CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Emilia Abdollahian

Project Number
J2001

Project Title
Do Green Cleaning Products Get Rid of Bacteria Better Than Ammonia Base Cleaner?

Abstract

Objectives/Goals
I am doing this project because I know now days everyone wants to be cool by going green, but is it worth it if it's not eliminating bacteria?

Methods/Materials
I used 20 petri dishes, and I tested bacteria from a bathroom doorknob and a kitchen sponge. The green cleaners I tested were Green Works and Mean Green and the two ammonia base cleaners I tested were Lysol and 409. My control variable was water. I first swabbed the bathroom doorknob then I swabbed it on the petri dish. Next I whole punched filter paper and dipped it into the cleaner. Finally, I placed it on the petri dish. I did these steps for all of my variables and with both of my bacteria. On day 3 I measured the inhibition rate then again I measured the inhibition rate on day 5.

Results
I found that Green cleaners do not decrease bacteria population at a higher rate than standard ammonia base cleaners. I also found that Lysol eliminated bacteria the best followed by 409 then Mean Green and finally Green Works.

Conclusions/Discussion
I found that even though Green Works was the most expensive cleaner it only worked as well as my control variable, which was water. I know it's important to save the environment, but if green cleaners don't eliminate bacteria, then the earth can be contaminated with so many bacteria.

Summary Statement
Are green cleaning products decreasing bacteria population as well as standard household cleaners?

Help Received
Mr. Gong helped with me do my flowchart.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Will Abele

Project Number
J2002

Project Title
Dissolution Resolution: How Do Beverages Affect the Speed of Dissolution of Pain Relievers?

Abstract

Objectives/Goals
I conducted this experiment to test the relative speed of dissolution of pain reliever tablets in simulated stomach fluid with different beverages. I tested two pain relievers, Tylenol and Advil, and three beverages (water, apple juice, and 7-UP).

Methods/Materials
I made simulated stomach fluid by combining 150 milliliters of water and 75 milliliters of hydrochloric acid. I split the pain reliever tablets in half, placed a half tablet in the fluid, and measured how long it took to dissolve. I conducted six trials. Then I made more simulated stomach fluid to which I added 150 milliliters of water. I placed a half tablet in the fluid and measured how long it took to dissolve. I conducted six trials. I repeated this process with apple juice and 7-UP.

Results
The Tylenol tablets dissolved faster than the Advil tablets with every beverage tested. For the most part, pure simulated stomach fluid, without any added beverage, most quickly dissolved both pain relievers. Generally, of the beverages tested, water provided the most efficient way to dissolve the tablets. As to the next best beverage, the Tylenol tablets dissolved quickly in 7-UP, while the Advil tablets dissolved quickly in apple juice.

Conclusions/Discussion
When taking Tylenol or Advil, I recommend doing so with a glass of water rather than with any other beverage. The results validate my hypothesis that the Tylenol would dissolve faster than the Advil, but reject my hypothesis that the pain relievers would dissolve fastest in apple juice.

Summary Statement
I tested the speed of dissolution of Tylenol and Advil when placed in simulated stomach fluid combined with one of three beverages: water, apple juice, and 7-UP.

Help Received
I received guidance from my teacher throughout the process. Also, I received help from my parents in purchasing the materials and in using the hydrochloric acid.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Delaney Berger; Nicole Gross

Project Number
J2003

Project Title
Is This Hairy Enough for You?

Abstract

Objectives/Goals
Which liquid can break down cat hairballs the best? Hairballs in cats can be a huge problem, so we studied what could break them down. Hairballs can get stuck in their digestive tract and esophagus. We decided to do this project because we are both cat owners, and sometimes the hairball has to leave their body and we have clean them up.

Methods/Materials
We weighed out 1 gram of cat hair and put 10 in each of the 4 ice cube trays. Then, we poured 10ml of pineapple juice, dish washing detergent, egg yolk, and water. We let them soak in the liquid for 3 days. After, we washed them out; we weighed them again and compared.

Results
The cat hairballs soaked in dish washing detergent broke down the most hair with an average loss of 0.15 grams. Our hairballs soaked in pineapple juice lost an average of 0.13 grams. The hairballs soaked in egg yolk lost an average of 0.13 grams also. The control hairballs soaked in water did not have a change of mass.

