CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Megan M. Arana

Project Number
J1401

Project Title
Some Like It Hot

Abstract

Objectives/Goals
My goal in this project is to find out if hot chili peppers will raise a human being's temperature.

Methods/Materials
Materials: 20 volunteer subjects, Data sheets, Rubber gloves, Oral thermometer, Probe covers for thermometer, One quarter cup measuring cup, Habanero peppers, Serrano peppers, Jalapenos peppers, Roma and garden tomatoes, Onions, Cilantro, Tortilla chips, Containers to put salsa in.

Procedure: The first thing I did for my science fair project was selected three varieties of chili peppers. I asked 20 volunteer subjects to eat three salsas, a different pepper in it each salsa. I took their temperature before and after they ate the salsa. I recorded the data and analyzed it.

Results
In every salsa test I did everybody's temperature changed whether it was higher or lower. Subjects who ate the peppers with the higher (SHU), had their temperature raise. Subjects who ate the peppers with the lower (SHU), their temperature dropped at least by a point. The body temperature stayed consistently higher or lower even after rechecking 5 minutes later.

Conclusions/Discussion
My hypothesis was partly right, your temperature does rise when you eat a chili pepper that is high in capsaicinoids. Your temperature goes down if you have a cooler salsa. The capsaicin seems to affect body temperature. Scientists are experimenting with the anti-inflammatory and anti-coagulant uses for capsaicin, so I conclude that it must thin the blood in certain concentrations.

Summary Statement
My project is about learning if the chemical make-up in a chili pepper will affect a human being's body temperature.

Help Received
My Mother edited my written work, my little sister helped me make the salsa, and my project advisor Judy Miller, just kept me going with little tips.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)

Kristin N. Beshears; Rosemeri K. N. Patterson

Project Number

J1402

Project Title

To Bee or Not to Bee OR Wish I May, Wish I Mite

Abstract

Objectives/Goals

Will formic acid be effective in removing Varroa jacobsoni, a species of bee mite, from Apis mellifera, the common honeybee?

Methods/Materials

Methods: We exposed bee hives to formic acid with two different procedures (Soapy Water/Powdered Sugar Rolls and Sticky Board) and measured how many dead mites were found compared to control hives that were not treated with formic acid.

Materials: bee hives, permanent marker, formic acid, notepad, pencil, 12 - 32oz. Jars, tweezers, powdered sugar, strainer, buckets, screen, dish detergent, sticky board, strawberry basket bottoms, 4 cotton cloths, aluminum foil

Results

We found that the formic acid is effective in decreasing the population of Varroa mites in the commercial honeybee hive if the formic acid is diluted down to 60%, the ambient temperature is between 55-70 degrees F., and the correct amount of formic acid is applied within the hive with a sufficient evaporation rate of 20 mL a day.

Conclusions/Discussion

The hypothesis was supported; formic acid was effective in removing Varroa mites from the hive. Apis mellifera is being attacked by Varroa jacobsoni by feeding off the larvae of the bee before it emerges, causing it to be deformed and an inefficient worker. Then, when the bee emerges, the Varroa mites spread through the bee's close contact with other bees. It is important to treat this problem because bees are very important pollinators.

Summary Statement

We tested to find out if formic acid is effective in removing Varroa jacobsoni, a species of bee mite, from Apis mellifera, the common honeybee.

Help Received

Measured formic acid and applied in hives under supervision of expert in the field, Les Beshears, president of Central Valley Beekeepers Association. Mrs. Patterson and Mrs. Beshears aided us in organizing the board.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alexandria C. Brown

Project Number
J1403

Project Title
A-B-C . . . As Easy as Acidity

Abstract

Objectives/Goals
The purpose of this project was to determine which non prescription antacid lowers the acidity in a person's stomach the most potently. My hypothesis was that pepdo-Bismol brand antacid would lower the acidity of the hydorchloric acid solution the most noticeably because of its higher concentration in the active ingrediant, Bismuth Subsalicylate, above the other brands.

Methods/Materials
The experiment involed testing the pH of a hydrochloric acid solution once mixed with different brands of antacids. The antacids used were all chewable tablets that are mild enough to use without a prescription. 10ml of a hydrochloric acid solution was used to represent the hydrochloric acid in a person's stomach and the ph level of the solution once mixed with the antacids represented how much the antacid actually lowered the acidity level of the solution.

Results
The control or untouched data,which in this case was the hydrochlorcic acid solution with no added variables had a pH of 4. Pepcid-AC recieved 4.5. Zantac 75 read 4.5 aswell. Cimetidine 200 had a pH of 5. Pepto-Bismol which lowered the acidity level of the hydrochloric acid solution the most noticebly had the pH of 6.

Conclusions/Discussion
In conclusion, my hypothesis was proven correct. Earlier in my hypothesis i stated that Pepto-Bismol would lower the acidity of the hydrochloric acid solution the most noticebly because of its high concentration in its active ingrediant. The experimental data supported my hypothesis,indicating that Pepto-Bismol actually does cope with sotmach acid complications more effectively that other brands. With this new found information scientist may be able to expand this project by developing a stronger antacid using some of the same active ingrediants. This new developed antacid could possibly treat more serious acid compliations such as Acid Reflux disease and Ulcers.

Summary Statement
The purpose of my project was to test to see which antacid lowers the acidity in your stomach the most using 5 different brands.

Help Received
My mother proof read my projects, helped me assemble my display board, and helped me gather supplies. My brother helped me develop my experiment. My teachers Mr. Snell and Ms. Solaegui helped me with any problems or questions i had with my project. Ms. Solaegui allowed me to borrow some of the

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Giselle H. Bui

Project Number
J1404

Project Title
Growth and Taste of Lettuce Plants When Given Coconut Milk, Soymilk, or Water

Abstract

Objectives/Goals
Hypothesis: I hypothesized that the lettuce plant given coconut milk will taste and grow better because of its high sugar content.

Methods/Materials
Materials: Coconut milk, soymilk, water, three syringes, flexible measuring tape, and three Romaine lettuce plants.
Procedures: First I purchased three Romaine lettuce plants. Each day I would measure the height of the plant from its base to the tip of its tallest leaf with the flexible ruler. I then recorded its height depending on how many millimeters it grew. With the syringes I pipette 1/2 oz from each of the fluids and placed it into each lettuce plant. The plants were put near a window receiving indirect sunlight.

Results
Although water is needed for nearly almost every living organism to survive this experiment has proven that the soymilk stimulated the growth of the lettuce plants by few inches more than the coconut milk, or water. The reason may have been because the coconut milk was too concentrated and the plant could not absorb the fluid properly. It needed more water to loosen the coconut milk. The controlled plant was given water, which didn't have a steady growth as the plant given soymilk. Water might not have had the wide abundance of nutrients as the soymilk and is the reason why it didn't grow as much.
The lettuce plant given soymilk enriched the lettuce taste and tasted the best but did not taste like soymilk. The lettuce leaves of the plants given coconut milk and water tasted plain. But those given water tasted crispier.

Conclusions/Discussion
My experiment has proved my hypothesis to be incorrect. The plant given soymilk grew and tasted best. The lettuce plant tested with soymilk grew at a more steady rate and better height than plants given coconut milk or water. If I had done this experiment differently, I would have diluted the coconut milk with water as to make it easier for the plants to uptake the liquid.

Summary Statement
The testing of whether coconut milk, soymilk, or water supports the growth of lettuce plants better.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Carol J. Cabrera

Project Number
J1405

Project Title
Can Garlic Prevent Crown Gall?

Abstract

Objectives/Goals
The purpose of this project is to determine whether or not a garlic capsule will prevent or prolong cancer in tomato plants.

Methods/Materials
Broad-leafed plants are affected by agrobacterium tumefaciens (crown gall) so the plant selected was the tomato plant. A tree already infected with crown gall was the source of the bacteria. The scientist transplanted the tomato plants into two different plots for the project. Group A would be the experimental group, which would be treated with the garlic oil. Group B would be the controlled variable which would only be infected with crown gall and not treated with garlic. Garlic capsuls were purchased and a thumbtack was inserted into one side of the capsule so that the liquid would come out and this was placed on the stem of the plants.

