CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Abdulkarim J. Alamad

Project Number
J1701

Project Title
Aroma Therapy: Fact or Fiction?

Abstract

Objectives/Goals
This project was to determine whether aroma therapy of eucalyptus spearmint oil and lotion can really help to reduce a person's stress level or not.

Methods/Materials
A sphygmomanometer and an oximeter were used to determine the resting heart rate, blood pressure, and oxygen saturation levels of 20 subjects; 10 boys and 10 girls ages 18-25. This was done after the subjects were asked to sit and relax for five minutes. Subjects were then asked to rub eucalyptus spearmint body lotion on their hands and arms while smelling the oil vapor of the same scent from an oil warmer for a period of five minutes. After the five minutes were done, the subjects' heart rate, blood pressure, and oxygen saturation levels were measured again and recorded.

Results
Results showed that after the aroma therapy, the subjects' heart rate decreased by an average of 7.3 BPM. The systolic blood pressure decreased by an average of 6.5 mmHg. And the diastolic blood pressure decreased an average of 6.2 mmHg. As for the oxygen saturation percentage, it had a very insignificant average increase of only 0.3%.

Conclusions/Discussion
The results proved that the hypothesis was mostly correct. Aroma therapy decreased the stress level of the subjects as seen in the reduction of the heart rate and the systolic and diastolic blood pressure. The only part of my hypothesis that was proven wrong was that the oxygen saturation was not affected. I concluded that much more serious health problems affect a person's oxygen saturation levels and that it is not affected by stress or aroma therapy.

Summary Statement
The effect of eucalyptus spearmint aroma therapy on the reduction of a person's stress level.

Help Received
My mother helped me to double check my entries for the tables and graphs. She also helped to make the board neat.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Mythri Ambatipudi

Project Number
J1702

Project Title
Bitter-Sweet Therapy: Hypoglycemic Effects of Bitter Melon and Fenugreek on Type 2 Diabetes Mellitus

Abstract

Objectives/Goals
About 80% of deaths resulting from Diabetes Mellitus occur in under-developed countries where modern hypoglycemic drugs are either unaffordable or inaccessible. Herbs such as Momordica Charantia, or Bitter Melon, and Trignoella Foenum-Graecum, or Fenugreek, are becoming popular remedies in such countries although their hypoglycemic effects are unproven. The objective of this project is to test the hypoglycemic effects of these herbs and find an alternative remedy for type 2 diabetes.

Methods/Materials
Informed consent was obtained from 10 type 2 diabetic and 10 non-diabetic human subjects. The blood glucose levels after 12 hours of overnight fasting as well as 1 hour, 2 hours and 3 hours after breakfast were measured for all the subjects for a period of 3 days. The experiment was then repeated for a period of 12 more days with the subjects consuming 60mL and 120mL of bitter melon juice and 1tsp. and 2tsp. of fenugreek powder along with the breakfast. The subjects maintained a consistent lifestyle and ate the same breakfast every day and the diabetic subjects continued their regular diabetic medication during the test period.

Results
Fenugreek lowered the blood glucose levels of 18 out of 20 subjects and bitter melon lowered the blood glucose levels of 17 out of 20 subjects. Type 2 diabetic subjects experienced improved body metabolism and reduced blood glucose levels with these herbs. Two type 2 diabetic subjects who experience high blood glucose levels due to the side effects of cholesterol lowering statins experienced reduced blood glucose levels with these herbs.

Conclusions/Discussion
Ingredients in bitter melon such as charantins, polypeptide-P and alkaloids improve glucose absorption and body metabolism. Ingredients in fenugreek such as the 4-hydroxyisoleucine amino acid, the trigonelline alkaloid and fenugreekine increase the number of insulin receptors, improve glucose utilization by peripheral tissues and improve body metabolism. The results from this experiment show that type 2 diabetic patients may use these herbs to control their diabetes. Non-diabetic people should use these herbs to lower their chances of developing diabetes.

Summary Statement
The objective of this project is to investigate the hypoglycemic effects of Momordica Charantia (Bitter Melon) and Trigonella Foenum-Graecum (Fenugreek) and find an alternative remedy for type 2 diabetes.

Help Received
Mrs. Svjetlana Dubocanin, a DM nutrition and prevention expert, and Mrs. Neha Makhijani, my project advisor, provided guidance on diabetes related research. My parents purchased all the material and provided transportation.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Austin P. Ambrose

Project Number
J1703

Project Title
Bio-Friendly Ant Repellant

Abstract

Objectives/Goals
The objective of this project iss to create an effective, bio-friendly, ant repellant.