Conclusions/Discussion
We believed that 10mL of pineapple juice poured onto 1 gram of cat hair would break down the hair more than 10mL of dish washing detergent or egg yolk. Our hypothesis was not supported because the average weight of the hair after being soaked in dish washing detergent was less than the average of the hair after being soaked in pineapple juice, and the average weight of hair after being soaked in egg yolk was the same as the pineapple juice. The hair soaked in dish washing detergent which had an average of 0.85g was 0.15g less than the average weight of hair soaked in pineapple juice which was 0.87g. The weight of the hair soaked in egg yolk went down an average of 0.13g and had an average mass of 0.87g. The hair soaked in water, our control, stayed at an average of 1.0g and did not change.

Summary Statement
Our project is about breaking down cat hairballs with house-hold remedies.

Help Received
Dr. Waterhouse

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jacob Bright; Brian Hanover

Project Number
J2004

Project Title
Does Your Dish Soap Kill Bacteria?

Abstract

Objectives/Goals
The purpose of our experiment was to determine which dish soap would be the most effective against bacteria.

Methods/Materials
Materials: 20 Petrie dishes with agar; Sterile cotton swabs; Raw chicken; Dawn dish soap; Dawn antibacterial dish soap; Palmolive dish soap; Palmolive antibacterial dish soap; 4 dinner plates; Water; Sink; 4 large bowls; Sharpie pens; Tape.

Method: The first step was to rub raw chicken on four different dinner plates. We then dipped each plate into its own soapy water. Each container of water had two tablespoons of its own dish soap mixed into twenty-four cups of water. Samples were obtained from each dinner plate with sterile cotton swabs, and then the agar dishes were inoculated with each swab. The petri dishes were observed daily for four days. After four days, our observations were recorded.

Results
The Palmolive antibacterial dish soap was the most successful in killing bacteria on the plates after washing and letting the plate air dry in comparison to it competitors.

Conclusions/Discussion
Our conclusions show that our hypothesis was incorrect because we predicted that Dawn Antibacterial dish soap would be more effective because it had more cleaning agents (3 cleaning agents). Our experiment demonstrated that Palmolive Antibacterial soap with only 2 cleaning agents was the most effective in fighting bacteria among those tested. Even though it wasn#t officially part of our experiment, we found that letting the dishes dry made the bacteria decrease a lot.

Summary Statement
To determine which dish soap actually kills the most bacteria on your hand-washed dinner dishes.

Help Received
Parent helped with the actual method/experiment, typing report, and making charts.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Kayley A. Bryan

Project Number
J2005

Project Title
Which of Four Flour Products Has the Most Gluten in It?

Abstract

Objectives/Goals
The objective of this project is to determine how much gluten is present in four different types of flours bough at the local grocery store. A second objective of this project is to see if one of the flours, the gluten free flour, which is also a control, is really gluten free as the product claims.

Methods/Materials
I purchased four different types of flour from a local grocery store. I then measure out 1 cup of each flour to mix with 2/3 cup of water. After mixing each flour and kneading the dough, I let each of them sit for 10 minutes to allow the two proteins, gliadin and glutenin, to bond and form gluten. After this I rinsed the balls of dough with warm water to remove all extra by-products. This step leaves the gluten behind because gluten, once formed, is not water soluble. The gluten was then weighed on a scale to see how much was present in each type of flour.

Results
The results showed that whole wheat flour contains the highest amount of gluten compared to the cake flour and self-rising flour. These two flours had about half of the amount of gluten as the whole wheat flour. The gluten free flour proved to be gluten free as the product suggested.

Conclusions/Discussion
Many people have gluten allergies or even gluten sensitivities. Since flour and wheat products are widely used in breads, desserts, sauces and many other products in the food industry it is important for consumers to know how much gluten is really in the products they buy. The data from this experiment suggests that products that are closer to the original wheat form have a higher amount of gluten in them. The whole wheat flour is not as processed as the other flours. And the gluten free flour is highly processed to remove all of the proteins which form gluten. People with a gluten sensitivity can learn which products have a minimal amount of gluten it them and can be consumed safely.

Summary Statement
The project is about discovering the amount of gluten present in four flour products sold at a local grocery store.

Help Received
My advisor helped me choose a project and where to do some of the research. My mother helped me purchase all the products needed for the experiment, helped take pictures while I did the experiment and helped me check my spelling and typed the report.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Klara J. Chang

Project Number
J2006

Project Title
Ultraviolet Light vs. Bacteria on Toothbrush

Abstract

Objectives/Goals
My objective is to see how long it takes for an ultraviolet light sanitizer to kill more than 99% of bacteria on a toothbrush. Based on my research, longer exposure should result in more bacteria killed.

