CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Hamilton A. Allport

Project Number
J1701

Project Title
Natural Preservatives in the Chemical Age

Abstract

Objectives/Goals
The goal of my project is to show that even though we live in an age where most ways of treating harmful organisms are chemical, such as bleach or pesticides, there are still ways of treating these harmful organisms in a way less harmful to ourselves.

Methods/Materials
Materials I needed were: 1 liter of white wine vinegar, 26 strawberries, 26 tangerines, 7 pears, 4 bananas, 1 large bowl, 1 notebook, 1 thermometer, and 1 hygrometer.
Half of the samples I put directly onto the sheet of parchment paper I prepared, while the other half of the samples I submerged in vinegar for 15-20 seconds then put on the parchment paper, distinctly separated from the fruits without vinegar. Every day I recorded the number of fruits starting to mold (10-25% covered in mold), the fruits with much mold (26-50% covered in mold), and the fruits filled with mold (over 50% covered in mold.) I then graphed my results.

Results
My results all supported my hypothesis that the vinegar did help to prevent the growth of mold. One surprising result was that in three of the four fruits, as time went by, the difference in time between the fruits with vinegar and the fruits without vinegar reaching each stage increased, not staying constant as I would have thought.

Conclusions/Discussion
This project can be used for a variety of purposes, especially for controlling mold growth on buildings. Right now bleach is used a lot, and that is bad for respiration, especially in those with asthma. Vinegar is much more natural and does not have dangerous chemicals. Vinegar and other natural acids such as pomegranate seed extract are a safe alternative to bleach in this chemical age.

Summary Statement
My project is about how acids, in this case vinegar, are able to prevent the growth of mold on foods and other substances.

Help Received
Teacher explained how to participate in science fair; Mother gave me idea for using white wine vinegar.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Vardhaan Sai Ambati

Project Number

J1702

Project Title

Are Manufactured Nano-Materials (MNMs) an eco-toxicological risk? - Conducted Using Three MNMs and a Biosensor, Rhizobia

Abstract

Objectives/Goals

Use of MNMs is increasing rapidly, and this experiment is to find out if MNMs are a greater eco-toxicological risk than their conventional sized counterparts, using rhizobia as biosensor. I picked soybean because it's the second largest crop in USA. I chose three commonly used nanoparticles of ZnO, TiO(2) and CeO(2) for the project. These particles end up in farms as solid waste and can cause harm to our ecology by contaminating our food crops, entering our food stream, and impairing rhizobia, which is essential for nitrogen cycle.

Methods/Materials

Soybeans seeds were sown in five groups of three different soil concentrations (5mg, 100mg & 500 mg in 1 kg of soil) made using six chemicals: ZnO, nanoZnO, CeO(2), nanoCeO(2), TiO(2), nanoTiO(2). Normal soil was used for control group. At the unrolled trifoliate (V1) stage, root nodules were crushed, and rhizobia cultures were developed using streaking method. The number of "colony forming units" (CFUs) on the fourth streak was recorded on the fifth day.

Results

The average CFUs per petri-dish are 20 for control group, 8 for non-nano (500mg), and 2 for MNMs (500mg). All plants exposed to non-nano particles except plants exposed to nanoZnO took less time to reach V1 stage than their MNM counterparts. A SEM analysis showed 2.7% of Zinc in ZnO 500mg plant and 3.11% of Zinc in nanoZnO 500mg plant. Also, mushrooms grew in soils containing higher concentrations of MNMs.

Conclusions/Discussion

MNMs are an eco-toxicological risk. The low CFU count proved that MNMs killed the rhizobia essential to the growth of soybeans and the nitrogen fixation. The growth of plants exposed to MNMs was inhibited compared to non-nano group and control group. The presence of mushrooms proved that MNMs caused nitrogen deprivation because an absence of nitrogen slows organic-matter decomposition, allowing mushrooms (fungus) to feed on organic-matter and thrive.

Summary Statement

Using rhizobia as a biosensor, this experiment's goal is to find out if MNM's are a greater eco-toxicological risk than their conventional sized counterparts.

Help Received

Navin Sharma of ICE Inc. mixed nanoparticles with soil and performed SEM analysis; Dr. Holden from Santa Barbara University suggested improvements; Ramona Desai and Wen CAO ,Ph.D., for helping me understand safety procedures; Neha Makhijani, my science teacher, for guiding me throughout the project.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Allen A. Badolian

Project Number
J1704

Project Title
The Amazing Antibiotic Race

Abstract

Objectives/Goals
Why is it that some antibiotics don't work as well as others? Well, the math is in the matter! Everyone has different blood cells that react differently to any certain disease. What happens when the disease is too much for your white blood cells to handle? The disease begins to take over, changing from a small bacterium to an army. I wonder trips to the doctor#s office can be cut down or even eliminated? Will natural antibiotics fight harder against bacteria than synthetic ones?

Methods/Materials
I predicted that the natural antibiotics will be more effective in killing bacteria than the synthetic antibiotics. I used the Baur-Kirby test to find out which group of antibiotics work better. In this project I used 9 petri dishes, 3 Bacterial Broth Cultures (E. aerogenes (Gram-negative rods, B. Cerus (Gram-positive rods, S. lutea Gram-positive rods). I used 3 Tubes of synthetic antibiotic disks. Each tube contained 9 Penicillin disks, 9 Tetracycline disks, and 9 Chloramphenicol disks. I also used 3 Natural antibiotics (Garlic, Rose Honey, Pau D#Arco, which were cut to small pieces).
I used 9 Easygel bottles, I used 9 sterile 1mL droppers, and a pair of clean forceps.

Results
Penicillin is one of the oldest used antibiotics. Unfortunately, Penicillin did the worst in fighting the bacteria. Penicillin, for one, is one of the oldest forms of antibiotics. Bacteria, after all of this time, could have developed resistance to Penicillin. Tetracycline did the second most effective, and chloramphenicol was the most effective. The garlic, though less effective than Chloramphenicol, did the best among the natural antibiotics group. Also, overall garlic was more effective in killing bacteria than Penicillin. The Rose Honey did second best, and the Pau D#Arco was ineffective in all three bacteria cultures. Although the results do not completely support my prediction, I believe that its relative success is a huge positive and justifies my entire project#s objective.

Conclusions/Discussion
Even though my hypothesis was technically incorrect, results show that natural antibiotics, such as garlic, have the ability to fight diseases. Of course, antibiotics have evolved and been tested, because after all, no compound becomes an antibiotic overnight. However, this project shows that eating garlic and honey can and will prevent diseases. That#s what this whole project was all about and that#s what I found out.

Summary Statement
This experiment tests the effects of natural antibiotics and synthetic antibiotics on various bacterial cultures.

Help Received
My mother supervized the experiment. We ordered antibiotics and cultures from Micrology Laboratories.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Justin S. Chang

Project Number
J1705

Project Title
The Prevention of the Cancer, Crown Galls

Abstract

Objectives/Goals
The objective of this experiment is to find the best antioxidant to prevent the common plant cancer, crown galls, in English Primroses.

Methods/Materials
To grow and reproduce the bacteria, Agrobacterium Tumefaciens, six petri dishes were used to create a culture for the Agrobacterium Tumefaciens.
Over a period of five days, five English Primroses were treated to 500 mg of beta-carotene; five English Primroses were treated to 500 mg of lycopene; five English Primroses were treated to 500 mg of Vitamin C, and five English Primroses were treated to 400 IU (approx. 500 mg) of Vitamin E. Also, five English Primroses were treated with only water (this was the control group).
After five days, all of the English Primroses were exposed to the Agrobacterium Tumefaciens. The bacteria were injected into all of the English Primroses with a needle and syringe.