Results
The results were negative because the garlic did not prevent or prolong the cancer. The garlic even stunted plant A's growth.

Conclusions/Discussion
Reasons for the negative results have so many maybes. The amount of garlic that A plants were treated with (1 capsule a day for a week) might have been too much. Too much of a good thing can be bad. The other variable that might have effected the result of the project was other nutrients or ingredients that could have been in the garlic. At the beginning of the project, the scientist assumed that the garlic capsule held pure garlic but at the end, the scientist was wary. There were other ingredients in the capsule that could have effected the results of the project.

Summary Statement
My project is about if garlic capsules can prevent crown gall, which is basically cancer, in plants.

Help Received
Supervision and help of Oscar Cabrera (father)

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Sara Carman; Rachel Enriquez

Project Number
J1406

Project Title
There's a Fly in My Ginseng!

Abstract

Objectives/Goals
The purpose of this experiment was to determine if E. senticosus (Ginseng) causes mutagenic effects on D. melanogaster (fruit flies). A lethal mutation will result in the absence of any red eye males in the Experimental F2 generation.

Methods/Materials
A population of over 100 Wild Type male fruit flies were administered an LD(50)dose [0.0216g] of Ginseng via food medium. They were then bred with virgin Muller-5 female fruit flies to producce an F1 generation. The F1 were allowed to breed again and produce an F2 generation. The F2 generation were sorted according to gender and specified phenotypes. A phenotipic ratio was calculated.

Results
Nineteen percent of the Experimental F2 Group was White eye male and 25% was red eye male. The resulting F2 generation ratio of 1:1:1:1 indicated that a lethal mutaton did not exist.

Conclusions/Discussion
E. senticosus does not induce mutagenic effects on D. melanogaster, therefore our hypothesis was incorrect. However, after thoroughly analyzing our results, and closely comparing the eyes of the red eye Wild Type males in the Experimental Group to the red eye Wild Type males of the Control Group, there might have been a slight mutation. The color of the Experimental red eye Wild Type male flies' eye's have a slight yellowish tint. The difference between the two colors is miniscule, but enough to give us an incentive to continue on with this project.

Summary Statement
Our project tests the effects of E. senticosus (Ginseng) on D. melanogaster (fruit flies).

Help Received
Ms. Carman helped us setup our project.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Erin R. Duralde

Project Number
J1407

Project Title
Is Acetaminophen or Ibuprofen More Effective for Treating Musculoskeletal Pain in Middle-Aged Athletes?

Abstract

Objectives/Goals
To determine whether Acetaminophen or Ibuprofen is more effective for treating musculo-skeletal pain in athletes between the ages of 40-55.

Methods/Materials
Each participant received 8 packages of pills. In these packages were 2 pills (500 mg each of Acetaminophen, or 200 mg each of Ibuprofen.) The participants could take the drugs at any time during the 3-week period of study. Using the "Pill Evaluation Forms" each participant recorded their pain level using a scale of 1-5 before taking the pills. Then, 2 hours later, they recorded their pain level again.

Results
With 24 participants responding, it was found that both drugs were equally effective when the average pain decrease from taking each drug was compared. Interestingly, some individuals showed a strong preference for one or the other drug. Of twelve participants showing a strong preference, 6 liked Ibuprofen, and 6 liked Acetaminophen. Males seemed to prefer Acetaminophen while females seemed to like Ibuprofen.

Conclusions/Discussion
The results of this experiment show that both medicines are effective for treating musculoskeletal pain, and the average pain decrease from taking the two drugs was basically the same. This is a good and important finding because some people can't take Ibuprofen due to its side effect of stomach discomfort. These people should be encouraged to take Acetaminophen, which will be just as effective and much milder on their stomachs.

Summary Statement
This project is meant to determine whether Acetaminophen or Ibuprofen is more effective for treating musculoskeletal pain in middle-aged athletes.

Help Received
Father determined dosages, purchased meds, and reviewed my questions re: medical eligibility to participate. Mother helped find some of the participants and drove me to participants' homes so that I could explain the study, determine whether they qualified, and explain how to complete the paperwork.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Kaitlyn K. Fitzgerald

Project Number
J1408

Project Title
Alcohol and Tobacco: Will It Affect Your Heart?

Abstract

Objectives/Goals

The objective of my project was to find out through experiments if alcohol and tobacco had an affect on the heart of the crustacean Daphnia magna. The Daphnia magna heart is similar to that of a human, so therefore, the effect will be the same.

Methods/Materials

The materials used were: tobacco, alcohol (rum), pure spring water, 50-mL graduated cylinder, 9 16-oz plastic bottles, 44 test cups, permanent marker, labels, Daphnia magna (approximately 100), pipet (used to transfer Daphnia from one place to another), dip slide, Eagle 340 trinocular laboratory microscope, stop watch, digital camera, computer and printer.

In this experiment I made different solutions of tobacco and alcohol, these solutions were 100%, 50%, 25%, 12.5%, 6.25%, 3.125% 1.56%, and .78% for tobacco and 100%, 50%, 25%, 12.5%, 6.25%, and 3.125% for the alcohol. I put the Daphnia magna into these solutions and after six hours I checked the mortality rate and the heartbeats per minute of the Daphnia magna that were still alive.

Results

Tobacco and alcohol reduced heart rates and produced a higher mortality rate much faster than the Daphnia magna with the spring water. I did a second six-hour experiment because the tobacco concentrations were too strong and the mortality rate too high for the first experiment to be valid. I felt that doing a second experiment with lower concentrations was necessary to achieve valid results.

Conclusions/Discussion

Both tobacco and alcohol adversely affect your heart. The toxic effects of tobacco products killed the Daphnia magna faster than the alcohol or pure water did. I also found out that both the tobacco and alcohol caused the heart rate to decrease. It was evident in my experiment, even though the alcohol had a high mortality rate, that tobacco is much more harmful to the heart than alcohol or spring water because of the higher mortality rate.

The six-hour experiment was needed for valid results. When a person smokes on a regular basis, they don't just smoke a little amount of time, or when a person drinks on a regular basis they don't just drink three drinks their whole life. Which is why it is necessary to leave the Daphnia in the testing solutions for as long as I did. These results clearly show that both tobacco and alcohol definitely affect your heart in an adverse way.

Summary Statement

My project was done to show others what the effects of tobacco and alcohol have on the human heart.

Help Received

During the experiment my father helped me make the tobacco and alcohol concentrations and my mother helped me on the general layout of the board.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alex J. Freeman

Project Number
J1409

Project Title
Plaque Attack: Taking a Bite Out of K-9 Dental Disease

Abstract

Objectives/Goals
In this experiment, two different commercially-manufactured dog treats, each claiming to reduce tooth tartar, were tested to see which were more effective in cleaning dogs' teeth. The two dog treats used were Greenies Smart Treats and Nutro Tartar Control Biscuits.

Methods/Materials
Fifty-one dogs were given a 28-day supply of treats. Twenty-five dogs were given Greenies Smart Treats. Twenty-six dogs were given Nutro Tartar Control Biscuits. Evaluations of each dog's teeth was performed twice by Dr. Benita Keiss, DVM, at Pacific Beach Veterinary Clinic, San Diego, CA; once before the experiment began, and soon after each dog had completed the 28-day study. Each time, the dogs were rated on a scale of 1-6.
A rating of (1) indicated that the dog had very little tartar. A rating of (6) indicated that a large amount of tartar was seen.