Methods/Materials
Four toothbrushes inoculated with similar amount of bacteria from my tongue were tested in the same UV sanitizer. Three of the toothbrushes were exposed to UV light, each for a different amount of time, while the fourth toothbrush, not exposed to the UV light, was used as the control. Afterwards, the remaining bacteria on the toothbrushes were transferred to a growth medium and the bacteria were grown for a specific amount of time before plating, so the number of bacterial colonies could be counted.

Results
The results of my experiments were consistent with my hypothesis. However, to kill more than 99% of bacteria, at least thirty minutes were required.

Conclusions/Discussion
My hypothesis was correct. Thirty minutes had the most effect on killing the bacteria. This would help in the real world by showing people the large amount of bacteria in their mouths that need to be cleaned. It also demonstrates a method of killing the bacteria left on the toothbrush.

Summary Statement
My project is about how long it takes for an ultraviolet light sanitizer to kill 99% of bacteria on a toothbrush.

Help Received
Amgen provided supplies for the experiment; Mother helped conduct experiment; Parents helped put together the project board; Teacher edited my research papers.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Hayden M. Costa

Project Number
J2007

Project Title
You're Drinking That?

Abstract

Objectives/Goals
The purpose of the experiment is to find how much bacteria is in fast food restaurant water and ice.

Methods/Materials
All samples are melted and materials gathered. The area is sanitized with alcohol base cleaner. Materials needed are: coliform petrifilm plates, standard petrifilm plates, spreader for the plates, dilution water, electronic pipetor, sterile tips (for pipetor), colony counter, and a tally counter. The coliform and standard plate (SPC) petrifilm is labeled according to dilution 1:1 and 1:10. A spreader is used to spread the sample. Time is recorded and plated for both coliform and SPC.
Plates are placed into an incubator. An oven light was used for this experiment as the incubator. The coliform for plates were read at 24 hours +/- 2 hours.
Coliform plates were taken out of the oven incubator and the colony counter was used along with the tally counter. The results were recorded.
The SPC plates were read at 24 hours +/- 2 hours. The coliform plates were taken out of the oven incubator. The results were recorded

Results
Samples of water and ice were taken from dine in and drive thru of 3 fast food restaurants labeled A, B, and C. Restaurants A and C had higher bacteria levels in the water and ice in the drive thru than dine in. However, restaurant B had higher bacteria levels dine-in and drive-thru. Overall, restaurant B had the greatest amount of bacteria in both water and ice regardless if it came from dine-in or drive-thru

Conclusions/Discussion
The conclusion proves that the hypothesis was incorrect. The drive-thru restaurant water and ice will be cleaner than getting water and ice from the dine-in restaurant.

Summary Statement
This experiment is to find how much bacteria is in fast food restaurant water and ince from drive-thru and dine in.

Help Received
Mother helped with my board; Lab equiptmen and supplies from lab at Land O' Lakes, Tulare, CA; 7th Grade Science teacher helped with graphs.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Shivani Gupta

Project Number
J2008

Project Title
Curdle It Up!

Abstract

Objectives/Goals
The objective was to determine the best type of milk to be used for milk coagulation. It was hypothesized that whole milk would be best for coagulation because it had the highest fat content out of three milks being tested: skim milk, reduced fat milk, and whole milk.

Methods/Materials
Milk was heated to eighty-two degrees Celsius on the stove using a thermometer. Once reaching this temperature, the milk was removed from the heat, and while gently stirring, eight milliliters of vinegar was added. The heated milk turned to curdled milk, and the curdles were drained by the use of a cheesecloth and a colander. Curdles were judged on yield and texture.

Results
Whole milk yielded in more cheese compared to reduced fat milk and skim milk. Based on texture of curdles, whole milk's curdles were creamy, moist, and soft. Reduced fat milk's curdles were dense and spongy. Meanwhile, skim milk curdled the least and its curdles had a pasty consistency and were sticky.

Conclusions/Discussion
The hypothesis was correct as whole milk curdled the best, having the highest curdle yield and best texture of curdles as compared to reduced fat milk and skim milk. Whole milk would be best recommended for the production of fresh cheeses. Also, while making milk-based sauces, skim milk would be recommended for the recipe to result in the least amount of curdling problems. Furthermore, skim milk coagulated the slowest as compared to reduced fat milk and whole milk.

Summary Statement
The best type of milk to be used for milk coagulation.