Results
The plants treated with beta-carotene had a total of three infected plants. The plants treated with lycopene had a total of five infected plants. The plants treated with Vitamin C had a total of five infected plants. The plants treated with Vitamin E had a total of three infected plants. The control group, which was treated with only water, had four infected plants.

Conclusions/Discussion
As proven by the results, the antioxidant that best prevented the cancer was beta-carotene. Of the five plants treated with beta-carotene, only three were infected with the crown gall disease.
Beta-Carotene and Vitamin E had a total of three plants infected. Results showed that beta-carotene was the most efficient antioxidant because it was best in suppressing the cancer for a longer time. It took beta-carotene five weeks to reach a number of three infected plants. It took Vitamin E only four weeks to reach this number. As shown by the evidence, beta-carotene was proven to be the best antioxidant that most efficiently prevents this disease.
After the third week of testing, the control group had three infected plants with the crown gall disease while the other groups had one or less infected plants. This shows that the use of antioxidants can delay the crown gall disease.

Summary Statement
To prevent the common plant cancer, crown galls, beta-carotene, lycopene, Vitamin C, Vitamin E, and water were tested against the cancer.

Help Received
My science teacher, Mr. Briner ordered the bacteria and answered questions; My parents bought me materials.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Talie L. Cloud

Project Number
J1706

Project Title
Viva La Coffee! The Effects of Various Coffee Bean Roasts on the Heart Rate and Longevity of Daphnia magna

Abstract

Objectives/Goals
An objective of my science project was to determine whether the consumption of various coffee bean roasts would affect the lifespan of Daphnia magna. In addition, I tested the effects of the degree of coffee bean roasts to the heart rate of Daphnia magna.

Methods/Materials
I used three types of coffee bean roasts: light, medium, and dark roasted beans. The coffee bean roasts were prepared by roasting the coffee in a hot air popper for specific time increments to achieve the desired roast. The coffee solution was developed by brewing the roasts with distilled water. To test the effects on Daphnia magna heart rate, I counted the resting heart rate of a Daphnia that was placed onto a cavity slide with one drop of pond water. Then I placed one drop of the test variable onto the Daphnia and counted the heart rate. This was repeated ten times per test variable. To test longevity, I inserted 10mL of pond water,10 Daphnia, and 2mL of the test variable solution into a petri dish. I counted and recorded the number of living Daphnia every 30 minutes for 18 hours. This was repeated 15 times per test variable. My control was brewed distilled water.

Results
The results of my investigation on Daphnia heart rate indicated that the dark roasted coffee caused the greatest drop in heart rate when compared to the other roasts. In comparison, the light roasted coffee led to the smallest decrease. For longevity, the Daphnia immersed in the light roasted coffee had a survival rate of 76% after 18 hours while those in the dark roasted coffee had a 0% survival rate.

Conclusions/Discussion
The type of coffee bean roast does have an effect on the longevity and heart rate of Daphnia magna. Light roasted coffee increased longevity; whereas, the medium and dark roasted coffee shortened it. Dark roasted coffee inhibited the heart rate the most when compared to the other roasts and the control.

Summary Statement
I used different coffee bean roasts to demonstrate that there is a significance between coffee roasts and the longevity and heart rate of Daphnia magna.

Help Received
I borrowed the microscope from school. My parents assisted in purchasing supplies.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Sam D. Edwards-Marsh

Project Number
J1707

Project Title
How Does Caffeine Affect Plant Growth?

Abstract

Objectives/Goals
The objective of my experiment was to determine if you get good results watering plants with caffeine. I also wanted to know what amount of caffeine was too much for plants to handle. My hypothesis was that plants watered with caffeine would have a huge growth spurt, but as caffeine use increased the plant health would decrease.

Methods/Materials
I filled 12 small starter pots with planting soil and planted 2 garden beans in each. Three pots where labeled "control", three more were labeled "one tablet", three more were labeled "two tablets", and the last three were labeled "three tablets". For the first 5 days each pot was watered with 2 0z of tap water. From day 6 to day 15, pots labeled "one tablet" had one caffeine tablet mixed in their water. Pots label "two tablets" had two tablets mixed in, and so on. The control group continued with water containing no caffeine.

Results
The plants in the control group were by far the strongest. They were always green, with thick stems and appeared healthy. Plants with 1 caffeine tablet had a faint yellow tint to them and were somewhat pale. Their growth was stunted compared to the control group. Plants with 2 caffeine tablets were very pale, yellow, had wrinkled leaves, and thinner stems. Their growth was stunted compared to the 1 tablet group. They eventually died. The 3 tablet group of plants barely grew at all and where severely wrinkled. They all died as well.

Conclusions/Discussion
My experiment demonstrated that caffeine does not benefit plant growth at all. The plants that received the most caffeine were the worst off, appearing wilted, wrinkled, and discolored. The plants that received the least amount of caffeine where the only caffeinated plants that survived, and they were far smaller and appeared less healthy than the control group.

Summary Statement
I measured and documented the effect of varying amounts of caffeine on plant growth.

Help Received
My science teacher, Mr. Brown, helped me to better understand the scientific method. My mom and dad provided all the materials, took pictures of me performing the experiment, and showed me how to use Pages and Numbers software to make my presentation.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Kristen F. Fukunaga

Project Number

J1708

Project Title

The Allelopathic Properties of Black Walnut Hulls

Abstract

Objectives/Goals

Black walnuts (Juglans Nigra) are allelopathic trees that release toxic chemicals to poison neighboring plants. The purpose of my project is to observe the effects of black walnut hulls on seed germination and radicle growth and to find out if different concentrations of black walnut extract will prevent seeds from germinating in my garden.

Methods/Materials

Ten seeds of seven plant species were placed in petri dishes with 5 ml of the different test solutions (1%, 2.5%, 5%, 10%, 20% concentration of black walnut hull extract) and a control with only distilled water. This dose/response bioassay was replicated 5 times. Seed germination rate, radicle length, germination index, toxic concentration (TC-50), and variance were calculated after seven days.

Results

Seeds in the control plate germinated faster and grew longer roots. Lettuce, cabbage, tomato, and beet were the most susceptible to juglone, the toxic allelochemical released by black walnuts. Radish and onion were more tolerant to juglone and their germination was not inhibited but may have been delayed (smaller roots and cotyledons), garden bean was the most resistant to black walnut hulls.

Conclusions/Discussion

The hypothesis that lettuce, radish, garden bean, tomato, cabbage onion, and beet seeds won#t germinate or grow as well when in contact of black walnut hull extract is supported by the data. The general trend showed that toxicity of the test solution increased with higher concentration. However, some plants might be more resistant (garden beans) or tolerant (radish and onion) to black walnut hulls. This experiment is relevant to landscapers and gardeners to assure survival of plantings. A research on the active compounds of black walnuts can help develop natural herbicides for farmers.

Summary Statement

The purpose of this experiment is to study the allelopathic effects of black walnut hulls on seed germination and radicle growth.