Results
At the beginning of the experiment, the average percent of plaque on all of the dogs that were given Nutro Tartar Control Biscuits was 57.789%. At the end of the experiment, the average percent of plaque on the dogs that were given Nutro Tartar Control Biscuits was 55.094%. Nutro Tartar Control Biscuits reduced plaque on dogs teeth by 2.695%.
At the beginning of the experiment, the average percent of plaque on the dogs given Greenies was 52.989%. At the end of the experiment, the average percent of plaque on the dogs given Greenies was 40.786%. Greenies reduced plaque on the dogs' teeth by 12.203%.

Conclusions/Discussion
Nutro Tartar Control Biscuits reduced plaque on dogs teeth by 2.695%. Greenies reduced plaque on the dogs' teeth by 12.203%. This demonstrated that in the experiment, Greenies cleaned dogs' teeth better than Nutro Tartar Control Biscuits by 9.508%.

Summary Statement
This project demonstrated how two popular brands of dog treats reduced plaque on dogs' teeth.

Help Received
Dr. Benita Keiss, D.V.M., for examining the dogs' teeth; Mother, for helping me organize data; Judy Roetheli, Greenies Co., and Christy Cooper, Nutro Co., for donating the supply of Greenies and Nutro Tartar Control Biscuits; the dog owners who particitated in my experiment.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Shoshana L. Freifeld Polansky

Project Number
J1410

Project Title
The Effects of Irradiation on the Shelf Life of Fruit and Meat

Abstract

Objectives/Goals
Irradiation of food offers the possibility of increasing the shelf life of many foods we eat. In this experiment I tested the effects of various doses of irradiation on meat and apples.

Methods/Materials
The meat and apple samples were placed in test tubes, labeled, and exposed to 250 Rads, 500 Rads, 900 Rads (of irradiation), or no irradiation at all (the control group). After irradiation, some samples were placed in airtight test tubes, and some were placed in open test tubes. Half of the test tubes were then refrigerated, and half left at room temperature. Observations were recorded every five days and after one month the test tubes were evaluated for signs of deterioration.

Results
After 31 days (one month) at all levels of irradiation, the airtight meat and apple samples showed very few signs of deterioration with generally just slight discoloration as a sign of deterioration. The refrigerated airtight meat and apple samples at all levels of irradiation showed no visible signs of spoilage. The most extreme deterioration occurred in the open test tubes. All samples were dehydrated, with slightly less deterioration in the test tubes with 250 Rads, 500 Rads and 900 Rads of irradiation. All control samples (no irradiation) were quite deteriorated.

Conclusions/Discussion
Levels of irradiation at 250 Rads, 500 Rads, and 900 Rads seemed to be effective in preserving the food samples for a full month when the food items were refrigerated and tightly capped. Although irradiation seemed to prolong shelf life greatly, much controversy still exists. Scientists continue to investigate whether chemical or cellular changes also occur with the foods that might ultimately do more harm than good.

Summary Statement
This project examines the effectiveness of varying levels of irradiation: 250 Rads, 500 Rads and 900 Rads in preserving meat and apple samples for a full month's time.

Help Received
Palomar Hospital allowed Andrew Polansky to irradiate the food samples.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alia Ghoneum

Project Number
J1411

Project Title
The Effect of Modified Rice Bran (MGN-3/Biobran) on the Growth of Breast Cancer Cells in vitro

Abstract

Objectives/Goals
This study addressed the problem of how the human breast cancer cells responded to a natural product made from rice bran (MGN-3/Biobran). The human breast cancer cells (MCF-7) were selected as the model. The purpose of this study investigated whether MGN-3/Biobran suppresses the growth of MCF-7 cells in vitro.

Methods/Materials
The primary materials used were modified rice bran (MGN-3/Biobran) and human breast cancer cells (MCF-7). The methods used included counting the number of cancer cells using a hemocytometer and light microscope. Briefly, four identical groups of cancer cells were subjected to different dosages of MGN-3. The control group was not given MGN-3, while the other three groups were given MGN-3 at different concentrations: 100 µg/ml (micro-gram per ml) (0.1 gram), 500µg/ml (0.5 gram), and 1000µg/ml (1 gram). The number of cancer cells was examined at 3, 4, and 5 days after treatment with MGN-3. The experiment was repeated four times.

Results
The significant finding of this study was that MGN-3, at a concentration of 1000µg/ml, decreased the number of cancer cells. After 3 days, the number of cancer cells decreased by 25% and continued to decline to 66% at 5 days, in comparison to the control group. Decline in the number of cancer cells was also noted at lower concentration, but to a lesser extent. The data represents the mean of four experiments.

Conclusions/Discussion
The findings of these experiments support the hypothesis. The results of this study contribute to the understanding of the benefits of natural products in the treatment of diseases such as cancer. Further studies must be carried out.

Summary Statement
This project examines the action of modified rice bran (MGN-3/Biobran) on the growth of breast cancer cells (MCF-7) in vitro.

Help Received
Mom helped cut and paste for board. Used lab equipment at Drew University of Medicine and Science under the supervision of Dr. James Tsao. Research Associate ordered, maintained, and photographed cancer cells.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Meghan A. Gorman

Project Number
J1412

Project Title
Can Methanol Protect Plants in a Drought Situation?

Abstract

Objectives/Goals
The purpose of this project was to investigate whether methanol treated plants could maintain a greater mass, than untreated plants when both are placed into a drought situation.

Methods/Materials
Three types of plants, leaf lettuce, Romaine lettuce and snapdragons were used in the experiment. Twenty four plants of each type were selected and then divided randomly into 3 groups of eight plants each. Eight plants were used at the beginning of the experiment to determine an average starting weight. Eight plants of each type were used as a control (no methanol or fertilizers, just water and sunlight). The final eight plants were treated with a 1.0% methanol solution, water and sunlight.
The control and mathanol treated plants were grown in a temperature controlled greenhouse for six weeks. The methanol treated plants were sprayed three times
per week for the six week growing period. The plants in both groups were then placed into a drought situatuion by not watering them for a period of four days.

Results
In leaf lettuce, both the control and methanol groups lost weight from the beginning average weight, but the methanol group maintained a slightly greater mass. In Romaine, there was no difference between the two groups tested. In snapdragons the methanol treated group retained a mass that was twice that of the control group.

Conclusions/Discussion
In the two out of three groups tested(leaf lettuce and snapdragons), the methanol treated plants were able to maintain a greater mass in a drought situation.
The results of my experiment show that for some plants, methanol may be useful as a drought protecting device. Treating plants with methanol could be beneficial to people growing crops in arid climates with limited water resources.

Summary Statement
The purpose of this project was to compare methanol treated plants with untreated plants and to determine which would maintain a greater mass in a drought situation.

Help Received
Mother helped type report. Used laboratory glassware ,balance, stir plate and greenhouse space at SunWorld International Inc., under supervision by Debra Gorman and Sharon Rosenthal. This experiment was done independently and is not associated with any research at SunWorld Inc.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Oliver M. Haywood

Project Number
J1413

Project Title
Goodness Gracious Great Gobs of Algae

Abstract

Objectives/Goals
To discover if phosphates affect the growth of algae.

Methods/Materials
I grew algae in several jars containing water taken from a local lake each with a different concentration of phosphate.

Results
Jars with a higher concentration of phosphates made the algae grow quicker.

Conclusions/Discussion
Phosphates can have a major affect on the natural environment.

Summary Statement
Many widely used household may contain substances that may be harmful to nature.

Help Received
Parents drove to lake to collect water and to garden center to buy fertilizer.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Christopher H. Helling

Project Number
J1414

Project Title
How Effective is Beta-Carotene in Fighting Cancer in Plants?

Abstract

Objectives/Goals
The objective is to determine if beta-carotene has any substantial effect in reducing or eliminating the presence of Agrobacterium tumefaciens in plants.

Methods/Materials
Materials used in the experiment were sunflower seeds, beta-carotene (vitamin A) of 25,000 IU, tap water, flower pots and soil, any standard type of disinfectant, a candle or match, an inoculating needle, a USDA permit, and Agrobacterium tumefaciens, the plant carcinogen.

