Muffins

Abstract

Objectives/Goals
My objective was to see which riser would make blueberry muffins rise the most, either baking powder or baking soda, and what would happen to a blueberry muffin without any riser. I believe that baking powder muffins will rise the most.

Methods/Materials
My materials were 3 cups of all-purpose flour, 3 cups of whole wheat flour, 2 cups of sugar, 3 teaspoons of baking powder, 3 teaspoons of baking soda, 1 ½ teaspoons of salt, 1 ½ teaspoons of ground nutmeg, 6 eggs, 2 cups of milk, 18 tablespoons of vegetable oil, 3 teaspoons of vanilla extract, 6 cups of fresh blueberries, a mixing bowl, and 36 muffin holders. My method was making 36 blueberry muffins, 12 at a time, and substituting each riser in, then no riser in the last batch. Then, I measured how tall each muffin was in millimeters.

Results
After gathering all the heights of the muffins and averaging the measurements, I found out that baking soda muffins raised the most. My hypothesis turned out to be wrong! The baking soda muffins had an average of 50.83 millimeters. In second, the baking powder#s average was 42 millimeters. Lastly, the no riser muffins came out with an average of 35.58 millimeters.

Conclusions/Discussion
My results did not support my hypothesis. I think the baking soda muffins rose the most because the carbon dioxide bubbles released were more aerated since the muffins was light and less dense compared to the other muffins. This project expands our knowledge in this subject because bakers will know which riser to use.

Summary Statement
To determine the effects of baking soda, baking powder and no riser on blueberry muffins.

Help Received
My mother helped take the muffins out of the oven.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Maria R. McKinney

Project Number
J0514

Project Title
Comparing Biogas Yield from Anaerobic Digestion

Abstract

Objectives/Goals
The purpose of this project was to determin which type of food (chocolate candy or oats) would produce more biogas when anaerobically digested.

Methods/Materials
The manure containing the microorganisms was put into a Gatorade bottle with 400 ml of food waste. the microorganisms comsume the volatile solids and produce biogas which builds up pressure and displaced the water in the second vessel into the third vessel which is granulated to that you can measure the amount of gas.

Results
My results showed that the chocolate candy produced more gas than the oats. The end results were 1600 ml of gas production for the chocolate candy and 180 ml of gas production for the oats. The range was 1420 ml of gas, which clearly showed that sugar-based food are better to use tehn anaerobically digesting.

Conclusions/Discussion
Microorganisms comsume volatile solids and produce biogas. Volatile solid content varies between wastes and can come from sugars, fats or proteins. Sugars and fats have higher gas yield than protein or carbohydrates. This explains why the sugar-based mix produced more biogas than the carbohydrate-based mix.

Summary Statement
My project was to determine which type of food waste (chocolate candy or oats) produced more biogas when anaerobically digested.

Help Received
Father helped order some supplies. Mother helped glue the display board together.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Alexa R. Melgoza

Project Number
J0515

Project Title
Ripe vs. Spoiled

Abstract

Objectives/Goals
My science experiment is determining which stage of ripening (ripe or spoiled) from fruits and vegetables obtains more extractable DNA.I am verifying whether these levels of maturity affect their quantity of DNA.In addition, my science fair experiment will demonstrate how DNA can be extracted with a simple detergent, and how ethylene helped with the ripening of the fruits and vegetables.I predict that ripe fruits and vegetables contain more extractable DNA than the spoiled ones.

Methods/Materials
I am extracting DNA from five fruits and five vegetables in their two stages of ripening - ripe and spoiled, with two samples of the same fruit/vegetable under each stage. That is forty fruits and vegetables total (twenty fruits and twenty vegetables).First, the fruit is broken up into a pulp, so that the cells seperate from each other, giving them away to the extraction solution. Then, the detergent is mixed with the pulp, to release the DNA from the membranes, and the mixture is filtered to set the DNA apart from the remains of the membranes. Lastly, the DNA becomes visible by precipitating it with alcohol.

Results
My results stated that fresh fruits and vegetables had an average of 18.07 milliliters of DNA, and the spoiled fruits and vegetables had an average of 26.3 milliliters. This means that spoiled fruits and vegetables have 45.5% more DNA than fresh ones.