Help Received
My father helped me by taking pictures while I was conducting the experiment.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Riley K. Harn

Project Number
J2009

Project Title
Commercial vs. Non-commercial Weed Killers: Which Works the Fastest?

Abstract

Objectives/Goals
The objective is to compare commercial, non-environmentally friendly weed killers with non-commercial, environmentally friendly substances to see which will kill weeds the fastest.

Methods/Materials
Five groups of 9 trials each of Forget-me-not weeds (each in its own seed tray compartment) were set up. On Day 1, one group of 9 was sprayed with Roundup; one group of 9 was sprayed with Weed B Gon; one group of 9 was sprayed with cider vinegar; one group of 9 had boiling water poured over it, and one group of 9 was left alone as a control. The plants were monitored for 4 days and their status was recorded with a camera and by using a 0 to 4 scale each day, where 0 = Alive, 1 = Starting to die, 2 = 1/2 dead, 1/2 alive, 3 = Barely alive, 4 = Completely dead.

Results
The cider vinegar worked the fastest, and then the boiling water. Roundup did third best and Weed B Gon got fourth place. The control plants that had nothing done did not die at all.

Conclusions/Discussion
My hypothesis was incorrect; boiling water was the second best substance I tested. The fastest way to kill weeds is by using cider vinegar. I had to revise the experiment several times to eliminate as many variables as possible, but I did obtain more accurate results. These results are great because the two environmentally friendly variables, cider vinegar and boiling water, worked better than the other two, Roundup and Weed B Gon, which were commercial brands that weren't environmentally friendly. This also proves that you cannot expect your weeds to die on their own. If you want an environmentally friendly way to kill your weeds fast, use cider vinegar!

Summary Statement
My project is about comparing commercial, non-environmentally friendly weed killers (Roundup and Weed B Gon) with non-commercial, environmentally friendly weed killers (cider vinegar and boiling water) to see which kills weeds the fastest.

Help Received
Mother helped with taking photos, charts, pouring boiling water.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Alonzo Javier

Project Number
J2010

Project Title
Which Won? Wipe or Wash

Abstract

Objectives/Goals

Objective: The objective of my experiment is to determine which cleans hands better, wiping hands with hand sanitizer or washing hands with soap and water.

Hypothesis: I believe that wiping with hand sanitizer will cleanse hands better than washing with soap and water.

Methods/Materials

Material: Hand Sanitizer (Unscented and Up & Up brand), Soap (Unscented and Up & Up brand), Paper Towel, Growth Media (R2A Agar # Heterotrophic Media), Media Plates with Lids (Plastic), Sharpie Marker, and Incubator (35ºC)

Method: Using growth media, test subject hands (palm & fingers) before and after using hand sanitizer. Similarly, compare this by testing another subject#s hands before and after washing with soap and water. Incubate the test growth media accordingly for two (2) days and read results directly by counting the number of dots (bacteria). Compare results.

Results

The results showed that before cleaning my hands with either soap and water or hand sanitizer, there were quite a number of bacteria compare with after the hands were cleaned which were considerably less. Before cleaning the hands using soap and water and hand sanitizer, the average number of bacteria were 4,282 and 61, respectively. After cleansing with soap and water, the average number of bacteria reduced was 154 or a 96.3% reduction. Cleansing with hand sanitizer resulted in the average reduction of the number of bacteria was 12 or a 71.1% reduction.

Conclusions/Discussion

My hypothesis was incorrect. The results show soap and water clean hands better than hand sanitizer does. There was an initial difference in the number of bacteria before the hands were cleaned, and this was due to the use of different volunteer for each test. However, the results showed that soap and water killed an average of 96.3% of the bacteria while the sanitizer killed an average of 71.1%. Though the hand sanitizer didn#t kill as much as the soap and water, both are meant to be used for cleaning the hands. The hand sanitizer still did a good job of reducing the number of bacteria but not as great as simply washing you hands.

Summary Statement

My experiment is to determine which cleans hands better, wiping hands with hand sanitizer or washing hands with soap and water.

Help Received

My parents helped with the assembly of the presentation board. I also had help with my Dad on the experiment using the laboratory (and lab equipment) at his work at a water company.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Eve Jones; Calissa Kloepfer

Project Number
J2011

Project Title
"Handy" Solutions

Abstract

Objectives/Goals
Our objective was to find out if hand sanitizer is really as effective at killing bacteria when cleaning hands as liquid hand soap.