Procedure
The first thing needed was to divide the sunflower seeds in three groups. Germinate the seeds in group A in the beta-carotene solution and the seeds in group B and C in tap water. After the seeds have germinated, plant them in the flowerpots in potting soil. Allow the plants to grow approximately seven to ten inches, after which the plants in Groups A and B will be ready for inoculation. Sterilize the inoculation needle by holding it for three seconds in the flame of the candle. Draw some Agrobacterium tumefaciens culture onto the needle tip and inject the plants from Group A. Then sterilize the needle again and inoculate the plants from Group B. Do not inoculate the plants from Group C. Continue to water the plants in Group A twice each week with the beta carotene solution and the plants in Group B and C with tap water. Record growth rates of the plants each week and note their appearances and record the rate of deterioration.

Results
Results of this experiment show that plants injected with Agrobacterium tumefaciens and treated with beta-carotene successfully fought off the carcinogen. The plants in group A2 resumed normal growth seven days after inoculation, meaning the plants were definitely healthy during the entire process. The average growth rate before inoculation was 0.295 in/day, while after the inoculation it dropped to 0.294 in/day. This means the plants health hardly varied. The plants continued to grow normally, proving that the beta-carotene successfully fought off the plant carcinogen. Beta-carotene is known to target and kill the dangerous and harmful cells in plants, and in this case, the beta-carotene eliminated the Agrobacterium tumefaciens cells inhabiting the sunflower plant, allowing the plant to continue living. Beta-carotene is very effective in fighting cancer in plants.

Conclusions/Discussion
Conclusion

Summary Statement
To determine how effective beta-carotene is in fighting cancer in plants.

Help Received
Mother received USDA permit and bought the plant carcinogen.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Erik P. Hilkey

Project Number
J1415

Project Title
Can Beta-Carotene Prevent Plant Cancer?

Abstract

Objectives/Goals
The objective of my project is to see if beta-carotene can prevent cancer in sunflowers.

Methods/Materials
I took six pots and filled them with potting soil. Then I planted sunflower seeds in each pot. Three pots of seeds were given beta-carotene in their water. I watered each pot 150ml of their appropriate water (3 were given beta-carotene with their water) for six weeks bi-weekly. After those six weeks I inoculated all plants with Agrobacterium tumafaciens which causes cancer in plants and observed them for three weeks.

Results
After all of the plants were inoculated, I found that the plants that did not receive beta-carotene developed more galls, had more numbers of plants in each pot die and did not grow as rapidly.

Conclusions/Discussion
Those plants given beta-carotene from the beginning appeared healthier. beta-carotene seemed to help the plants immune system and helped the plant grow thicker stalks and greater foliage. Those plants receiving beta-carotene had the strength to fight off the cancer better. This would be worthy to further investigate to see if beta-carotene might be helpful in preventing cancer in humans.

Summary Statement
My project was to see if Beta-Carotene (Vitamin A) could in some way boost a sunflower's immune system enough to prevent Crown Gall Disease (a form of cancer).

Help Received
Father and Mother helped put board together.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Brandon Iwata; Catherine Nguyen

Project Number
J1416

Project Title
Measuring Velocity of a Daphnia's Body

Abstract

Objectives/Goals

In order to decipher the effects of stimulants and depressants on daphnia velocity, my partner and I decided to infuse each daphnia with a certain percentage of one of the four drugs (Caffeine, Pseudoephedrine, Ethyl Alcohol, and Nicotine.)

We used a total of 10 daphnia, 2 of which were our controlled variable; the additional 8 were supplied with 2 mL of Caffeine, Pseudoephedrine, Ethyl Alcohol, and Nicotine each.

To supply the daphnia with the drugs, we ground up Caffeine, and Pseudoephedrine pills. To acquire the Nicotine, we soaked a cigarette in 150mL of water. Since the Ethyl Alcohol was already a liquid, all that was done was the addition of water to the drug. We diluted each solution into 50% and 40% liquids, by including the necessary amount of water to each concentrate.

Once finished with the making of each mixture, we added 2mL of each formula to one daphnia. The measuring of the daphnia speed was conducted each day to see what effects might transpire. For ten days, we placed each daphnia in the glass aquarium and timed how long it would take for each daphnia to swim 2 cm. Daily comparisons were made towards the manipulated daphnia and the controlled daphnia.

After ten days of experimentation, 6 of the 10 daphnia had died. The end results showed that the daphnia that consumed the stimulants (Caffeine and Pseudoephedrine) had a longer life span than the daphnia, which consumed the depressants. Though the control daphnia had a prolonged life span than all of the manipulated daphnia.

Methods/Materials

O 6 Cultures of Daphnia Pulex from Carolina Biological Center
O 1 473mL of 70%Ethyl alcohol from Sav-On's
O Pseudoephedrine/ a packet of Suphedrine from Sav-On's
O Caffeine/ a packet of Stay Awake from Sav-On's
O Nicotine/ Marlboro cigarette
O 3 Small bags of yeast
O 2 Small bags of sugar
O 2 Deep well slides
O 3 plastic medicine dropper from Carolina Biological Center
O 20 Plastic containers with a diameter of 12 cm
O 1 Piece of 30x40 inches piece of glass
O 1 West-Germany glass cutter

Summary Statement

The effects of stimulants and depressants on Daphnia speed

Help Received

Brandon'sFather helped build material Catherine's Aunt helped provide drugs Teacher helped provide materials

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)

Alan M. Joyce

Project Number

J1418

Project Title

The Effectiveness of Commercial Products vs. Home Remedies on Whitefly

Abstract

Objectives/Goals

This experiment sought to determine which was more effective, commercial products or home remedies for the prevention of whitefly on hibiscus plants. These solutions were compared to each other and to a treatment of water alone. A second goal was to compare cost effectiveness.

Methods/Materials

This experiment required five spray bottles and one bottle each of Spectracide Triazicide, Spectracide Immunox and Garden Safe Insecticidal Soap. It also required shampoo and cooking oil as ingredients in the home remedy solutions. The spray bottles were filled with their respective treatments the Insecticidal Soap stayed in the spray bottle it was manufactured in. While wearing a mask, the various treatments were applied to hibiscus plants every other day for a fourteen-day period and a thirty-day period. Pictures were taken of the leaves every day during the first testing period and every five days during the second trial. When the testing periods were over, the pictures were analyzed and the cost effectiveness of each treatment was calculated.

Results

After averaging the results of the two testing periods, the most effective sprays were the homemade sprays, which averaged 60% less whitefly than they began with. The Insecticidal Soap was approximately as effective, but cost seven times more than the homemade solutions and contained more hazardous substances. Spectracide Immunox was approximately 10% less effective than the homemade solutions and cost nearly three times as much. The Spectracide Triazicide was quite inexpensive, but also quite ineffective. It worked only slightly better than plain water.

Conclusions/Discussion

The homemade products were as effective or more effective than the commercial products. They were also much more cost efficient than the commercial products and did not contain hazardous substances.

Summary Statement

This project compares the effectiveness and cost efficiency of homemade remedies versus commercial products in reducing whitefly numbers on hibiscus plants.

Help Received

Neighbors allowed me to use their hibiscus plants; Father helped proofread report; Mother helped create display

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Kelly C. Kean

Project Number
J1419

Project Title
A Wrinkle in Time

Abstract

Objectives/Goals
I read a short article which discussed why the skin wrinkles in water. I wondered, would the skin on a finger "wrinkle" at the same rate in ocean water as it did in fresh water? I designed an experiment to test the effects of "wrinkling" in room temperature, distilled water; room temperature distilled water with Epsom salt (10 % concentration); room temperature ocean water (3.5 % concentration); and 40 degree Celsius (warm), distilled water.

Methods/Materials
Materials and Methods:
Ten subjects soaked their hands in 1.5 liters of the water samples until wrinkling occurred. The time was noted and fingers were photographed using a microscope attached to a computer. A delay of 30 minutes was allowed for the skin to return to normal before testing with another water sample.