Conclusions/Discussion
The reason for my results in my science fair experiment is ethylene and the ripening process that both fruits and vegetables encounter. Ethylene is the factor for the process that all fruits and vegetables undergo # ripening. As the ethylene took affect, pectinases (an enzyme that arranges the transmogrification of pectin into sugars and galacturonic acid) broke down the cell walls and softened the fruit and vegetable.When the cell walls break, it is easier for them to release their DNA, which is held inside the nucleus, and makes it easier for me to mash the fruit or vegetable and extract the DNA. Under-ripe fruits and vegetables do not produce as much enzymes, so they relinquish less DNA.This experiment relates to the real world by offering an introduction to molecular biology and agricultural manufacturing.

Summary Statement
Determining the quantity of DNA pertaining to the two stages of Ripening from fruits and vegetables.

Help Received
Materials provided by Rincon Middle School.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Leif E. Morgan

Project Number
J0516

Project Title
Fruits Eat Jell-O: The Effects of Acids and Bases on Fruit Protease Activity

Abstract

Objectives/Goals
My project was to determine if acids and bases have an effect on the protease activity in certain fruits. I believe the protease activity will be higher in an acidic environment than in a basic environment.

Methods/Materials
I made extracts of pineapple, kiwi, and papaya, which are known to have proteases. To measure the activity of the proteases, I poured Jell-O into petri dishes and made holes in the Jell-O with straws. I poured extracts in the holes and measured the increase in the size of the hole after six hours. To test the effects of acids and bases I also measured protease activity with plates made of Jell-O with vinegar or baking soda added. I used pH paper to measure the pH of the Jell-O.

Results
All three fruits made the Jell-O hole bigger. The activity of all three proteases was best in acidic environments and was lower in basic environments. When I compared kiwi and pineapple extracts closely, I found that pineapple protease was more active in basic environments than the kiwi protease.

Conclusions/Discussion
I concluded that most proteases are more active in acidic environments. This may be because fruits contain a lot of acids, such as citric acid, and so proteases have to work in these conditions.

Summary Statement
This project tested the effects of acids and bases on the activity of proteases from fruits.

Help Received
Father provided petri dishes and other supplies from his research lab at UCSF.

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

Abstract

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.

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.

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 conentration 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.

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.

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.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Cynthia Perez

Project Number
J0518

Project Title
Yeast Competition

Abstract

Objectives/Goals
This experiment examines a possible method to increase the production of alcohol through fermentation with yeast by species competition. This is important because of the increase in the use of biofuels.

Methods/Materials
In a classic competition experiment that Gause performed in 1934 with yeasts, he noted that one species of yeast was essentially eliminated in a mixed culture by a presumed increase in alcohol production by the other species possibly as a competition kill mechanism. I examined this again with the interest in biofuel technology. I ran monoculture controls, and mixed culture trials. I took population counts and measured alcohol production in each with a refractometer, as well as double distilling the media.

Results
Combining Saccharomyces cerevisiae and Schizosaccharomyces pombe produced more alcohol than individual monocultures alone, with a sharp decline in the S. cerevisiae population.

Conclusions/Discussion
Though not intended to be used for alcohol production, Gause#s original experiment did mention a presumed increase in alcohol production during competitive fermentation by one species, and did peak my interest. It did indeed produce more alcohol through competition. This may be of note to industry in their attempts to increase alcohol production.

Summary Statement
This experiment examines a possible method to improve the production of alcohol through fermentation with yeast by species competition.

Help Received
I was assisted in part by my instructor Dr. Morse, to comply with federal regulations with the distillation of ethanol.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Maya C. Peterson

Project Number
J0519

Project Title
PCR in Action: The Study of Magnets Representing the Process of Copying DNA

Abstract

Objectives/Goals
The Polymerase Chain Reaction is a process that scientists use to copy DNA. They use a primer and anneal it to a selected piece of DNA, called a template. This experiment replicates the process by constructing a magnet template and magnet primers to see how matches and mismatches affect the ability of the primers to stick to DNA that is copied during PCR. If there is a greater amount of magnets matches in a strand, then the annealing ability between it and the template will increase.