Methods/Materials
Materials used:Water,Liquid hand soap,Hand sanitizer,Blow dryer,20 Petri dishes,Camera,20 mL of AGAR,Swabs,Two hands(right\left),Assistant(s),Flat surface.
To conduct this experiment; first, we had our assistant thoroughly wash their hands. Next, our assistant washed our right hand with cold tap water while singing "Happy Birthday" twice and rinsed our hand off. After that our partner used a hair dryer to blow our hand dry and then swabbed our hand in a zig zag pattern. Then the partner transferred the bacteria from the swab to the Petri dish. We then did the same thing, only with our left hand and the hand sanitizer.
Starting at day three we took pictures of each test every other day, while charting the percentages of visible bacteria growth in each petri dish. The growth of the bacteria will be monitored for the next 9 days.
To rule out any question of more bacteria possibly being on our dominant hand, Eve will "wash" her left hand (dominant) with hand sanitizer, and Calissa will wash her right hand (dominant) with liquid soap and water.

Results
Two out of three tests show that liquid soap works more effectively than hand sanitizer. Our petri dish with nothing put in it showed a tiny spec of growth at the very end of the nine days, indicating that it would have very little influence on our results. The unwashed hand control shows a lot of bacteria present and consistent growth throughout the trial. When comparing the unwashed hands to the liquid soap and hand sanitizer samples, you can see that while liquid soap works better, both kill bacteria on hands thus preventing the spread of germs and bacteria.

Conclusions/Discussion
We came to the conclusion that hand sanitizer does not work as effectively as liquid hand soap.For the 6 tests we conducted, the results varied a little but we still feel we have come to a solid conclusion. While hand sanitizer did kill germs, it was ineffective unlike the liquid soap. Liquid soap showed less bacteria growth than the hand sanitizer. The unwashed control dishes showed major growth from day one and continued over the period of time we monitored it. Therefore we conclude that it is better to wash your hands with liquid soap and water rather than use hand sanitizer.

Summary Statement
We tried to find out if hand sanitizer kills as much bacteria as liquid soap and if you were given both choices is the the more effective one.

Help Received
Both of our Mothers helped with the lay-out of the board, Katlin Kloepfer assisted with hand washing, and Dr. Christian Heywood gave us some advice.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Meghana Khurana

Project Number

J2012

Project Title

Milk Matters! Organic vs. Conventional Milk: Comparison of Milk Spoilage (pH) and Bacterial Growth

Abstract

Objectives/Goals

To determine if organic or conventional milk lasts longer by studying pH, color, odor and Bacterial growth for 3 weeks in refrigerator and room temperatures. I believe organic milk will last longer than conventional milk. I also think conventional milk will be more susceptible to bacterial growth than organic milk.

Methods/Materials

Two organic brands of milk, Heritage & Horizon and 2 conventional brands, Alta Dena & Albertsons, were tested. Both full fat & low fat versions were tested for each brand for a total of 8 milk types. For each milk type, I made 6 milk samples in Ziploc cups and inoculated 6 corresponding agar petri dishes from the samples. 3 sets of milk cups & petri dishes were kept in room temp. and 3 sets were kept in the refrigerator. Everyday, for 3 weeks, readings were taken for milk pH, odor, appearance (from Ziploc cups) and bacterial growth in the petri dishes. Altogether there were 48 milk samples & 48 petri dishes.

Results

At room temperature, organic milks lasted longer than conventional ones. In the refrigerator, organic and conventional milk lasted almost equally long. Horizon, Albertsons and Heritage were very comparable. Alta Dena spoiled earlier. Milk fat did not make matter.

Bacterial growth: Alta Dena low fat had the most bacterial growth right away. Horizon and Heritage samples grew bacteria after a delayed period slowly, but once they started appearing, they grew rapidly. Albertsons milk showed significantly fewer colonies.

Conclusions/Discussion

1.At higher temperatures ultra-pasteurized milk lasts longer.

2.When refrigerated, life of milk is very comparable between conventional and organic brands contrary to my hypothesis. Organic milk does not always last longer.

3.I expected all conventional milk to have more bacterial growth than organic milk. My prediction was wrong. Albertsons brand had the least growth of bacteria in the agar plates. Alta Dena had the most. Both are conventional brands making me wonder why one conventional brand had the most resistance to bacterial growth.

Summary Statement

Comparison of organic and conventional milk: Study of pH, odor, appearance and bacterial growth in milk samples in refrigerator and room temperatures over 3 weeks

Help Received

Teacher provided pH Vernier equipment, mother helped with readings a little bit on some days as readings sometime took 4 to 5 hours a day, sister helped make labels

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Kerris L. Lassley

Project Number
J2013

Project Title
Which Household Substance Will Slow Down the Ice Nucleation Process of Dew on Orange Trees?