Help Received

My parents bought the materials, and my mom helped with the board layout. I would like to thank Mrs. Anderson and Dr Oliver for their guidance.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Daniela Galvez

Project Number
J1709

Project Title
The Effects of Temperature and Type of Liquid on the Dissolution Rate of Ibuprofen

Abstract

Objectives/Goals
The purpose of my project was to determine the fastest way to dissolve Advil Pain Relievers.

Methods/Materials
For each trial, four labeled beakers were individually filled with water, pomegranate juice, grape juice, and apple juice. Using a timer, I measured how long it took for each form of Advil (tablet, caplet, or gelcap) to dissolve. The experiment was repeated three times, once with cold liquids (from the refrigerator), once with room temperature liquids, and once with hot liquids (heated in the microwave).

Results
Results of the experiment show that hot water dissolves Advil pain relief tablets the fastest. Individually, results show that tablets dissolved faster than capsules or gelcaps. Results also show that water dissolves all three types of pain relievers faster than the other liquids tested.

Conclusions/Discussion
The type of liquid, temperature of liquid, and type of Advil pain reliever all had a big impact on the dissolution rate. I predicted that hot apple juice dissolving a liquid gel would have the fastest results but i found that I was incorrect. In the future, people may want to redo this experiment examining the effect of pH of the liquids used to dissolve the pain reliever.

Summary Statement
My project was designed to find the best way for consumers to intake Advil Pain Relieves in order to get fast results.

Help Received
Teacher helped proofread report;Teacher helped organize display board;Mom helped print pictures

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Jack V. Glenn

Project Number
J1710

Project Title
The Effect on Termites of Orange Peels, Vinegar, and Canola Oil

Abstract

Objectives/Goals
The objective of this experiment is to determine whether pureed orange peels, canola oil or vinegar can effectively kill termites.

Methods/Materials
Termites were obtained from a commercial source. Termites were then individually placed in a glass container holding a test environment. Test environments included untreated wood or wood treated with one of vinegar, canola oil or pureed orange peels. Each of these environments included water. Termites were also placed in empty glass containers.

Results
Termites in the canola oil environment survived an average of one day, the pureed oil peels an average of two days and the vinegar an average of eight days. The termites in the untreated wood environment survived an average of five days while the termites in the empty containers survived an average of eight days.

Conclusions/Discussion
The conclusion of this experiment is that canola oil and pureed oil peels are more efficient in killing termites than vinegar.

Summary Statement
This project evaluates the potentially toxic effects of common household items on termites.

Help Received
My mother helped me print and mount report on board. My father proofread reports and typed application into web page. My science teacher walked me through the steps of creating my project and explaining my results/reports.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Levi J. Houghton

Project Number
J1711

Project Title
A 'Smashing' Eggsperiment

Abstract

Objectives/Goals
I would like to know if and by how much feeding oyster shell to chickens affects the strength of their egg-shells. I think that the oyster shell will increase the strength but not by much.

Methods/Materials
To start this experiment you must weigh and measure the egg. Then, after you record your data you set the egg clapper at the edge of a table or counter so that the egg clapper is hanging off the surface approximately 2 1/2 inches, then once that egg clapper itself is positioned you put the egg in the clapper and begin pouring water into the bale. When the egg breaks under pressure you weigh the water and record the weight in a table or diagram. Then after performing the control experiment you feed the chickens oyster shell, wait a few days, and then repeat the experiment 2 or 3 times.

Materials
- egg clapper
- jug of water
- scale
- notebook

Results
My results show that the the oyster shell did in fact affect the strength of the egg-shells. The increase in strength was about 100 grams every day I fed the chickens oyster shell.

Conclusions/Discussion
These results show that my hypothesis was correct and the strength was affected positively. Clearly, oyster shell affects the strength of egg-shells.

Summary Statement
This experiment was a test to see if and by how much feeding a hen oyster shell affects the strength of the eggs the hen lays

Help Received
Grandpa helped make egg clapper, Mother and Father helped spray paint board and put board together, Sisters helped make idea

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Jeffrey E. Jones

Project Number
J1712

Project Title
The Effect of Ocean Acidification on Emerald Crabs (Mithrax sculptus)

Abstract

Objectives/Goals

Burning fossil fuels releases carbon dioxide (CO2) into the atmosphere. When CO2 reacts with saltwater, hydrogen and bicarbonate ions are released, resulting in ocean acidification (lower pH). Hydrogen ions combine with beneficial carbonate ions to create detrimental bicarbonate ions.

As the amount of bicarbonate increases and carbonate decreases, pH of the saltwater is reduced, causing ocean acidification. The reduction of carbonate ions makes it difficult for organisms dependent upon calcium carbonate to maintain healthy shells. As those shells become thinner they make the organisms more susceptible to disease.

My hypothesis states that the crabs in the test aquarium will grow at a slower rate than the crabs in the control aquarium because of reduced availability of carbonates to promote shell growth.

Methods/Materials

Burning fossil fuels releases carbon dioxide (CO2) into the atmosphere. When CO2 reacts with saltwater, hydrogen and bicarbonate ions are released, resulting in ocean acidification (lower pH). Hydrogen ions combine with beneficial carbonate ions to create detrimental bicarbonate ions.

As the amount of bicarbonate increases and carbonate decreases, pH of the saltwater is reduced, causing ocean acidification. The reduction of carbonate ions makes it difficult for organisms dependent upon calcium carbonate to maintain healthy shells. As those shells become thinner they make the organisms more susceptible to disease.

My hypothesis states that the crabs in the test aquarium will grow at a slower rate than the crabs in the control aquarium because of reduced availability of carbonates to promote shell growth.

Results

I setup two aquariums, one as control, one as test. I weighed the crabs every three days and inputted the data into a Microsoft Excel spreadsheet. I later analyzed my results and generated my conclusions.

Crabs in the test aquarium (lower pH) tended to not grow in width nor gain weight as much as the crabs in the control aquarium.

Conclusions/Discussion

My hypothesis was partially supported in that the crabs in the test aquarium decreased in mean width as compared to the crabs in the control aquarium. I was surprised that the decrease in average width of the test crabs was not accompanied with a corresponding loss in weight. Even the crabs in the control aquarium did not seem to experience a change in weight.

If the test were to be run again, I would try feeding both sets of crabs a greater amount of food. If the

Summary Statement

To determine and measure the effect and potential impacst of ocean acidification caused by CO2 on crabs and similar sea-life.

Help Received

Parent wrote down measurements as I weighed and measured the crabs and returned them to the aquariums (my hands were wet)

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
David E. Kranker

Project Number
J1713

Project Title
Energy Drinks: Heart Safe or Heart Stopping?

Abstract

Objectives/Goals
Testing the effect of energy drinks such as 5 Hour Energy, Monster Energy, Hansen's Energy Pro, Xing Tea's Green Tea with Ginseng and SoBe Energize on the heart rates of Daphnia to find if any of them are heart safe.

Methods/Materials
I used the following materials: 300 Daphnia, 4 test tubes, a digital stopwatch, a digital microscope, a laptop computer, Distilled Water, 5 Hour Energy, Monster Energy, Hansen's Energy Pro, Xing Tea Green Tea with Ginseng and SoBe Energize. For each of the energy drinks, I mixed 4 solutions: 0% solution (distilled water); 10% solution; 50% solution; and, 100% solution(pure energy drink). I placed 5 daphnia in each solution and waited for 5 minutes. Using a digital microscope and a lap top computer, I counted the daphnia's heart rates. I recorded the results of each reading.