Methods/Materials
A model DNA template is made by placing 10 magnets (all facing the same direction) along one edge of a strip of packing tape, then folding the other side of the tape over the magnets so that they are all wrapped up in one long strand. Similarly made, smaller strands (primers) are 5 magnets long, but the magnetic sequences of their poles will be different. One end of the larger magnetic (DNA) sequence is fixed from overhead so that it freely hangs. Then, we attach each primer strip one by one to the DNA template. Each primer strip will have a hole punched at the lower end so that a paper cup can be hooked to it. The strength of each bond will be measured by the amount of pennies it can hold until it drops.

Results
The results of the experiment conclude that the more magnetic matches there are in a sequence, the stronger the primer strand anneals to template. But something else was observed. When a magnet primer has the same amount of matches or mismatches, the sequence can also affect the result. When more matches were grouped together, the results showed the primer was more strongly attached to the template.

Conclusions/Discussion
Comparing all the evidence, the hypothesis is supported. Supposedly, this project was about how more matches affected the strength of the bond, which seemed self-evident. But through trial and error, it was determined that the sequence of matches also matters. When the magnets that attract are grouped together instead of spread apart, they create a stronger bond. The outcome means that in order to have a sturdy primer to replicate DNA, scientists should make sure that there are more matches of the bases so the copies of DNA bond better.

Summary Statement
How matches and mismatches affect the ability of primers to anneal to DNA that is copied during PCR.

Help Received
Mom helped type research report. Sister helped with some computer difficulties; Dad helped take pictures, edit some writing, and arrange information on board; Science teacher, Mrs. Burnett provided suggestions to improve project for County Fair; Millikan librarian, Mrs. Carrol proofread and gave suggestions for

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jadyn V. Reed

Project Number
J0520

Project Title
The Effect of Cooking on Vitamin C

Abstract

Objectives/Goals
The objective of this experiment is to find the effect of cooking methods and time on the Vitamin C content in food, specifically spinach.

Methods/Materials
20 grams of spinach was measured out and were cooked for 30, 60, 90, 120, 150, and 180 seconds for each of the following cooking methods: boiled, steamed, microwaved and sautéed. Raw spinach was used as the control. The spinach was then blended into a solution using the cooked spinach and 100mL of distilled water. Then 2mL of the solution was mixed with 0.5mL of starch solution. Then the solution was titrated using Iodine.

Results
The microwave maintained the same Vitamin C content as the control, boiling decreased Vitamin C content, while sautéing and steaming showed a higher Vitamin C content.

Conclusions/Discussion
The experiment showed that cooking methods do affect the Vitamin C content of the food. Time of cooking also affects the Vitamin C content.

Summary Statement
The goal of this project was to determine if cooking method and time had an effect on Vitamin C concentration in food, specifically spinach.

Help Received
Mother diluted Lugol's iodine solution and trained me how to do a titration. She also helped type the report. My father helped me organize data into spreadsheet, and programmed the spreadsheet to do the standard deviation calculation, and the calculatons for Vitamin C concentraion.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Barron Regan

Project Number

J0521

Project Title

The Effects of Antioxidants on Agrobacterium tumefaciens Induced Plant Tumors

Abstract

Objectives/Goals

Agrobacterium tumefaciens is a bacteria that injects its own DNA into plant cells causing cancerous tumors to grow. The objective of my experiment was to see if antioxidants could minimize or prevent the growth of these tumors in sunflower plants.

Methods/Materials

I grew 25 sunflower plants from seeds and divided them into five groups. I watered one control group with plain water and four groups with antioxidants including: acai berry, blueberry, grape seed and green tea. On week two, I inoculated all of the plants with Agrobacterium tumefaciens, also known as Crown Gall disease. By week four, many tumors began to appear. I counted and measured the tumors for four weeks.

Results

My results showed that antioxidants are effective in reducing Agrobacterium tumefaciens-induced plant tumors. The Control group grew the most tumors and they had the largest average volume. The green tea, on the other hand, completely prevented the growth of any tumors. The acai berry, blueberry and grape seed were effective in slowing the growth and size of tumors, but a number of tumors still appeared.

Conclusions/Discussion

My experiment showed that certain antioxidants can minimize or prevent cancerous tumors in plants. Although many studies have shown that antioxidants protect cells from the damage caused by free radicals, the National Cancer Institute has stated that more research is necessary to prove their effectiveness in fighting cancer, especially in humans. My project shows that more research is worthwhile.