Abstract

Objectives/Goals
The reason I am doing this investigation is to find out how to slow down the freezing process of dew on orange trees. By doing this I will find a method for farmers to protect their crops from frost damage, which causes farmers to loose thousands of dollars each year.

Methods/Materials
I am using water droplets in my investigation to determine how to slow down the freezing process of dew on orange trees. In the first group for my control I will be spraying plain droplets of water on orange leaves and placing the tree in the freezer and timing it to see how long it takes for frost damage to occur. Then I will record results in a data book. In my first group I will mix water with salt. I will spray droplets on orange leaves and place the tree in freezer and timing it to see how long it takes for frost damage to occur. Then I will record results in the data book.Repeat with salt, dish soap, orange juice, and honey.

Results
*Using water as my control showed that 77% of the leaves were damaged in a 24 hour time frame.
*Water with salt Froze quickly, showing that 74% of the leaves were damaged in a 24 hour time frame.
*Water with orange juice did have an affect on slowing the freezing process, showing that 32% of the leaves were damaged in a 24 hour time frame.
*Water with dish soap did have an affect on slowing the freezing process, showing that 22% of the leaves were damaged in a 24 hour time frame.
*Water with honey had the best affect on slowing the freezing process, showing that 16% of the leaves were damaged in a 24 hour time frame.

Conclusions/Discussion
In conclusion, I have learned that by adding honey to water it will slow down the ice nucleation process of dew on orange trees. Still not clear if it was the thickness of the droplets or the honey that slowed down the freezing process, by coating the leaves. With more research and testing, I am sure I can find a method to slow down the ice nucleation process of dew on orange trees to help our farmers with protecting their crops from frost damage.

Summary Statement
I have tried to slow down the freezing process by adding household substances to water to see if it slows down the ice nucleation process of dew on orange trees.

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

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Sarah Levi; Amanda Radner

Project Number
J2014

Project Title
How Do Different Methods of Washing Affect Bacteria on Lettuce?

Abstract

Objectives/Goals
Our goal was to determine how common methods of washing affect bacterial counts on organic and conventionally grown Romaine lettuce given concerns about bacteria on produce causing illness. We hypothesized that triple washed non-organic lettuce would have the most bacteria because it had been stored in a closed bag. We thought that organic lettuce washed with produce cleaner would have the least bacteria because we suspected that organic lettuce was cleaner to begin with, and we thought that produce cleaner combined with a thorough washing would kill the most bacteria.

Methods/Materials
Organic Romaine lettuce was rinsed with room temperature water for one minute. Organic Romaine lettuce was washed with room temperature water mixed with widely available commercial produce cleaner for one minute. Unwashed conventional lettuce was rinsed for one minute with room temperature water, and unwashed conventional lettuce was washed with room temperature water mixed with produce cleaner for one minute. Commercially triple washed organic and conventional lettuce was used as packaged. Five leaves of each lettuce sample were swabbed using a sterile cotton swab. The swabs were streaked on nutrient agar plates and then placed upside-down for five days in a warm, dark location (100 F, 37 C). Bacterial counts were obtained daily.

Results
Within the conventional lettuce groups lettuce washed with produce cleaner had the least bacteria and hand washed lettuce had the most bacteria at 24 hours. However, organic commercially triple washed, packaged lettuce had the least bacteria of all groups at 24 hours. Organic hand washed lettuce had the most bacteria of all groups at 24 hours.

Conclusions/Discussion
Our hypothesis was incorrect. Organic lettuce washed with produce cleaner did not have the least bacteria. Organic lettuce which is commercially triple washed receives a thorough washing prior to purchase. Likewise, commercially triple washed conventional lettuce did not have the highest bacterial counts. Lettuce that was hand washed without produce cleaner, in both groups had the most bacteria. We believe that the act of hand washing added bacteria to the lettuce, and produce cleaner is partially successful in removing bacteria.

Summary Statement
Our project demonstrates that simple hand washing of lettuce leads to the highest bacterial counts, and these results are important for food safety.

Help Received
Physician parent showed us how to safely swab agar plates and count colonies. Used incubator at local hospital. Parents drove us to stores and hospital.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Opal B. Pandya

Project Number
J2015

Project Title
Hand Sanitizers: Germbusters? Alcohol-Based vs. Non-alcohol Based

Abstract

Objectives/Goals
The purpose of this project is to compare the effectiveness of alcohol-based sanitizers and non-alcohol based sanitizers to kill the bacteria, Staphylococcus epidermidis.