Results
Results:
Warm, distilled water was quickest to wrinkle the skin. Distilled water with Epsom salt caused rapid wrinkling also. Distilled water at room temperature came in third. The ocean water samples did not cause wrinkling within the two hour time limit, except in one subject.

Conclusions/Discussion
Conclusions:
The warm, distilled water, a hypotonic environment, allowed the water to penetrate the skin rapidly, resulting in wrinkling. In an opposite reaction, the hypertonic environment of the Epsom salts may have drawn water out of the cells, causing the outer layer of skin to be "too large" and also become wrinkled. In general, the bigger the subject, the longer until wrinkling occurred, perhaps due to a smaller surface area to volume ratio. The thickness of the skin might also be a factor, but testing this was outside the scope of this experiment.

Summary Statement
This experiment was designed to test the rate at which the skin wrinkles in distilled water, ocean water, water with Epsom salt, and warm, distilled water.

Help Received
My mother supervised my experiment with human subjects at home. My science teacher lent me her Intel microscope to view the results.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Justin Koh

Project Number
J1420

Project Title
Aspirin: How Much Is Too Much? Creating An in vitro Model to Determine Minimum Daily Aspirin Dosage (MDAD) for Anticoag

Abstract

Objectives/Goals

If I can create a measurable in vitro model that can aspirinize the platelets with varying amounts of aspirin, stimulate them with a coagulant, and measure the anti-coagulant activity, then I can determine an individual's customized Minimum Daily Aspirin Dosage.

Methods/Materials

Eight 4.5 cc Vacutainer tubes, with 0.5 cc of 3.2% Sodium Citrate, of blood were drawn from 11 healthy subjects.

Aspirin solutions were prepared by dissolving 500 mg of pure aspirin powder into 5 cc of 99% ethyl alcohol. This initial solution was further diluted in 1:9 ratio twice with 0.9% sodium chloride (normal saline), resulting making a 1 mg aspirin solution in 1% aqueous alcohol.

Varying amounts of aspirin were added to tube 1 to 8: Tube 1, the control, received no aspirin. Tube 2 received 2.5 µg . Tube 3 received 5 µg (10 mg daily or 40 mg saturation). Tube 4 received 7.5 µg (15 mg daily or 60 mg saturation). Tube 5 received 10 µg . Tube 6 received 20 µg . Tube 7 received 30 µg . Tube 8 received 40 µg. Tubes were left for two hours at room temperature to aspirinize platelets.

0.5 cc of aspirinized blood was mixed with 0.5 cc of normal saline in a cuvette. The cuvette was placed into a Chrono-Log Whole Blood Aggregometer with a plastic-coated magnetic stir-bar. It was warmed to 37o C and a straight baseline was established. Then, 10 microL Arachidonic Acid were added to stimulate platelets aggregation. The final concentration of Arachidonic Acid was 0.5 mM. As the platelets aggregated, they formed a non-conductive barrier between the electrodes of the probe, which decreased conductivity.

Precautions: Blood was drawn and handled using universal precautions by Dr. Koh.

Results

My results showed that it was indeed possible to create an in vitro model to determine the MDAD for each of the tested individuals, 8 female and 3 male. The MDADs ranged from 10mg to 80mg. The resulting MDADs for the subjects 1 to 11 were: 20 mg, 40 mg, 20 mg, 10 mg, 10 mg, 60 mg, 80 mg, 60 mg, 40 mg, 40 mg, 40 mg, respectively.

Conclusions/Discussion

My hypothesis was supported. I was able to design a measurable in vitro model that demonstrated the anticoagulant activities of varying levels of aspirin, and determine individual MDAD for anti-coagulant purposes. The MDAD for anti-coagulant purpose is truly individual.

Summary Statement

Creating an in vitro model to determine Minimum Daily Aspirin Dosage (MDAD) for anticoagulant purposes.

Help Received

My father helped by drawing (and disposing) the blood using universal precautions.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Diana K. Lok

Project Number
J1421

Project Title
Effect of Caffeine on Mosquitoes

Abstract

Objectives/Goals
The objective was to determine if caffeine could be a future larvicide. Therefore, one of my main goals was to find which concentration would kill majority of the population. A goal that was secondary, was to find if caffeine was really harmful to living organisms.

Methods/Materials
I crushed the caffeine pills into a fine powder and measured the amounts (0.05, 0.1, 0.2, 0.3) and poured in 1 liter of water into soda bottles along with the amount. Then I poured 80mL of each solution into 4 baby food jars. My instructor and I went in the field to collect the mosquito's , Culiseta incidens, egg rafts. When the eggs hatched I put 10 in each of the 20 baby food jars. Then I fed them every other day with crushed Total cereal, which I had determined in other experiments that it was the best food for the mosquitoes, every other day and then analyzed the data by using a formula, statistical analysis, to find if there was any significant difference, and the estimation of LD50 (the lethal dosage that would kill about 50 % of the population).

Results
There seemed to be no significant difference between the rates of development, but there was a significant difference in the adult emergence between the concentrations Control and 0.2gms/1000mL, control and 0.3gms/1000mL, 0.05gms/1000mL and 0.2gms/1000mL, 0.05gms/1000mL and 0.3gms/1000mL, 0.1gms/1000mL and 0.2gms/1000mL, 0.2gms/1000mL and 0.3gms/1000mL. However, there was no significant difference in control and 0.05, control and 0.1. It appears that between 0.1 and 0.2 there was a definite drop in adult emergences. The estimation of LD50 showed that we could hypothesize that 1.4gm/ liter of water, would kill about 50% of the population.

Conclusions/Discussion
A nuisance that have bugged humans and other creatures is a mosquito because they leave itchy and sometimes painful welts and carry diseases. If we could find a pesticide that would just destroy the mosquito population a vast number of problems would be solved.My hypothesis, that caffeine would have an effect on mosquitoes was correct. This experiment also proved that caffeine is harmful, proving that we should think the next time we consume soda, coffee, or any other caffeine containing substance.

Summary Statement
My project was to find the effect of caffiene on mosquitoes and to see if it is harmful.

Help Received
Mr. Lee, supervised the project, brought me to the field to collect mosquito egg rafts, taught me all the math formulas, including statistical analysis F method and estimation of LD50

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Erin R. Mallon

Project Number
J1422

Project Title
Caffeinated Daphnia: A Project Testing the Effects of Different Concentrations of Caffeine on a Daphnia's Heartrate

Abstract

Objectives/Goals
My objective was to test the effect of caffeine on a Daphnia's heartrate, and to test how the type of lighting used to gather data affected the overall heartrate.

Methods/Materials
First, 18 Daphnia were cultured. 9 were tested 6 times each for their heartrate in beats/minute over the microscope lamp, 3 times before being given caffeine, and 3 times after being given caffeine. This was repeated with 9 more Daphnia over the LED light.

Results
The median of the Daphnias' heartrates increased by 40 BPM from the initial to the caffeinated test when data was taken with the microscope lamp. The median of the Daphnias' heartrates increased by 39 BPM from the initial to the caffeinated test when data was taken with the LED light. The median of the Daphnias' heartrates in the microscope lamp test was 22 BPM higher overall than the median of the overall heartrates in the LED test.

Conclusions/Discussion
My conclusion is that, according to my data, both caffeine and the microscope lamp increased the Daphnias' heartrates. I had some trouble counting the Daphnias' heartrates, and since this may have affected my data, I am currently retesting the effects of caffeine on a Daphnia's heartrate using a new method, and a modification to the original problem: I will test how different concentrations of caffeine affect a Daphnia's heartrate by hooking up a camera to the microscope and recording the Daphnia's heart beating before and after being given caffeine. Then I can play it back slower and count the heartbeats with much more accuracy. Using this method will eliminate any discrepancies in the data that might have occured because of miscounting the Daphnias' heartrates, and will enable me to accurately test the effects of different concentrations of caffeine on a Daphnia's heartrate.

Summary Statement
My project is testing the effectsof caffeine on a Daphnia's heartrate, and how the type of lighting used to gather data affects the overall heartrate.