Summary Statement

My project tested the ability of antioxidants to minimize or prevent the growth of tumors in sunflower plants.

Help Received

Mr. McAusland, my math teacher, helped decide proper calculations for measuring tumors; Mr. Binkley, at Carolina Biological Supply, answered questions about bacteria; mom helped take pictures, proof read report and cut papers for board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Scott T. Robertson

Project Number
J0522

Project Title
Eggsperiment: How Common Household Liquids with Different pH Levels Affect Eggs

Abstract

Objectives/Goals
The goal of this experiment is to determine whether eggs can be affected by common household liquids, with different pH levels, if exposed to them for three days. I believe the vinegar, lemon juice, and Pepsi will dissolve the shell of the egg because they are so acidic.

Methods/Materials
Seven eggs were each weighed and measured and then placed in a container filled with one of seven different household liquids; vinegar, lemon juice, apple juice, Pepsi, milk, water, and Windex. Each day the liquid was drained, the egg's size, weight and appearance were recorded and the liquid was refreshed. After three days the liquids were drained and final data was collected and recorded.

Results
The eggs that were soaked in vinegar and lemon juice had the shells completely dissolved and had absorbed liquid through the egg membrane which increased the egg's size and weight. The egg soaked in apple juice had a softened shell that was stained brown. The egg soaked in Pepsi was stained dark brown, but the shell was not softened. The egg soaked in Windex was stained light blue with no shell softening. The eggs soaked in milk and water were unaffected, except for some light gray speckles.

Conclusions/Discussion
I believe that the different acids in the vinegar and lemon juice reacted with the calcium carbonate in the eggshell, causing it to dissolve. This allowed the liquids to be absorbed through the membrane into the egg, increasing their size and weight. I learned that Pepsi, even though it is acidic, did not dissolve the eggshell because it contains Phosphoric Acid, which does not dissolve eggshells.

Summary Statement
My project is about the affects of different liquids on whole, raw eggs.

Help Received
Sister helped with data analysis and graphs; Mom helped with typing, provided materials and supervised for safety.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Adi Shiloni

Project Number
J0523

Project Title
Healthy Leafy Greens and Chlorophyll

Abstract

Objectives/Goals
The title of my project is: Do Healthier Leaves Have More Chlorophyll? I will test the levels of chlorophyll in a few healthy leafy vegetables by extracting chlorophyll from each leaf. The purpose of this project is for me to see if chlorophyll level has anything to do with how healthy a leaf is.

Methods/Materials
In my study I researched which leafy vegetables are the healthiest. I tested different leafy vegetables including spinach, kale, iceberg lettuce, romaine lettuce, rainbow chard, broccoli leaf, and parsley, for the amount of chlorophyll in each leaf. I tested for the amount of chlorophyll using three different methods, by eye, by TLC, and by a Nano drop. I used the same amount of alcohol for each leaf to make sure that the only thing I change each time is the leaf, which is the independent variable.

Results
My results showed that there is a correlation between the amount of chlorophyll in the leaves and how healthy they are. I saw that kale and rainbow chard that are the two healthiest leaves had the highest amount of chlorophyll. I also saw that iceberg lettuce which is known as one of the less healthier leaf had just a tiny bit of chlorophyll in it.

Conclusions/Discussion
The main conclusion from my experiment is that there is a correlation between the amount of chlorophyll in a leaf and its nutritional value. I proved my hypothesis correct because I said that healthier leaves have more chlorophyll and they did. If I were to do this project again I would also add frozen leafy vegetables to see if when you freeze a vegetable does it change the amount of chlorophyll in it and does it change how healthy a leaf is. I would also add a few more vegetables to collect even more comprehensive data.

Summary Statement
Do healthier leaves have more chlorophyll.