Methods/Materials
I conducted this experiment in the Memorial Hospital Lab with my designated scientist and supervisor, Mrs. Tracy Langenfeld. The first thing we did was take on colony of Staphylococcus epidermidis bacteria and mix it thoroughly into 3 ml of saline. Then, we placed 0.1ml 0.2ml of each antiseptic into the solution. After allowing the solution to settle for five minutes, we took a 0.01ml calibrated loop and dipped it into the concentration. We made an inoculation in the Petri dish for each of the sanitizers. Once this was done, we put all the dishes into an incubator at 35-37 degrees Celsius for 48 hours.

Results
My results were that the alcohol-based sanitizers did not work that well against the Staphylococcus epidermidis bacteria. Purell and Rite-Aid had moderate to heavy growth, while Veripur had mild, and Gold Bond had no bacterial growth at all.

Conclusions/Discussion
My conclusion is that my hypotheses were incorrect. The non-alcohol based sanitizers worked a lot better than the alcohol-based sanitizers to kill the bacteria, Staphylococcus epidermidis. My second hypothesis was also wrong because the Rite-Aid brand sanitizer worked slightly better than Purell.

Summary Statement
Comparing the effectiveness of alcohol-based versus non-alcohol based sanitizers to kill a bacteria.

Help Received
Mrs. Tracy Langenfeld handled the bacteria and inoculating the Petri dishes.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Nicholas B. Pickett

Project Number
J2016

Project Title
To "E" or Not to "E"

Abstract

Objectives/Goals
The goal of this project is to determine which type of reading platform is better: Back-lit (LCD) eReader, Non- Back- lit (eInk)eReader, and a book.

Methods/Materials
There are 2 parts to this experiment: Part One, Health and Part Two, Comprehension. For part one, subjects come to test site late at night and have their eyes tested for redness and soreness. Then subjects will alternate reading an Ipad (LCD), a Kobo (eInk), and a book for one hour per reader and then be checked for redness and soreness again. For part two, subjects read material from one of the three readers and then took a test on it. All that was needed was a camera, an Ipad, a Kobo, and a book.

Results
For part one, the Kobo did worst by .33 on a scale of 1 to 10, then the Ipad and Book tied. For part two, the Ipad did by far worst with the subjects averaging a test score of 4 and the Kobo being second with an average and book being best for comprehension.

Conclusions/Discussion
In order to determine which of the readers was best, it had to succeed in both parts of the experiment. For part one, the Kobo lost the race by being the worst for your eyes and the Ipad and book tied. For part two, the Ipad also lost the race with the Kobo being a pathetic second and the book by far beating everything else. In conclusion, the book is the best type of reading platform made today.

Summary Statement
My project is on how eReaders in comparison to books effect the health of your eye and your comprehension.

Help Received
Parents helped edit report; had 18 subjects be in experimentation.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Rebecca C. Pierce

Project Number
J2017

Project Title
Soap Nuts: Do They Have Antibacterial Properties in the Laundry?

Abstract

Objectives/Goals
Scientists have recently discovered that your washing machine contains many harmful bacteria and are currently evaluating the risk that these bacteria pose to humans. Bleach, hot water and microwave radiation are used to kill bacteria and viruses in clothes; however these methods are toxic or require large amounts of energy. Is there a relatively low-cost, environmentally-friendly, energy-efficient way to disinfect clothes?
Many natural soaps exist and have been used for thousands of years. One of these natural soaps is derived from the sapindus mukorossi or Soap Nut tree which occurs naturally in the Himalayan foothills. Soap Nut marketers, who are beginning to target the American market, claim that in addition to being able to clean and soften clothes, Soap Nuts are also antimicrobial. If this is true, Soap Nuts could be the answer to producing environmentally responsible, bacteriologically clean clothes. Based upon the research available, it is probable that Soap Nuts detergent will kill bacteria.

Methods/Materials
A procedure was designed to test Soap Nut solution and Tide on a piece of filter paper placed in petri dishes infected with E-Coli K-12. Dilutions with water of each concentrate were tested to mimic the detergents dilutions with water similar to what is experienced in a washing machine. Ethanol alcohol, a scientifically-proven, antibacterial agent, was used as the control.