Results
In 5 Hour Energy, Monster Energy and Hansen Energy Pro, the heart rates of the Daphnia initially increased in the 0.1 solutions and then decreased as the Daphnia died in the more concentrated solutions.

In the Xing Tea's Green Tea with Ginseng, the heart rates of the Daphnia were slightly elevated in the 0.1 Solution. In the 0.5 Solution, the heart rates of the Daphnia were significantly elevated to an average of 795 beats per minute. In the 1.0 Solution, the heart rates of the Daphnia were greatly elevated with an average of more than 1500 beats per minute.

In SoBe Energize, the heart rates of the Daphnia were almost doubled to an average of 418 in the 0.1 Solution. In the 0.5 Solution, the heart rates of the Daphnia remained about the same as in the 0.1 Solution with an average heart rate of 402 beats per minute. In the 1.0 Solution, the heart rates of the Daphnia were again elevated to an average of 506 beats per minute.

Conclusions/Discussion
When the Daphnia were placed in the 5 Hour Energy, Monster Energy and Hansen Energy Pro they died as the concentration increased. When the Daphnia were placed in the Xing Tea's Green Tea with Ginseng and the SoBe their heart rate increased 7-fold and 2-fold, respectively.

Summary Statement
I tested the effects of different energy drinks on the heart rates of Daphnia.

Help Received
Father helped keep time when observing the Daphnia's heart rates and helped type the report. Mother helped with the display board.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Mason Mallory; Vance Mallory

Project Number

J1714

Project Title

How Pollutants and Natural Elements Can Affect the Plant Cells of a Clover

Abstract

Objectives/Goals

Objective: In this project, using a microscope and slides, we compared the effects of man made and natural pollutants on the plant cells of a grass clover. Our hypothesis is that bleach and salt will have the most dramatic affect on the plant cells.

Methods/Materials

Materials and Methods: We used four solutions for our test: bleach, chlorine, salt and water. There was a control group with nothing added to the sample. To complete this experiment, we put samples of clover leaves on 15 slides, 12 of these slide were treated with the different solutions, placed by a dropper directly onto the leaf tissue. We observed the plant cells and judged them by how many cells there were and the color for seven days to see how they react differently and took notes and pictures throughout the process.

Results

Results: After seven days, bleach had the most dramatic affect on the plant. It started to turn brown, and dissolve the leave and its cells from the outside edges towards the center. Chlorine and salt seemed to have similar effects on the plant cells, leaving darkened black spots and holes in the plant cell tissue.

Conclusions/Discussion

Conclusions: Our hypothesis was that bleach and salt would have the most dramatic affect on the plant cells. By the end of the seven day period, our hypothesis was proven correct.

Summary Statement

We studied the affect different solutions, both natural and man made, had on a clover plant.

Help Received

Mom helped us edit and type the report

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Samuel McCabe; Barron Regan

Project Number

J1715

Project Title

The Effects of Docosahexaenoic Acid on Manduca sexta

Abstract

Objectives/Goals

The brain of the Manduca sexta, also known as the tobacco hornworm, has olfactory and memory systems. Scientists have shown that the larvae can be conditioned to avoid specific odors. Our experiment takes these tests one step further. We added docosahexaenoic acid (DHA), an Omega-3 fatty acid, to the food of M. sexta larvae to see if they would perform better after being conditioned. We hypothesized that the group given the highest concentration of DHA would have the best memory.

Methods/Materials

We mixed three different concentrations of DHA, 0.03%, 0.53%, and 1.03%, into the food of 160 M. sexta eggs. The Control group did not receive any DHA. After the larvae matured and molted to the fifth instar, we conditioned the larvae to associate a specific odor with a mild electrical shock, eight times over an eight hour period. We then built a Y-apparatus to test whether the larvae learned to avoid the odor.

Results

The results partially supported our hypothesis. The larvae that were fed the lowest concentration of DHA, 0.03%, performed 28.6% better in the memory testing than the larvae that did not receive DHA, the Control. The Control had a 42.8% success rate in memory testing and the 0.03% had a 71.4% success rate. The larvae in the 0.53% and 1.03% concentrations died before conditioning could take place. Since we had such a poor survival rate of the larvae, we conducted a second test with another 40 eggs in each category. The Control group, with 10 larvae, was the only group to survive to the 5th instar. After conditioning and testing, the results were consistent with our first test - 40% were successful in memory testing.

Conclusions/Discussion

Thus, the results from our two tests indicate that DHA can enhance the memory of M. sexta and that the effect is dose dependent. Although there are no studies on the effects of DHA on M. sexta, there are many studies on human brains which show that DHA is vital to a high functioning memory. These studies have found that DHA enhances communication between the cells, reduces inflammation, stimulates synaptic plasticity, increases the growth of the dendrites, and increases the release of neurotransmitters.

Summary Statement

We tested whether docosahexaenoic acid (DHA), an Omega-3 fatty acid, has a positive effect on the memory of Manduca sexta, also known as the tobacco hornworm.

Help Received

Grandfather helped with setting up electric shock chamber; Brother checked accuracy of calculations; Mothers supervised conditioning/testing, took pictures and edited report.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Adrian M. Mendoza

Project Number
J1716

Project Title
Investigating the Toxicity Level of Pollutants on Plant Cells

Abstract

Objectives/Goals
My objective was to determine which pollutant is the most harmful to plant cells. I believe that the gasoline will damage the plant cells in the celery the most.

Methods/Materials
I cut 15 65ml celery stalks and mixed 300ml of water and 2.5ml of red and black food coloring. I then put the mixture in a plastic container and put the stalks in the container. I measured and graphed how much water each stalk absorbed. Then Put 15 stalks in the variables for 30 minutes then rinsed all 15 stalks with tap water. I repeated this for each variable: gasoline, acid rain, detergent, and motor oil, and then put them in the dyed water mixture for 12 hours. I lastly measured and graphed my results.

Results
The Gasoline proved to be the worst to plant cells of all variables and is not healthy for plants, while the detergent proved to be the least harmful out of the variables.

Conclusions/Discussion
After completing my investigation on the toxicity level of my variables, gasoline, acid rain, detergent, and, motor oil, I found my hypothesis was correct. My hypothesis was that the gasoline was going to be the worst to the cells. My hypothesis was incorrect for the acid rain and for the detergent. The detergent was the best for the cells where the acid rain was the second to last. While some of the pollutants I tested were less harmful than others to the plants none of them were beneficial.

Summary Statement
My project was about finding out which pollutant is the most harmful to plant cells.

Help Received
My parents Mr. Nelson.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Robert J. Raad

Project Number
J1717

Project Title
Does Hydrogen Peroxide Affect Germination?

Abstract

Objectives/Goals
To find out if hydrogen peroxide, a common fungicide and algaecide, at different concentrations, affects germination.

Methods/Materials
Materials: Snap Pea Seeds, plastic cups (4), cotton balls, hydrogen peroxide (3%), tape, bowls (4), teaspoon, tablespoon, measuring cup, black Sharpie.