Methods/Materials
This project uses 5 different spices, and water. The spices are paprika, mustard powder, garlic powder, cayenne pepper, and chili powder. The spices are diluted in water, and then put into spray bottles. Cutting boards are placed in a garden area with sugar water on top are used to attract ants. When enough ants are on a board, they are sprayed with the spice mixtures to check the effectiveness of each mixture in driving away ants(several experiments are done with each spice mixture, and plain water). A video camera and computer are used to determine each spray's effectiveness (and the effectiveness of plain water)

Results
Paprika diluted in water caused, on average, a greater percentage of ants to exit the boards within 1 minute of spray compared to 4 other spices diluted in water, and plain water. Plain water was the least effective.

Conclusions/Discussion
The paprika mixture is environmentally friendly, and doesn#t kill, but rather quickly and effectively drivea ants away. Creating sprays like this will hopefully contribute to humanity's efforts to become more peaceful with nature and its creatures.

Summary Statement
The purpose of this project is to find a bio-friendly ant repellant that drives away ants without killing them

Help Received
Parents helped set up experiment areas

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Erica L. Barrett

Project Number
J1704

Project Title
Osage Orange: Does It Have Antibacterial or Insect Repellent Effects?

Abstract

Objectives/Goals
Last year I performed water quality tests on creek water in the Los Peñasquitos Canyon Preserve. There, I saw a grove of trees that bore lime green, warty balls of fruit. After doing research, I discovered these were Osage Orange trees. Online I learned the trees are very hardy and may contain antibacterial and antifungal compounds. Some researchers believe the Osage Orange fruit may even repel insects. I set out to try to verify these claims by performing experiments. I predicted that the Osage Orange peel and pulp would indeed have antimicrobial properties and that the fruit would repel insects.

Methods/Materials
I made a boiling water extract from the peel and one from the pulp, then also a coldwater extract using both. I added creek water containing bacteria and fungi to the extracts and plated the solutions into 15 Petri dishes. I used Coliscan Easygel, disposable serological pipets, and an incubator. After 48 hours, I counted the colonies of bacteria. For the second trial, I ran three tests each with 18 crickets in a terrarium. In test one, an Osage Orange was placed in one corner while I observed, recorded, and photographed cricket behavior. The experiment was repeated using Osage Orange pulp, then DEET for comparison.

Results
The Petri dishes containing Osage Orange water-soluble extracts grew mold colonies and bacteria colonies too numerous to count. There did not appear to be any water soluble antimicrobial agents in the fruit. As for repelling insects, the Osage Orange seemed to attract crickets rather than repel them. There was a 35% increase in cricket activity in the quadrant with the Osage Orange. DEET, however effectively repelled the crickets with only 5.6% of crickets on average in the DEET quadrant. On average, about 15.6% of the crickets were in the pulp quadrant. The pulp may have repelled the crickets to a small extent, but the DEET was three times more effective.

Conclusions/Discussion
In conclusion, the Osage Orange did not appear to have water soluble compounds that are antibacterial, but fat soluble components still hold promise. I could not test these since I would have to use ethyl alcohol to extract them, the alcohol might have antibacterial properties. The whole fruit did not seem to repel insects. The pulp may have, to some degree, repelled the crickets. Osage Oranges do have unusual properties like resistance to decay and disease which still invites further study.

Summary Statement
My project explored the antibacterial and insect repellent properties of the Osage Oranges.

Help Received
Thanks to my parents who helped me obtain supplies. Thanks to my science teacher who taught me sterile procedures.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Talie L. Cloud

Project Number
J1706

Project Title
Viva La Coffee! The Effects of Various Coffee Bean Roasts on the Longevity of Drosophila melanogaster

Abstract

Objectives/Goals
The objective of my science project was to determine whether the consumption of various types of coffee bean roasts would affect the lifespan of Drosophila melanogaster.

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. I combined 10mL of dry fruit fly food with 10mL of brewed coffee solution. My control was brewed distilled water given to the flies in the same manner as the coffee roasts. Each mixture of coffee solution and food was placed in a separate vial. I added 20 granules of yeast into each vial with ten fruit flies. The number of fruit flies remaining alive were recorded daily. Every 10 days the remaining living fruit flies were removed and transferred to a new vial containing fresh food and the coffee solution. I repeated this until there were no living fruit flies from the original ten left. In this manner I compared how long each fruit fly population was sustained on each of the coffee bean roasts.