Results
The Ethanol control group produced a ring of inhibition around the filter paper. The Soap Nuts concentrate and dilutions produced no ring. Tide produced a slight ring at more viscous dilutions; however this ring was insignificant and would be expected by a thicker substance. To conclude, neither Soap Nuts nor Tide presented antibacterial properties when compared to the Ethanol Alcohol control group.

Summary Statement
Soap Nuts' antibacterial properties may provide answers to combat the rampant growth of bacteria in the washing machine.

Help Received
Used lab at SDSU under direction of Dr. Stanley Maloy, Dean of the College of Sciences

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Emily R. Sinsky

Project Number
J2018

Project Title
How Effective Are Automatic Soap Dispensers?

Abstract

Objectives/Goals
My project goal is to test my hypothesis, which states that automatic soap dispensers and manual soap pumps are equally effective against bacteria since you wash your hands immediately after using either one.

Methods/Materials
In order to test my hypothesis, I inoculated my hands and washed them, using a manual soap dispenser, swabbed my hands and then repeated the process, only this time using an automatic soap dispenser. My hands were then cultured and I counted the bacterial colonies. I tested ten sites, varying from gas station restrooms to my own kitchen sink.

Results
My results did not support my hypothesis. I found that automatic soap dispensers are actually 31% more effective than manual soap pumps, so they are most likely a better choice to keep your hands clean.

Conclusions/Discussion
My project results were very surprising, because I also determined that there were not many bacterial colonies on the soap pumps themselves, so I wouldn't expect it to make a difference, just because I touched them. If I were to continue this project, I would increase the number of sites, especially in different locations, as well as see if the volume of soap dispensed from automatic soap pumps makes a difference, but so far, spending extra money on an automatic soap dispenser would most likely be worth it. My project results will be helpful to those working in schools, restaurants and hospitals, or wherever there may be an abundance of germs.

Summary Statement
I compared the effectiveness of automatic verses manual soap dispensers.

Help Received
My dad helped me obtain the cultures and drove me to test sites. Dr. McClay supplied petri dishes.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Maya R. Wilson

Project Number
J2019

Project Title
Bacteria Be Gone! Do Non-Toxic Disinfectants Really Work?

Abstract

Objectives/Goals
The objective of my experiment was to determine if non-toxic disinfectants work as well as those which contain toxic materials in eliminating bacteria from a wooden cutting board.

Methods/Materials
I chose 5 household disinfectants that were developed to kill bacteria, three that contained toxic materials: bleach (10% Clorox), ammonia and petroleum based (409), and sodium hydroxide (Mr. Clean), and two that contained less toxic ingredients: thymol from thyme oil, (7th Generation) and a homemade combination of white vinegar and hydrogen peroxide. I divided a wooden cutting board into six sections, one for each of the 5 different disinfectants, and one for a control. I contaminated the cutting board with raw chicken, then applied a different disinfectant to each of the 5 squares. I waited 10 minutes, wiped each surface with a sterilized sponge, and swabbed each square. I rubbed each swab on a labeled Petri dish, and allowed the bacteria to grow for 5 days at 62 degrees F. I measured the bacterial growth in each Petri dish to determine antimicrobial effectiveness. I conducted my experiment three times.

Results
Averaging the results from my three trials, the non-toxic mixture of hydrogen peroxide and vinegar eliminated the most bacteria from the cutting board. The other non-toxic disinfectant, 7th Generation, tied for 3rd place with Chlorox Bleach. The more toxic 409 came in 2nd, while Mr. Clean consistently failed to eliminate bacteria.

Conclusions/Discussion
The results of my experiment supported my hypothesis that the hydrogen peroxide and vinegar combination would eliminate more bacteria from a wooden cutting board than more toxic disinfectants. I believe vinegar and hydrogen peroxide, sprayed one right after the other, worked the best because, from my research, I learned that this combination oxidizes the surface of bacteria, causing their cell walls to split open, killing the bacteria. This method of killing bacteria seems to work better than more more toxic disinfectants which poison bacteria. This is important because it shows that people can use relatively non-toxic disinfectants to effectively clean cutting boards while avoiding the environmental and health problems that more toxic disinfectants can cause.

Summary Statement
My science fair experiment proved that non-toxic disinfectants can work as well as, and even better than, toxic disinfectants in eliminating bacteria from a wooden cutting board.

Help Received
My mother proofread my writing, took photographs of my experiment, and helped me with my display board. My science teacher suggested that I repeat my experiment a third time, which increased the validity of my results because I incorporated lessons learned from my first two trials.