Procedure:
1.Use the measuring cup to create these solutions, place in seperate bowls, and mix.
A. One cup of water. Label this bowl as None.
B. One cup of water and one teaspoon of hydrogen peroxide. Label this bowl as Low.
C. One cup of water and three teaspoons of hydrogen peroxide. Label this bowl as Medium.
D. One cup of water and five teaspoons of hydrogen peroxide. Label this bowl as high.
2. Place 10 seeds into each of the growing solutions in the bowls.
3. Record the root and stem growth for two days.
4. After two days, use the Sharpie to label the cups as None, Low, Medium, and High.
5. Spread a cotton ball along the bottom of each cup.
6. Move the seeds into the cups made earlier. The bowls should coorespond (The none seeds in the none bowl, etc.)
7. Spoon in four tablespoons of each mixture into the cooresponding cup.
8. Record the root and stem growth for 8 days.

Results
The hydrogen peroxide had a positive effect on the plants. The ones with a low concentration of hydrogen peroxide grew the fastest, then the medium, then the high, and lastly came the ones with only water in their cup (dependant variable). Since the hydrogen peroxide contains oxygen, the plant roots grew faster. The roots need oxygen, and it was always readily available in this way. As the concentration of it got higher, the acidity of the hydrogen peroxide began to affect the seeds and made them grow slower.

Conclusions/Discussion
My hypothesis was proven wrong. I thought that the hydrogen peroxide would slow down the germination or even kill the plants, but the exact opposite occured. I would like to further test this on fully grown plants.

Summary Statement
My project is about the effects of hydrogen peroxide, a common fungicide and algaecide, on plant germination.

Help Received
Mother helped glue papers onto the board.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Joel E. Randolph

Project Number
J1718

Project Title
Nuclear Plant

Abstract

Objectives/Goals
My project was to determine the effect of a minor source of radiation(thorium containing lantern mantles) on plant growth. I hypothesized that the plants exposed to radiation would suffer ill effects ranging from slower growth rates to mutations.

Methods/Materials
My project was to determine the effect of a minor source of radiation(thorium containing lantern mantles) on plant growth. I hypothesized that the plants exposed to radiation would suffer ill effects ranging from slower growth rates to mutations.

Results
In most cases the plants suffered detrimental effects when exposed to the lantern mantles. In some this was slower growth, but in others actual abnormalities appeared. 41% of the zinnia seedlings failed to sprout in one trial when exposed to radiation. But, in a later trial the rate of zinnia seeds sprouting compared to the control. The beans showed the most noticeable effect from radiation. Not only did specimens exposed to radiation consistently show a slower growth rate, 17% showed abnormalities.

Conclusions/Discussion
My hypothesis was supported by this experiment. Plants exposed to radiation during my experiment most often exhibited negative effects. If these same effects carry over to trashed lantern mantles at campsites and dumps, what might be the possible environmental effect?

Summary Statement
My project is to explore the effect of a commonly found object containing radioactive substances on plant life.

Help Received
Mother helped put together board, nagged me to water plants, and recorded data as I measured plants; Uncle who lent geiger counter; Brother who showed me how to make graphs.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Joshua B. Reed

Project Number
J1719

Project Title
Oil's Effect on Aquatic Plants

Abstract

Objectives/Goals
The purpose of this project was to observe how motor oil effected aquatic plant life. It was originally hypothesized that the higher viscosity, as well as a 25 milliliter amount of oil would result in the subjects decomposition. Subsequent trials were conducted in an attempt to determine what ratio of water to oil would result in a plants death.

Methods/Materials
Four experiments were conducted using varying viscosities of oil, which were added to tap water in sample containers with a 10 centimeter section of Egeria Densa. Every twelve hours the samples were compared to the color charts, evaluated using the plant health rubric, and photographed. At this time the ambient room temperature was also documented. The first trial utilized 25 subjects in five groups with one control for 96 hours. The second and third trials involved 14 subjects with one control over 108 hours. The fourth used 13 subjects over 360 hours with ratios of water to oil. The fifth is still occurring using three different plant species and a 1-1 ratio of water to oil.

Results
Through-out these experimental trials the manipulated variable was the amount of and viscosity of oil, while the responding variable was the plants health. The responding variable was documented via color chart and plant health rubric. The results of the experiments were some changes in plant health with higher oil viscosity and greater concentration of oil, but no complete plant decomposition thus rejecting the hypothesis. However, it appears that the different types of plants are reacting differently to the oil.

Conclusions/Discussion
The results of these experiments would be useful for the petroleum industry and environmental impact studies. Discussions regarding results differing with the use of salt water as opposed to fresh water, or crude oil as opposed to synthetic, processed oil provide questions for further experimentation. Perhaps the largest discussion questions have involved why the public has the general idea that even small amounts of oil will result in the destruction of all life.

Summary Statement
My project is about motor oils effect on the health of aquatic plants.

Help Received
Parents helped taping, gluing, and drilling holes in project board and funded my research.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Brissa G. Rodriguez

Project Number
J1720

Project Title
Determining the Effects of Battery Acid on the Survival Rate of Eisenia fetida

Abstract

Objectives/Goals
My objective is to determine if measured amounts of battery acid will contaminate soil enough to shorten the lifespan of the "Eisenia fetida." I believe that placing "Eisenia fetida" in soil contaminated by battery acid will decrease their survival rate.

Methods/Materials
Three Text Variables were set up by placing "Eisenia fetida" into small trays. The trays were filled with soil and moistened with water contaminated by measured amounts of battery acid. The Test Variables had ten trials in each variable. The survival rate of "Eisenia fetida" was recorded over a period of 5 days.

Results
The survival rate of "Eisenia fetida" in all three Test Variables decreased by at least 90% when contaminated with acid from single use batteries with in a couple of days. All three Test Variables showed no signs of life after only three days of exposure to contamination.

Conclusions/Discussion
Battery Acid does have an effect on the survival rate of "Eisenia fetida". Based on my experiment, the "Eisenia fetida" in all three Test Variables had died after just 3 days into the experiment. It is possible that the battery acid in the water affected the PH level of the soil which quickly decreased the survival rate of the "Eisenia fetida." The battery acid also seemed to change the appearance of the "Eisenia fetida." Many were discolored and deformed. The "Eisenia fetida" in the Control Group however, showed no abnormalities such as this. Batteries are filled with harmful, toxic substances that contaminate our soil and negatively affect our environment. Incorrect disposal of batteries could possibly have a tragic effect on the earth in which we live.

Summary Statement
The purpose of my science project is to investigate the ways in which battery acid affects the survival rate of Eisenia fetida.

Help Received
Mother helped put project board together

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Carly A. Scheufler

Project Number
J1722

Project Title
The Effects of Pesticide Residues on Brine Shrimp Mortality

Abstract

Objectives/Goals
I read an article regarding commercial produce that listed some vegetables that may contain pesticide residues. Organic farming does not use pesticides. My family has begun purchasing organic fruits and vegetables. I wondered about the levels of pesticide residues present in commercial vegetables. The purpose of this project was to determine if the amount of pesticide residues present in the commercial vegetables might be significant enough to affect brine shrimp health.

Methods/Materials
From a list of 45 fruits and vegetables arranged in order of possible pesticide residue contamination from greatest potential (number 1) to most pesticide free (number 45), I tested carrots (number 21), celery (number 2), green beans (number 18), potatoes (number 12), red peppers (number 3), and spinach (number 8). I weighed the vegetables to try to test similar amounts of commercial versus organic vegetables of each type. I soaked all of the vegetables in bottled spring water for 32 hours. I removed the vegetable water and placed the hatched brine shrimp into the sample water. After placing the brine shrimp in the vegetable water, I checked the brine shrimp every 30 minutes with a flashlight to see if there was a change in number of live brine shrimp. I compared the results of the organic versus the commercial vegetable water samples in the experiment.