Help Received
Science teachers edited writing, ordered original Daphnia culture, and provided some materials used in experiment; Used school's digital video camera.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Meagan G. Martin

Project Number
J1423

Project Title
Puffing and Pumping

Abstract

Objectives/Goals
My objective was to find out if the pulse taken after smoking would be higher than the pulse taken before smoking a cigarette. My hypothesis was that the second pulse recording would be higher because of a stimulant in tobacco called nicotine.

Methods/Materials
20 smokers were tested for this experiment, seven females and 13 males all between the ages of 18 and 25. Their pulse was taken for one minute before they smoked and then again after they had smoked for two minutes.

Results
According to the results of my experiment, after averaging all of the participants' heart rates, a smoker's pulse raises 10 beats after smoking for two minutes.

Conclusions/Discussion
My conclusion is that smoking does raise the heart rate, an average of 10 beats after two minutes of smoking, proving my hypothesis to be correct. This is one example of the harm smoking does to a human body, as shown from the heart rate increase after smoking for as short a time as two minutes. The heart has to work harder to supply the body with blood because of the constriction of the blood vessels caused by nicotine.

Summary Statement
My project, Puffing and Pumping, was done to find out if smoking raises the heart rate.

Help Received
Friend helped take pulse and find smokers.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alexandra S. McLaughlin

Project Number
J1424

Project Title
How Does Acid Rain with a pH Level of 3.0 and 6.0 Affect the Cell Structure of Spirogyra?

Abstract

Objectives/Goals
Hypothesis: The cell structure of the spirogyra will start to deteriorate when the acid rain is at a pH level of 3.0.

Methods/Materials
Materials: 15cc of acid containing 90% water and 10% sulfuric acid, 3 1-qt bottles of soil/water mixture, 3 Spirogyra algae cultures, 1 cc-calibrated dropper, 1 pen, 15 concave microscope slides, 3 1-gallon fishbowls, 3 lamps, 10 sheets of paper, 1 200x microscope, 6 qts of distilled water, 3 40-watt bulbs, 1 pH indicator, 1 pair of gloves

Procedure:
1. Set out fish bowls labeled 1 to 3 with 2 quarts of distilled water, equal amounts of the Spirogyra and soil water.
2. Place each bowl under a 40-watt lamp, heat to 20 degrees Celsius and observe algae growth.
3. When algae look healthy take a small sample from each bowl and observe under the microscope. Label the slides and place in a safe area.
4. Observe algae for ten days then repeat step three.
5. Test the pH level of the water by using the pH indicator. Check to see it's neutral.
6. 1st day - Acid treatment.
 a. Repeat step 3 and 5. Add 12 cc of the mixture water and 10% sulfuric acid to bowl 1. This simulates a low pH level of 3.0. Add 3 cc of the mixture water and 10% sulfuric acid to bowl 2. This simulates a high pH level of 6.0.
 b. Leave the third bowl to grow naturally without acid as the control. Record what was put into each of the bowls. Immediately take a sample from bowls number 1 and 2 and follow step 3. Draw what was seen under the microscope.
7. 24 hours later.
 a. Repeat step 3 with all of the bowls. Draw what was seen under the microscope for each of the bowls.
8. 48 hours later.
 a. Repeat step 3 with all of the bowls. Draw what was seen under the microscope for each of the bowls.
 b. Note any changes in the cellular structure of bowls 1and 2.
9. Compare the notes and drawings from experiment. Note changes or differences in cell structure from the acid in bowls 1 and 2. Refer to the control, bowl 3, to see change.

Summary Statement
My project tested the effects of acid rain on the cell structure of spirogyra.

Help Received
My mother poured my acid into a temporary holding beaker.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Brent W. Merrill

Project Number
J1425

Project Title
Lead Poisoning: From Lead Paint to Cigarettes

Abstract

Objectives/Goals

For hundreds of years, man has used a heavy metal called lead in many products and objects. When absorbed into the body, it is highly toxic to human organs and systems and seriously hinders the body's physical, intellectual, and neurological development. Lead is a natural element that does not break down in the environment. Once lead has been dispersed into the environment, it will remain to poison generations of children unless it is controlled or eliminated. Even very limited exposures to lead are hazardous to children and can even cause death.

After reading an article about kids with learning disabilities due to lead poisoning, I was curious to find what exactly did the lead do to the cells reproduction known as mitosis

Methods/Materials

To find the answer I decided to test a strain of cells under different concentrations. Onion cells are one of the easiest cells to grow and observe so I placed one bulb in a test tube and filled it with diluted water and different concentrations of lead, 1cc, 10 cc, 20 cc, and 50 cc. I then did a second set where I allowed the onion roots to begin growing for 3 days before I exposed them to the lead. After measuring root growth after 3, 7, and 14 days of exposure (with a centimeter ruler), I took a slide sample of each root tip and observed them under high power. I then counted all the cells in ¼ of the view in the microscope and how many were going through mitosis.

Results

The results were conclusive; lead has a profound toxic affect on the mitotic process of the onion root tips. The 7.5% cc lead solution froze the most cells during Interphase, preventing further mitosis from taking place. The 1.5% and 3.0% solutions affected the cells; some roots were able to grow normally but at a greatly reduced rate. Set A had more devastating results because many onion bulbs couldn't even begin to grow roots. Set B however, had a greater amount of cells going through the regular mitotic cycle. Set A had a much larger kill rate of 8 dead bulbs. Set B had only 3.

Conclusions/Discussion

Lead is a harmful, dangerous substance that should not be taken lightly. It has numerous affects on cells. This project taught me the importance of proper lead removal, and how lead is still a pervasive element in today's modern world that could poison future generations.

Summary Statement

By exposing diffrent cocntrations of lead to ce

Help Received

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Dustin J. Pattigan

Project Number
J1426

Project Title
Alternatives to Methyl Bromide

Abstract

Objectives/Goals
Methyl bromide, an ozone depleting pre-plant soil fumigant will be banned in the year 2005. An alternative is desperately needed. I chose to evaluate methyl iodide(chemical alternative), walnut tea extract and commercial compost(natural alternatives) and an untreated check against the current industry standard methyl bromide. I believe methyl iodide will be very effective at disinfesting the soil of root-knot nematodes and weeds.

Methods/Materials
In a randomized and replicated experiment, five soil treatments were evaluated for their effectiveness against the root-knot nematode. 500cc of methyl bromide, methyl iodide, walnut tea extract, commercial compost and untreated soil was placed in 750cc plastic pots. A radish plant was used as a host plant to measure the host response and plant development in the different soil treatments.

Results
In my experiment the natural alternatives, walnut tea extract and commercial compost failed to disinfest the soil of root-knot nematodes and weeds, and plant growth was poor. Methyl iodide, the chemical alternative with a 2.5 day half life was very effective at disinfesting the soil of nematodes and weeds and plant growth was moderate.

Conclusions/Discussion
It will be difficult to find effective alternatives to methyl bromide. Methyl iodide is very effective at disinfesting the soil of root-knot nematodes and weeds, but did not produce plants as large as the methyl bromide treated soil. The walnut tea extract, compost, and the untreated soils were severely infested at the end of 7 weeks. The search must continue for natural or chemical products that minimize the risk to workers and the environment.

Summary Statement
Evaluating natural and chemical alternatives to methyl bromide.

Help Received
Used a greenhouse at the University of California, Kearney Ag Center, under the supervision of Staff Research Associate Tom Buzo, UCR Nematology.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
E. Anders Pedersen

Project Number
J1427

Project Title
The Effect of Mercury on Learning Behavior in Planaria

Abstract

Objectives/Goals
The purpose of my research is to see if exposure to mercury effects the learning ability of planaria. My hypothesis is that planaria exposed to mercury either through their diet or through the water in which they live will have reduced ability to learn a simple Y maze when compared to those with no or minimal mercury exposure.