Help Received
Grandmother helped use lab equiptment at a biotech company PeproTech; Father helped with board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Arpita Singhal

Project Number

J0524

Project Title

Herbalism as a Hypoglycemic Agent: Evaluation of Alpha Amylase Inhibition by Different Medicinal Plants

Abstract

Objectives/Goals

Diabetes mellitus, a carbohydrate metabolism disorder of the endocrine system, affects more than 100 million people around the world and appears in one of two types: Type 1 or Type 2. Type 1 diabetes occurs when the body produces no insulin, whereas Type 2 occurs when the body produces less insulin, or the cells do not recognize all the insulin. This project tests ten medicinal plants for their alpha amylase inhibitory properties. Alpha amylase hydrolyzes complex carbohydrates into simple sugars. Insulin, a hormone, gives signals to the cells to convert glucose into energy. If the amylase activity is inhibited, the same amount of glucose is produced in a smaller amount of time; thus less insulin can transport the smaller amount of blood sugar into cells; thereby, the blood glucose level after a carbohydrate-filled meal is reduced.

Methods/Materials

Control: the solution that represents 100% enzyme activity and contains only the amylase and the starch solution; Independent variable: the ten medicinal plant extracts; Dependent variable: the amylase activity inhibition. Each of the ten plants is extracted in five solvents ranging from polar to non-polar. The inhibitory properties of each plant extract are evaluated using a qualitative test and a quantitative assay.

Results

The following top five medicinal plants: T. foenum, M. charantia, E. officinalis, C. longa, and C. sinensis demonstrated significant alpha amylase inhibition; however, T. foenum inhibited the amylase activity the most in comparison to the control and other plant extracts. In cold water it exhibited 70% amylase activity inhibition; in hot water it demonstrated 61% inhibition; in methanol it displayed 49% inhibition; in isopropanol it showed 46% inhibition; and in acetone it exhibited 32% inhibition.

Conclusions/Discussion

This research shows that T. foenum inhibits the alpha amylase activity the most, partly supporting my hypothesis that the C. sinensis extracts would inhibit the amylase activity the most. T. foenum seeds displayed the most inhibitory potential in all solvents, except in acetone since the inhibitory bioactive materials were not extracted by the acetone. Any of the top five plants can act as effective hypoglycemic agents because they will give insulin enough time to regulate the blood sugar level. This discovery could lead to a possible solution for Type 2 diabetes.

Summary Statement

In this study I tested ten medicinal plants for their amylase inhibitory potential and identified T. foenum as a natural alternative to diabetic medications; this study could lead to a possible therapeutic solution for Type 2 diabetes.

Help Received

I thank Dr. Roger Terrill from the San Jose State University for letting me work in his laboratory and use his equipment; my science teacher for her guidance; and my family for their support.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Noopur G. Siroya

Project Number
J0525

Project Title
Carbon Catcher

Abstract

Objectives/Goals
The objective is to find out which type of sugar substitute(Splenda, Sweet n' Low, or Honey) will produce the most amount carbon dioxide in the least amount of time using yeast.

Methods/Materials
You will be collecting carbon dioxide from the yeast, sugar and sugar substitute's reaction by displacing water trapped in a graduated cylinder. Here's how to set it up: 1. Fill the bucket about one-third full with water and then invert the graduated cylinder filled with water. 2. Attach some plastic tubing to the bottle cap by making a hole in the bottle cap, inserting the plastic tubing and sealing the tube to the cap with silicone sealant to make it air-tight. Once the silicone is fully dry, place the other end of the tubing inside the inverted graduated cylinder and start the actual experiment. 3. Make one solution at a time. Dissolve 1 tablespoon of sugar in 1 cup of warm water at 115°F into a glass cup. Then add 2 teaspoons of yeast. Mix and pour into a bottle and cap the bottle tightly with the tube cap. Start the timer. 4. Stop the timer when 140 mL of water in the graduated cylinder is displaced by CO2. Keep a maximum time limit of 30 minutes for displacement of 140 mL water with CO2 in the graduated cylinder for each experiment. Repeat Step 4 for 5 times for each sugar substitute.

Results
The first experiment was conducted with sugar and it took 9 min. and 21 sec. for 140 mL of water to be displaced by CO2 in the graduated cylinder. Then 5 experiments were conducted with honey, giving an average time of 8 min. and 53 sec. Similar 5 experiments each were conducted with Sweet n' Low, giving an average time of 12 min. and 35 sec. Finally, Splenda displaced no water with CO2 in the graduated cylinder in the maximum time limit of 30 minutes.