Results
I tested more than 600 brine shrimp in 78 different sample dishes. I ran a preliminary test, Trial One, in order to refine my procedures. I wanted to become familiar with observing brine shrimp and transferring the shrimp. The commercial produce came from Vons for Trial Two and Ralphs and Albertsons for Trial three. All of the brine shrimp survived in the water samples from the soaked organic vegetables and the control spring water samples. For all three trials, the water from the soaked organic vegetables did not affect the brine shrimp in any adverse way. However, for the commercial vegetables, the number of brine shrimp remaining at end of six hours revealed mortality rates averaging 80%.

Conclusions/Discussion
The findings supported the hypothesis, that pesticides used in commercial vegetable farming could affect brine shrimp survival rates. The findings show that even vegetables not considered to have the greatest contamination for produce may still contain significant harmful pesticide residues and further studies should be conducted.

Summary Statement
The purpose of this project was to test the effects of pesticide residues from commercial produce on brine shrimp mortality.

Help Received
I would like to thank my mother and father for driving me to the store to buy commercial and organic vegetables, and the sterile containers for testing. I would also like to thank my science teacher for providing me with guidance, some materials, and a lab in which to perform my tests.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Samantha Simmons

Project Number
J1723

Project Title
The Effects of Sugar on My Hamster's Activities

Abstract

Objectives/Goals

The objective was to determine if sugar would affect my hamster's activities. My hypothesis is when sugar is given to my hamster; it would become more active by spending more time running, less time walking around and more time resting than it would when not given sugar.

Methods/Materials

I chose to monitor my hamster on two separate nights for an hour each time. This is because hamsters are nocturnal and most active at night. Sugar would be giving in the drinking water. The first night would be with plain water and the second night with sugar water. I did the monitoring at my house where my hamster is use to the environment.

To make the sugar water I dissolved one teaspoon of pure cane sugar in one cup of hot water. I let the water cool to room temperature before I put it in the cage.

Prior to the start of the tests, I took the water away from my hamster for an hour. I did this so it would be at least 60 minutes from the last time it drank, it would be thirsty and I would have a starting point. After waiting for an hour, the water or sugar water was put in the cage with the hamster. Once the hamster drank, the 60 minutes of monitoring would begin. Using a stop watch and pen and paper, I tracked and recorded how long the hamster walked around its cage, ran on the wheel, rested, drank, ate and defecated.

Results

After drinking the plain water, my hamster spent 37% of its time resting (22 minutes) and 27% of the time walking (16 minutes 19 seconds). After drinking sugar water, it spent 48% of the time walking (29 minutes) and 29% of the time resting (13 minutes 26 seconds).

There was a greater amount of time spent drinking sugar water than plain water and deficated only during the time observed when sugar water was provided.

Conclusions/Discussion

The results of my test revealed that sugar did affect my hamster's behavior. When given sugar water, my hamster drank a lot more, walked more than it ran, and it urinated more often. I also realized there were similar results to the scientist's findings that I reviewed during my project research.

When my teacher and I talked about my project, we talked about my sample size of just one hamster. I

Summary Statement

Realizing how sugar affects my hamster's active behavor.

Help Received

Consulted with my teacher on preparing for a science project and discussed with him what I observed and where I may find research on similar topics. My mother helped purchasing my hamster, typing the report and laying out the presentation board.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Shivam Singhal

Project Number
J1724

Project Title
A Secret Cure: Evaluation of a Novel Method Applying Curcuma longa's Antioxidant Properties to Cure Hypothyroidism

Abstract

Objectives/Goals
The thyroid hormones are key to our body because they maintain our metabolic rate. They are created at the thyroid gland with the aid of the integral component iodide ions. Once inside the thyroid gland, these ions combine with the amino acid, tyrosine, and form the T3 and T4 thyroid hormones. This cycle continues until we eat or drink a substance contaminated with Perchlorate, an ion which competes with iodide ions. The objective of this project was to see whether Curcuma Longa an antioxidant will be able to deactivate the Perchlorate so that it does not interact with the iodide ions

Methods/Materials
To perform this experiment, I needed the following materials: Iodide solution, Curcuma Longa, Potassium Perchlorate, the UV/Vis spectrophotometer, starch solution, test tubes, Deionized water, and methanol. I needed to perform the following procedure: Put 3mL of starch solution and 2 drops of iodide solution in 9 test tubes and take the UV/Vis spectrophotometer wavelength. Prepare the 5 different concentrations (10%, 30%, 50%, 80%, and 100%) of potassium perchlorate and add it to the starch-iodine complex. Take the UV/Vis absorbance and record it. Take different concentrations of Curcuma Longa and Make the concentrations (0.01-07%) of Curcuma Longa and measure the absorbance to create a calibration curve. Dissolve 100 mg of Curcuma Longa in 100 mL of DI and filter it. Use the filtrate as the 100% Curcuma Longa solution. Add 2mL of the 10%, 50%, and 100% Perchlorate solutions to 3 test tubes. Then add the Curcuma Longa solution to each test tube. Take the UV/Vis absorbance and record it Calculate the percentage of Curcuma Longa left in the test tubes using the Calibration curve created before.

Results
As the concentration of the Perchlorate increased, more iodide ions were competed with. The higher concentrations of the Perchlorate consumed more Curcuma Longa. However, the Curcuma Longa still succeeded in deactivating the Perchlorate; I knew this because the solutions were still giving an absorbance in the UV/Vis Spectrophotometer which Curcuma longa gives not Perchlorate.

Conclusions/Discussion
This experiment proves that Curcuma Longa is an antioxidant and can be used as a natural cure for not only Hypothyroidism but for various malicious diseases such as heart disease, lung disease, ulceritive colitis, Alzheimer's disease, etc.; Curcuma Longa can also be used as a sanitizer for cuts, bruises, and splinters.

Summary Statement
This experiment explored a novel method of utilizing Curcuma Longa's antioxidant properties to cure malicious diseases such as Hypothyroidism; it provides a natural way to alleviate health issues as an antioxidant.

Help Received
I would like to thank Dr. Roger Terrill of San Jose State University for allowing me to use his labratory, my science teacher, Mrs. Nguyen, and my family for their constant support.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Gennevieve F. Springer

Project Number

J1725

Project Title

It's Not Easy Being Green: LC-50 Determination and Comparison of Biological Based vs. Traditional Cleaning Solutions

Abstract

Objectives/Goals

The objective is to determine if #eco# cleaners are less harmful to plant germination than traditional cleansers.

Methods/Materials

Radish seeds were placed on paper towel moistened with different concentrations of both #eco# cleaners and traditional cleansers. The number of seeds not germinated was counted daily for 5 days. The data was graphed and an LC50 was generated for each cleanser.

Results

#Eco# cleaners as a group did not have significantly higher LC50 numbers. One traditional cleaner, Fabuloso, was the least toxic to seed germination while one of the #eco# cleaners, Parsley Plus, had an LC50 similar to bleach.

Conclusions/Discussion

Cleaners advertised as #eco# are not necessarily better for the environment, as demonstrated by seed germination. Cleaners advertised as #eco# or green do not have to provide any data to support their claims. They rely on marketing to convince consumers that their products are earth friendly, when in fact they might not be. These data suggest that consumers should be skeptical of marketing claims and not just assume that the #eco# products are better for the earth. Pressure by consumers may also be needed to force companies to prove their #eco# claims.