Methods/Materials
Brown Planaria (three groups of 5)
Train-a-Tray "Y" maze 6V battery
Mercury contaminated water (Guadalupe River)
Mercury free water (Hech-Hechy)
Salmon
Swordfish
A month before I started my test I introduced my planaria into their environment. One group was put into mercury-contaminated water drawn from the Guadalupe River. This group was fed farmed salmon, which is mercury free. The second group was put into mercury-free Hech- Hechy water but was fed swordfish, which has a mercury level of.88-ppm. My control group was maintained in Hech-Hechy water on a diet of salmon to avoid any mercury exposure. After a month I began testing them in the "Y" maze. Each planarium was given three trial runs per day for six consecutive days. I used a pipette to place the planarium in the maze at point "A" facing towards the fork in the Y. As it traveled down the maze, I shocked it if it turned to the right. I continued giving it brief, light shocks until it went up the left arm of the maze. The direction of the first turn was recorded for each run and then the totals for the three groups were recorded for each day.

Results
The first three days of training showed very little difference between the three groups. On the first three days they turned right in approximately half the trials. On the fourth day the third group showed great improvement in their learning with only two wrong turns. Although all three groups demonstrated improvement, when comparing the groups over the last three days, the group without mercury exposure made significantly fewer errors.

Conclusions/Discussion
Mercury is believed to be associated with learning problems in humans. In this experiment planaria were exposed to mercury for one-month and then their learning ability was tested in a simple Y maze. I found

Summary Statement
This experiment shows that mercury negatively effects the learning ability of planaria.

Help Received
mom, helped me by finding an article in the news about mercury contamination of the Guadalupe River telling me about planaria and by editing the final draft

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alek J. Pronenko

Project Number
J1428

Project Title
Blood Rush

Abstract

Objectives/Goals
The objective is to determine if caffeine effects the blood pressure of children.

Methods/Materials
Eight subjects ages 9-15 were used in the project. The blood pressure of each subject was taken with a stethoscope before drinking a Coca Cola, at which time, the systolic and diastolic measurements were recorded.

Each subject drank a Coca Cola drink within a 10 minute period. The blood pressure of each subject was taken again then recorded 30 minutes after the Coca Cola drink had been consumed. The blood pressure was again taken 60 minutes after the Coca Cola drink had been consumed.

To get an accurate reading and a results average, the process above was repeated again two more times on different days. Upon completion of the readings, the results were compared.

The materials used were eight subjects, a stethoscope, a watch for timing and 24 -355 ml cans of Coca Cola with caffeine.

Results
On the first day and after the 30 minute reading, 5 subjects experienced decreasing blood pressure while 3 of the subjects experienced increased blood pressure. The 5 subjects who's blood pressures decreased, experienced increased blood pressure after 60 minutes. One of the 3 remaining subjects stayed the same while the other decreased. One of the subjects experienced a jump of 14 points in the systolic reading.

On the second day, 3 subjects experienced increased blood pressure. 3 other subjects experienced decreasing blood pressure with the 2 remaining staying the same. After 60 minutes, 5 subjects were up, 2 stayed the same and 1 was down.

On the third day after 30 minutes, 3 subjects were up, 3 were down and 2 stayed the same. After 60 minutes, 6 subjects were down and 2 were up.

Most subjects experienced upward blood pressure readings on the 1st and 2nd days of testing. On the third day, most subjects experienced downward blood pressure readings.

Summary Statement
Measuring the effects of caffeine on the blood pressure of children.

Help Received
My Mom provided the 24 drinks and assisted me in taking the blood pressure of each subject. I timed each subject, and entered the data for each blood pressure reading. My Dad used the computer to take the raw data from each reading and create color graph charts for each reading, of each subject, for each day.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Julia M. Reintjes

Project Number
J1430

Project Title
Crickets and Caffeine

Abstract

Objectives/Goals
My project was to determine if caffeine could be used as a natural pesticide for crickets.

Methods/Materials
90 live field crickets were separated evenly into nine disposable Tupperware containers. Holes were poked into the lids for ventilation. Vivarin, which is pure caffeine, was crushed into a fine powder and sprinkled onto the thin slices of juicy potato. Three slices were left plain for the control group. Three slices had 400 milligrams worth of caffeine on them. Three slices had 800 milligrams worth of caffeine on them. The potatoes were placed in the boxes with the crickets. The boxes were checked every day at 8:00 a.m. and 8:00 p.m. and the dead crickets were counted.

Results
The crickets that ate the caffeine had a much higher death rate than the control group. By day six, in the 400 and 800 milligram groups, nine to ten crickets out of ten were dead. The control groups only had three, four, and six crickets dead by the sixth day.

Conclusions/Discussion
Caffeine does work as a natural pesticide for crickets. My next step would be to try more of a variety of amounts of caffeine to see the lowest amount that would be effective to kill crickets.

Summary Statement
My project determines that caffeine is a natural pesticide for crickets.

Help Received
Mom and Dad helped sort crickets and buy supplies.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Kaylah L. Rubish

Project Number
J1431

Project Title
More Magnetite, Please!

Abstract

Objectives/Goals
Homing pigeons have been racing home for many generations. Is it possible to add a supplement to their food that would allow then to find their way home quicker?

Methods/Materials
I separated two groups of birds and fed Group A, the Magnetite supplement, along with their feed.Group B was fed it's regular diet.Both groups were banded with electronic race bands. I took the two groups of birds on six training tosses in six weeks. Each group was released at the same distance (half-hour apart)and allowed to fly home. An electronic clock was set up at my house and recorded the birds as they entered their loft. I detailed my findings in my journal for each of the six training tosses.

Results
From my observations, it was hard to pinpoint the success from the Magnetite supplement. On certain training tosses the Magnetite fed birds did arrive home faster. However, on the other training tosses this was not the case. Group A arrived home faster on the third, fifth, and sixth toss. Group B arrived home faster on the first, second, and fourth toss.

Conclusions/Discussion
Based on my experiment I was not able to clearly determine that Magnetite does enhance a pigeon's flying ability. I am rejecting my original hypothesis because there were too many variables that I did not take into consideration.

Summary Statement
Improving the flying ability of Homing pigeons with Magnetite.

Help Received
Mother helped type report and Father helped crate pigeons and drive to training tosses.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Kristof Z. Ruzics

Project Number
J1432

Project Title
Coca Cola Raises Blood Pressure

Abstract

Objectives/Goals
The objective is to determine if Coca Cola with caffeine will change the heart rate and blood pressure of people within thirty minutes after being consumed.

Methods/Materials
Informed consent was obtained from 10 individuals who were then randomly assigned to either 355ml. of Coca Cola with caffeine or 355ml. of Coca Cola without caffeine (control) the identity of which was blinded to the subject and the researcher (double-blinded). Before drinking the Coca Cola each subject relaxed for 10 minutes in a quiet controlled environment, while watching the black and white documentary video "Kon Tiki" and then had baseline blood pressure (BP) and heart rate (HR) measurements three times using an automatic sphygmomanometer. 30 minutes after cola was consumed BP and HR were measured again three times. Data was analyzed comparing changes in BP and HR between study and control group. Statistical analysis using simple t-test was obtained.

Results
Every subject who drank caffeinated cola had a rise in systolic blood pressure (SBP) at an average rise of 7mmHg. The SBP rose in some subjects and fell in others of the subjects who drank decaffeinated cola in the control group. The control group had an average rise of 1mmHg SBP. There was no significant change in heart rate. The simple t-test statistical analysis revealed that there were enough subjects in each group and enough of a difference in SBP to be statistically significant (P = .05).

Conclusions/Discussion
This experiment proved the hypothesis that Coca Cola with caffeine will raise the blood pressure of a person within thirty minutes (p-value = 0.05), but did not prove that it would raise the heart rate (p-value = 0.65).

Summary Statement
This project proves that Coca Cola with caffeine raises blood pressure within thirty minutes.