Conclusions/Discussion
My data did not support my hypothesis that Splenda will produce carbon dioxide in the least time. I found that Honey produced CO2 the fastest of all the variables because it is a simple sugar even though regular granulated sugar can not be extracted from it. Sweet n' Low has fruit sugars which work well with yeast and produced CO2 in resonable time. Splenda did not produce any CO2 because its sugar molecules are backwards even though it is 99% sugar and 1% sucralose.

Summary Statement
This project is about measuring the time taken to produce carbon dioxide when yeast is mixed with 3 different types of sugar substitutes

Help Received
My mom proof-read all of my work and my dad got the supplies and helped with the technical aspect of this project. They both helped with the actual experiment and the board. My science lab teacher Mrs. Seager and Ms. Crane from Ask # A # Scientist Night answered my questions.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Haley B. Theaker

Project Number
J0526

Project Title
Jell Well or Gel Not

Abstract

Objectives/Goals
My objective was to identify fruits which had protease enzymes and what treatment methods I could use to break down these fruit enzymes so that the Jello could gel. I expected that the raw, frozen, and dehydrated kiwi and mango would not gel because of the protease enzymes they contain.

Methods/Materials
I made 60 cups of Jello and added raw, frozen, dehydrated, cooked, lemon treated, and alcohol treated kiwi, mango, and apple. I also had cups that contained no fruit and cups that had meat tenderizer (a known protease, as controls. I allowed ample time for the gelatin to gel. I recorded which fruit treatments allowed the gelatin to gel.

Results
I found that the cups with kiwi that was raw, frozen, lemon treated, and alcohol (whisky) treated, did not let the gelatin gel. All the other cups gelled, with the exception of the meat tenderizer cups.

Conclusions/Discussion
I found that my hypothesis was proved partially correct with respect to the raw and frozen kiwi, but the pH changed fruit (lemon treated) and alcohol (whisky) treated kiwi did not gel either. The dehydrated kiwi still allowed the gelatin to gel. I believe that the lemon was not a strong enough acid to denature the kiwi enzyme, and the whisky I used was not strong enough to denature the enzyme either. I believe that the dehydrated kiwi allowed for gelling because the fruit dehydrator must have been hot enough to break down the enzyme. The mango gelled in all cases which disproved my hypothesis. I think, because of the time of year, the mangos may not have had enough enzyme in them to prevent gelling.

Summary Statement
I explored how fruit enzymes prevent gelling of gelatin and what you can do to fruit to denature their enzymes.

Help Received
My mother helped me put my board together & cook

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jesse Wang

Project Number
J0527

Project Title
Organic vs. Conventional: Which Is Superior?

Abstract

Objectives/Goals
The objective is to determine whether organic or conventional tomatoes have more nutrients. Along with that, testing will also be conducted to determine which type of tomato is preferred by the public in terms of taste, and if the public can determine which tomato is organic just off of taste.

Methods/Materials
The materials in the #Chemistry of Food Experiment Kit# (including Biuret#s reagent, indophenol powder, Lugol#s iodine, and Benedict#s solution) were used to test both organic and conventional tomatoes for starch, protein, glucose, and Vitamin C. People were anonymously given a slice of both organic and conventional tomato and then asked to determine which tasted better and if they could determine which tomato was organic.

Results
It was observed that the organic tomato had more glucose than the conventional tomato. The organic tomato also had almost 150% more Vitamin C than the conventional tomato. Neither starch nor protein was present in either tomato. In the survey portion of testing, 52% tested preferred the taste of organic tomato over conventional, 14% preferred neither, and the remaining 34% preferred the taste of conventional tomato.

Conclusions/Discussion
The organic tomato, although more expensive and also smaller than the conventional tomato, contains a lot more glucose and Vitamin C. The taste of the organic tomato is also preferred by the majority of the public. Because farming methods are the same for all organic crops, it is possible to conclude that most, if not all, of the other organic crops will have more nutrients than their conventional counterparts. If cost is not an issue, organic is a good choice. However, there are no obvious problems with eating conventional food; it is still a viable choice, especially if cost is an issue.

Summary Statement
This project was done to determine if organic tomatoes are truly superior to conventional tomatoes in terms of taste and nutrition.

Help Received
Mom helped me with testing and purchasing materials; Teacher helped edit work; Brother helped with testing and editing graphs.