Summary Statement

This project was designed to determine if "eco" cleansers are less toxic to seed germination than traditional cleansers.

Help Received

My mother drove me to buy materials and pick up photos. My science teacher helped focus my ideas and focus my experiment

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Anthony A. Stenzel

Project Number
J1726

Project Title
The Effect of Run-off Water on Aquatic Invertebrates: The Effect of Sodium Phosphate on the Heart Rate of Daphnia magna

Abstract

Objectives/Goals
My objective was to learn if phosphates in the run-off waters that drain into the Madrona Marsh have any effect on the heart rate of the aquatic invertebrates inhabiting the vernal pools, specifically Daphnia Magna.

Methods/Materials
I introduced Daphnia Magna to Sodium Triphosphate diluted to the appropriate levels by distilled water using a volumetric flask. I used a compound light microscope to observe the heart beats of daphnia at 100x. First I prepared my solutions at 1.0mg/L, 5.0mg/L, 10.0mg/L, 20.0mg/L and 50mg/L. I also had a control that was plain distilled water. Next, I placed my subject daphnia into a test tube filled with the test solution and let the subject adjust for 5 minutes. Then I put the subject on a slide with cover slip and let it adjust 5 more minutes. Then I put the slide under the microscope and counted its heart beats per minute and recorded the results. A different specimen was used each time.

Results
The results showed that as the concentration increased, so did the heart rate of the subject increase. Now that I know that there is a strong correlation between phosphates and the heart rates of daphnia, I am currently running a follow-on project dialing in the concentrations to more closely match those observed through my 12 month water chemistry study. Early results show that at even small amounts 0.5 mg/L, there continues to be a positive correlation between the presence of phosphates and increased heart rates in daphnia.

Conclusions/Discussion
My study confirmed my hypothesis. What this means to me is that in order to responsibly introduce an endangered species that is sensitive to phosphate levels into the vernal pools of Madrona Marsh, phosphate levels need to be monitored and controlled.

Summary Statement
The positive correlation between dissolved phosphates in the marsh and the heart rate of Daphnia Magna

Help Received
My parents gave me advice. I received encouragement and advice from the the staff at Madrona Marsh.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Tyler P. Sweeney

Project Number

J1727

Project Title

Which Hiking Water Purification Method Is Safest?

Abstract

Objectives/Goals

When going on long hiking trips with my Boy Scout Troop, drinkable water is not readily available. Water from the streams can be contaminated by pollution with microorganisms that can make a person sick. There are several different ways of treating the water while hiking. The water treatment methods that we used on our Boy Scout hiking trips included Potable Aqua (Iodine) tablets, SteriPEN# (UV light), and boiling the water for up to four minutes. The objective is to determine the most effective water treatment process when hiking.

Methods/Materials

Collect water sample in sterilized large container from 3 different water sources (1 pond and 2 streams). Take a control water sample from each source in a sterilized test container. Treat 1 liter of each of the water collected using the different water purification methods. Treat using the UV light, Iodine tablets, and heating in a tea kettle on propane stove for just to boil, boiling for 2 minutes, and boiling for 4 minutes. Sample of the treated water is placed in sterilized water test containers. Test each water test sample for coliforms, E. coli, and microorganism count.

Results

Each of the untreated water samples tested positive for Coliforms and E .coli and had bioburden counts of over 900 CFU(colony forming units)/10 ml. The UV light did not remove Coliforms from any of the water samples, and only removed E. coli from one of the 3 samples. The bioburden counts were decreased to between 893 to 2060 CFU/10 ml. The iodine tablets eliminated Coliforms or E.coli and reduced the bioburden counts to between 3 and 748 CFU/10 ml. Boiling water was the most effect treatment method eliminating coliforms and E. coli. Biobudern counts were reduced to between 0 and 95 CFU/10 ml.

Conclusions/Discussion

UV light was the most ineffective water treatment. This process only removed coliforms and E-coli in one of the three water samples. Iodine made water safe in two of the samples but didn#t remove the coliforms from the stagnant pond water sample. Boiling water was the most effective water treatment process. Boiling water is the best process to remove microorganisms to make the water safe for drinking, but you need to be able to carry the required equipment to boil water and have time where you are not hiking to boil the water. Iodine is a very effective alternative way of treating water. Iodine tablets are also light and small so they are easy to pack.

Summary Statement

Which Hiking Water Purification Method is Safest project determines the most effective water treatment process that can be used when hiking in the field..

Help Received

Danilo Ang, Ultimate Labs preformed testing and the test containers, the cooler, and the ice packs; Michael Land, USGS provided sterilized water bottles and hazard protection gloves; my Dad provided materials, drove and hiked with me when I was collecting water and supervised me in treating the water.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Jared Truong

Project Number
J1728

Project Title
From Mealworm to Darkling Beetle: Does UV-C Radiation Have a Mutagenic Effect?

Abstract

Objectives/Goals
To determine whether beetles of mealworms irradiated with UV-C rays will have a higher percentage of mutated beetles than that of non-irradiated mealworms.

Methods/Materials
Six hundred large-sized healthy mealworms were divided equally into six groups, three controls and three tests. Groups were kept in boxes with mesh lids. Once per day, the food, consisting of bran and oats, was sifted out of each box through the lid and the number of dead was recorded. Each test group was then irradiated using a UV-C sanitizing wand for three minutes. All radiation terminated when the first worm pupated. As beetles hatched, a checklist of major characteristics of Darkling Beetles was used to determine whether the beetle was mutated.

Results
The aggregate mutation rate for the control groups was 23.077% while for the test groups it was 35.714%. One surprising observation was that the test groups had a higher hatching rate than the control groups.

Conclusions/Discussion
There was a definitive increase in mutation on the beetles of UV-C irradiated mealworms. Although the 54.761% greater mutation rate for the test groups was less than the 75% predicted rate, the hypothesis was largely correct. The unexpected higher hatching rate in the test groups, however, might be a result of the #sanitized# condition created by UV-C radiation.

Summary Statement
UV-C radiation increases the mutation rate in beetles of irradiated mealworms, but also increases the hatching rate of the pupa.

Help Received
Mother helped purchase materials and set up experiment. Father helped take pictures and put together board. Teacher helped advise the project and edit papers.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Helena R. Washburn

Project Number
J1729

Project Title
The Effects of Homeopathic Therapy on the Regeneration Rate of Planaria

Abstract

Objectives/Goals
The purpose of my investigation is to determine if different homeopathic medicinal treatments and dosages will effect the regeneration rate of planaria.

Methods/Materials
I used brown planaria for testing because they are easily seen and capable of bi-directional regeneration. I used 3 top selling homeopathic wound therapy medicines; Aloe Vera, Gotu Kola, and Arnica. Using a scapel I removed the head of the planaria and placed it in a dish of fresh water for regrowth (the head portion of the planaria was not used in testing) I put the body in a petri dish with 15ml of test solution. I did this 9 more times for 10 tests per test group. I have 10 test groups: control of clean water, .15%, .25%, .5% aloe vera solution, .15%, .25%, .5% gotu kola solution, and .15%, .25%, .5% arnica solution. Solutions were created by mixing 3, 5, or 10 drops of homeopathic medicine with 200ml of water. Solution was refreshed daily and planaria were monitored under a microscope for 7 days. Regeneration was considered complete with the development of 2 eyes and triangular head.