Help Received
1. Father offered advice and helped edit papers. 2. D. Gjertson, Ph.D. (Statistician UCLA Immunogenetics Center) provided statistical analysis of results.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Stephen M. Shay

Project Number
J1433

Project Title
The Effects of Storm Water Runoff on Marine Life

Abstract

Objectives/Goals
The purpose of this experiment was to determine the effects of stormwater runoff (using various everyday pollutants which can be found in stormwater runoff) on marine life (using brine shrimp as the test species).

Methods/Materials
The independent variables were gasoline, motor oil, weed killer, pesticide, fertilizer and Drano. The dependent variable was the death in the brine shrimp.

Six glass 9 oz cups were lined up and filled with 100 mL of salt water using a syringe. Using a syringe 5 mL of each pollutant was drawn, placed and stirred into each cup with a sterile plastic straw. Using a syringe, 20 brine shrimp in 2.5 mL of salt water were placed in each cup. A timer was started and each minute the brine shrimp in each cup were counted and monitored and the death of each logged on my test sheet. Three cups were monitored at a time with a magnified eye piece for each 20 minute interval until all pollutants had been tested and each minute logged. This test was conducted on two separate weekends with the average results graphed.

Results
All pollutants did not kill the brine shrimp at the same rate. The pesticide and Drano were the most harmful killing all the brine shrimp in the first 10 minutes. The motor oil and weed killer were the least harmful in the 20 minutes of the study. The above findings demonstrated that everyday pollutants contain ingredients so destructive to brine shrimp that alternative products should be used. This teaches us that other everyday products containing the same ingredients as the most harmful (pesticide and Drano) should be avoided.

Conclusions/Discussion
The information gained from this experiment will help people realize the damage stormwater runoff pollutants can have on our marine life. Hopefully it will educate people about their impact on marine life through stormwater runoff pollution. People can then make more informed choices about how their everyday behavior effects marine life and ultimately all life on this planet.

If the concentration of pollutants had been increased, would all the brine shrimp have died? Would actual testing of coastal waters affect the brine shrimp over a longer period of time? It would be interesting to use a more extensive list of household pollutants and log the outcome.

Summary Statement
My project shows how common everyday household pollutants can be washed into stormdrains and carried to the ocean, thereby harming and/or killing our marine life.

Help Received
Dad helped assemble and monitor the use of the harmful pollutants. Mom helped me search the internet for background and helped correct my punctuation. My Aunt helped me choose graphics and print them out.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Craig F. Smith

Project Number
J1434

Project Title
Can Allelopathy Be Used in Our Favor for No More Weeds?

Abstract

Objectives/Goals
To determine if top dressings made from leaves affect the germination of radish seeds.

Methods/Materials
A commercial top dressing, pine needles (Pinus halipensis), eucalyptus (Eucalyptus leucoxylon) & sycamore (Platanus racemosa) leaves were shred and sifted to a uniform size. 50 radish seeds were planted in commercial potting soil in each plastic container. The containers were topped with one type of shredded leaves, commercial top dressing or potting soil (control). Sunlight & water were controlled. The number of seeds germinated from each container were recorded daily until there were no new seedlings for 3 consecutive days. Two trials (250 seeds each, 50 per bin) were completed (100 seeds for each variable). The average & percent germination were computed & graphed.

Results
The average germination of radish seeds after 13 days was: 5% pine needles, 18% eucalyptus leaves, 29% sycamore leaves, 27% commercial top dressing & 50% potting soil (control). The pine needles showed the greatest effect on germination followed by eucalyptus leaves, with sycamore & the commercial top dressing being close to the same, but almost half the percent germination rate of the control.

Conclusions/Discussion
Pine needles affected the ability of the radish seeds to germinate successfully in high numbers. Eucalyptus leaves also affected the average germination rate as well. Sycamore leaves & the commercial top dressing affected the average germination, but to a lesser degree. I conclude that there is a significant difference in the average germination of radish seeds between containers with pine needles or eucalyptus leaves & the control. My hypothesis may be correct for some types of leaves, but not for others. Chemicals that cause allelopathy are released when leaves fall to the ground & decay. Leaves from some plants might be able to be used as a top dressing to reduce weed germination. I used what I thought was a large sample size (100 seeds for each container), but I was able to complete only 2 trials. There is a discrepancy between trials 1 & 2 for the germination rate of seeds with the sycamore leaves. I would like to complete more trials, identify chemicals that affect germination, & refine this experiment to control unexpected variables (i.e. water loss or its inability to penetrate the surface of the top dressings).

Summary Statement
My project is to determine if top dressings made from shredded leaves have an effect (due to allelopathy) on the germination of radish seeds, which might be used to control similar weedy species.

Help Received
My mom discussed research on allelopathy with me, took pictures, & typed my report. My dad helped me build a sieve, buy materials & gather leaves. Mr. Post taught me Excell for data tables & graphs.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Haileigh K. Stainbrook

Project Number
J1435

Project Title
Nutritional Mineral or Formulated Drug: The Effects of Different Anthelmintics on Range Land Cattle, Year II

Abstract

Objectives/Goals
The purpose of my experiment is to determine which anthelmintic would be most effective in reducing internal parasites in range land cattle.

Methods/Materials
I randomly placed 21 steers into three test groups and then took fecal samples rectally from each steer and administered the appropriate anthelmintic {Safe-Guard (fenbendazole) Paste 10%, Copper Sulfate, and Control}. Each group of seven were weighed and the weights were recorded. The whole group of 21 steers were released into their designated pasture. Every seven days, fecal samples and weights were taken by test groups until a significant reinfestation occurred in all three test groups. A complicated laboratory process was followed to observe the fecal samples for ova.

Results
Group one {Safe-Guard (fenbendazole) Paste 10%} had the largest decrease of internal parasites. Group two (Copper Sulfate) had fluctuating ova counts and the fastest weight gain. Group three (Control) had an overall higher infestation of ova and the slowest weight gain.

Conclusions/Discussion
In conclusion, it seemed that Safe-Guard (fenbendazole) Paste 10% worked better in controlling internal parasites. Copper Sulfate did have positive results, but would need to be administered more often and it would be more labor intensive. The cattle used seemed to be deficient in copper, so therefore, after receiving the Copper Sulfate, the cattle could utilize their feed and gain weight faster.

Summary Statement
My project was on the effects of different anthelmintics such as Safe-Guard (fenbendazole) Paste 10% and Copper Sulfate on range land cattle.

Help Received
Dr. LeRoy Krum provided lab equipment, books, and materials. Mom helped with the board and photos. Dad helped with the cattle.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Megan E. Worton

Project Number
J1436

Project Title
Determining the Effects of Paclobutrazol on Green Waste Management

Abstract

Objectives/Goals
My objective was to determine if the product "Paclobutrazol" could be used to control the growth of landscape shrubs and therefore aid in the reduction of green waste. If this product could reduce the overall plant growth without changing the natural appearance of the plant, the need to prune off excess growth could be reduced or eliminated.

Methods/Materials
I applied various rates of Paclobutrazol to ten container grown shrubs using a soil drench and a foliar spray. All ten plants were grown in a hot house environment with continuous plant light. The air temperature was held at a constant 70 degrees and the soil was kept moist. I made visual observations daily and measured and recorded plant growth weekly, if there was any to record.

Results
Although all of the plants showed favorable results in my experiment, 5 plants showed the best results. On each of these 5 plants the Paclobutrazol either stopped the growth altogether or caused the plant to die back at the tips of the foliage. The remaining 4 plants tested had various results but had continued growth. The control plant had vigorous growth with overall height increase of three inches and many blooming branches.

Conclusions/Discussion
In conclusion it appears that this product can control plant growth and could be an effective tool in reducing green waste. In order to evaluate this product more effeciently a longer period of growing time and a wider variety of shrubs would help to determine if this product could be used on a larger more constructive scale.

Summary Statement
My project is about using a bedding plant growth regulator to control growth on landscape shrubs.

Help Received
Father supplied product and supervised application.