Results
The control group had an average regeneration rate of 5.7 days with no planaria death.
The .15% Aloe Vera had the best averaged regeneration rate of 5.5 days with no planaria death, the .25% AV solution averaged 6.5 days with a 50% death rate.
The .15% Gotu Kola solution had an averaged regeneration rate of 6.5 days with no planaria death, the .25 GK solution averaged 6.5 days with a 60% death rate.
The .15% Arnica solution had an averaged regeneration rate of 6 days with no planaria death, the .25% Arnica solution averaged 7+ days with a 40% death rate.
All .5% test solution had 100% planaria death after just 1 day.

Conclusions/Discussion
After testing I determined that the homeopathic therapy did affect the regeneration rate of planaria. The .15% solution of Aloe Vera proved to Slightly speed up the rate of regeneration, but the other .15% solutions slowed the process down and as the dosage was increased the planarians ability to regenerate decreased and resulted in death. These are extremely important findings because while they prove that a .15% Aloe Vera solution helps with regeneration; dosage is vitally important, and the other 2 homeopathic therapies were actually harmful to the planaria.

Summary Statement
Homeopathic medicines are becoming very popular so to determine if they really work I chose the 3 top selling wound care medicines and investigated how they effected the regeneration rate of planaria.

Help Received
My mom took pictures of my procedures

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Audrey Q. Webb

Project Number

J1730

Project Title

GMO: Food or Foe? The Effects of GMO vs. Organic Papaya Diet on the Longevity and Fertility of the Fruit Fly

Abstract

Objectives/Goals

If the independent variable "organic vs GMO diet" is fed to separate populations of fruit flies, I expect the dependent variables "longevity" and "fertility" to be reduced in the GMO fed fruit fly populations.

Methods/Materials

24 vials of fruit flies were fed GMO papaya media and 24 vials of fruit flies were fed organic papaya media. The flies were observed for 2 generations over the course of 6 weeks to record longevity and fertility data. For longevity study, the adult flies were transferred to new vials every 5 days to avoid including their offsprings in the longevity count. The lifespan of these adults were recorded. For fertility study, 24 male and 24 female 2nd generation flies were mated in 8 separate vials to observe reproductive rate on GMO and organic papaya media. The larvae in these 8 vials were counted and recorded on day 5.

Results

The 1st generation fruit flies which were fed organic papaya lived longer on average than the flies fed GMO papaya by 22%. The difference became more pronounced with the 2nd generation; the 2nd generation flies fed organic papaya lived longer by by 41% on average. Regarding dietary effects on reproductive rates, flies fed organic papaya produced more larvae than flies fed GMO papaya media by 12%.

Conclusions/Discussion

Based on the experimental data I observed, the results support my hypothesis that fruit flies fed GMO papaya will have a reduced lifespan and fertility compared to fruit flies that are fed organic papaya. Therefore, I would recommend that people avoid GMO and choose organic until human clinical trials reveal the long-term effect on the human race. Not only are GE agricultural practices questionable, but also our health could quite possibly be compromised.

Summary Statement

This project observes the effects of GMO versus organic papaya diet on the longevity and fertility of fruit flies.

Help Received

Alexis Bailey at Margaret Fuller Fly Lab at Stanford suggested techniques for handling the Drosophila. Mom provided an extra set of hands for counting, chilling, sorting, and transferring hundreds of flies, and offered guidance on how to create a display board using Pages software. Dad taught me how to make

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Vatsal Jain

Project Number
J1798

Project Title
Acid Blasted

Abstract

Objectives/Goals
My projects objective was to find out which antacid has the highest potency to cure heartburn. Hypothesis: I believe that Equate will cure heartburn the fastest, because when we compared active ingredients Equate would always have the most variety.

Methods/Materials
In this project I determined which antacid neutralizes an acid in the fastest amount of time. The materials I used were red cabbage, measuring cup, blender, strainer, 4 small glass jars, lemon juice, marking pen, two eye droppers, and three different types of antacids tablets with the same active ingredients. In this experiment, I used red cabbage as an indicator, since it is neutral, to see when the lemon juice, which is an acid, had lost all its color. An equal amount of each brand of the antacids were crushed and added to the each mixture of lemon and cabbage juice. I started the stopwatch and recorded the time when the each mixture turned transparent.

Results
The antacid that took the longest duration of time to make the mixture transparent has the lowest potency, or ability to neutralize an acid. The antacid that took the shortest duration of time to make the mixture transparent has the highest potency. Tums took the shortest amount of time to neutralize the lemon juice, which means it has the highest potency to cure heartburn. Equate took the longest time, which means it has the lowest potency to neutralize stomach acid.

Conclusions/Discussion
The results showed that Tums was the best antacid when heartburn strikes. My hypothesis was incorrect and took the longest duration of time. Since I experimented in my kitchen there could be some environmental factors that could have influenced my results air pressure, moisture, and temperature. Obviously biological factors are different in the stomach. My experiment can help people in the world because many people get confused about which antacid to buy because of the variety, but now we know Tums is the one of the best antacids for heartburns.

Summary Statement
I tested which antacid has the highest potency to cure heartburn.

Help Received
My mother supervised me during my experiment and also took me shopping for antacids.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Nykolas Maxey

Project Number

J1799

Project Title

The Effects of Metformin on the Caudal and Cephalic Regeneration of Planaria

Abstract

Objectives/Goals

In this experiment, I studied the potential use of less expensive planaria to examine the effects of the drug metformin on the speed of (neurogenesis) tissue regeneration. It was recently shown that metformin, by activating an aPKC-CBP pathway, recruits neural stem cells and enhances neural function in mice and human cells, thereby providing a candidate pharmacological approach for nervous system therapy. My study examines if metformin would also activate similar pathways and neurogenesis for study with well studied planaria.

Methods/Materials

Basically, I divided two groups of planaria into 20 control individuals and 20 #treated# individuals. Each planaria was bisected behind the larynx the best I could. The treated group had an application of 50mM metformin solution to application group 1-20 for 20 minutes on day 1, and again on day 5. The control group remained as such. Both groups were maintained and observed alike.

Results

My observations indicated that the control cephalic regeneration control group showed the first signs of eyespots around day 7 and photoreceptors around day 10. The metformin application group showed slightly earlier regeneration a full day earlier with first signs of eyespots at day 6 and photoreceptors around day 9. Caudal regeneration did not appear accelerated. Accurate measurements were difficult because of movement, but were clearly observable. In both caudal and cephalic regeneration, the coloration of the application group was noticeably a lighter shade of brown until a several days after full regeneration had taken place.

Conclusions/Discussion

In conclusion, my results would suggest that the metformin did cause a noticeable increase in tissue regeneration speed and more specifically in the areas with a denser concentration of eyespot and photoreceptor neurological tissue, or perhaps denser concentrations of neoblasts. Under the influence of metformin it appears that the cephalic regeneration process is stimulated even more. Under the influence of metformin, caudal regenerative process appears to be retarded or the same as the control group.

Summary Statement

In this experiment, I studied the potential use of less expensive planaria to examine the effects of the drug metformin on the speed of (neurogenesis) tissue regeneration.

Help Received

My advisor Dr. Morse supplied and handled the metformin drug for classroom compliance.