Results
The results of my investigation indicated that the coffee roast that promoted the longevity of the fruit flies overall was light roasted coffee. When the flies lifespan was counted, I discovered that the flies that consumed the light roasted coffee consistently lived longer than any of the other coffee roasts. After one week, 52% consuming light roast, 37.3% control, 12.7% of the medium roast, and 0% of the fruit flies from the dark roasted coffee were living. After two weeks, only fruit flies from the light roasted coffee and the control were still alive. An unanticipated result that I found was that the medium and dark roasted coffees appeared toxic to the fruit flies and shortened their lifespan.

Conclusions/Discussion
The type of coffee bean roast consumed does have an effect on the longevity of the Drosophila melanogaster. Light roasted coffee lengthened the lifespan; whereas, the medium and dark roasted coffee shortened it.

Summary Statement
I used a variety of coffee bean roasts to show that some roasts can promote a greater lifespan on Drosophila melanogaster.

Help Received
My parents helped in purchasing the fruit flies and supplies.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

S. Annika Daug

Project Number

J1707

Project Title

Evaluating Curcumin As a Cytotoxic Agent Using a Germinating Seed Model

Abstract

Objectives/Goals

The objective of this project was to evaluate curcumin#s cytotoxic effects using a germinating seed model. I hypothesized that germinating black eyed beans (Vigna unguiculata) exposed to curcumin would be affected adversely in a dose-dependent manner based on four parameters: extent of water imbibition, seed germination percentage, radicle length, and seedling weight.

Methods/Materials

Four sets of 30 black eyed beans were exposed to either water,low dose curcumin (LD) solution (2 mg/mL), medium dose curcumin (MD) (4 mg/mL), or high dose curcumin (HD) (8 mg/mL). Seeds were weighed, soaked for 3 hours in the corresponding solutions, then allowed to germinate in petri dishes under growing lights for 96 hours. Factors that would affect seed germination (such as ambient temperature, time exposed to light, volume of solution for watering) were kept constant. Parameters measured included weight of seeds after soaking, seed germination percentage, radicle length (using string method), and seedling weight after 96 hours. A total of 5 trials were done.

Results

Average percent weight gain of seeds after soaking for control, LD, MD, and HD were 110%, 103%, 102%, and 100% respectively. There was a 10% drop in water imbibition between control and HD. Seed germination percentage for control, LD, MD, and HD were 95%, 91%, 89%, and 83% respectively, with a 12% decrease between control and HD. Average radicle length after 96 hours for control, LD, MD, and HD were 68mm, 59mm, 58mm, and 57mm respectively. Average percent weight gain from dry beans to 96th hour for control, LD, MD, HD were 192%, 177%, 177%, and 172% respectively with a 20% drop between control and HD.

Conclusions/Discussion

Turmeric has long been used in Asian traditional medicine. In recent years, its active ingredient, curcumin, has been shown to have anti-cancer potential because it causes apoptosis in cultured cancer cells. This project evaluated curcumin's cytotoxic effects using a germinating seed model. The results showed that black eyed beans given water alone gained the most weight after soaking, had the highest seed germination percentage, the longest radicle length, and the highest seedling weight after 4 days of germination. Seeds exposed to high dose curcumin scored the lowest on all parameters. Dose dependency was demonstrated to a certain extent, although differences between LD and MD were small.

Summary Statement

This project investigated curcumin's cytotoxic effects on germinating black eyed beans using varying concentrations of curcumin solutions+

Help Received

Mother helped gather materials

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jamie A. Dyvig

Project Number
J1708

Project Title
Effects of Electromagnetic Radiation on Plant Growth

Abstract

Objectives/Goals
Electromagnetic radiation is used constantly in our daily lives; does it affect living organisms? The purpose of this project was to discover if electromagnetic radiation affects plant growth. Based on my research, my hypothesis was that exposure to low levels of electromagnetic radiation would have minimal impact on the growth rate of wheatgrass and radish sprouts.

Methods/Materials
I constructed two aluminum foil Faraday cages to isolate the electromagnetic fields. Next, I set up the electromagnetic radiation by having a wireless video camera and wireless access point emit microwave radiation at 2.4 GHz. Six trials were performed with a total of 880 seeds (560 radish sprout seeds and 320 wheatgrass seeds). I recorded the air temperature, relative humidity, soil temperature, and electromagnetic wave exposure levels daily.

Results
The first trial was a control, conducted to ensure that the environments in the boxes were the same. The wireless devices were not turned on, and no significant differences in the resulting plant growth were found in the two Faraday cages. Radish sprouts had a mean height difference of 2%, and the wheatgrass had a mean height difference of less than 1%. The second experiment had continuous radiation at 2.4 GHz. The mean height of the radish plants exposed to the electromagnetic radiation was 16.5% lower than the control plants. The wheatgrass mean was 5.1% lower. In the third experiment, the difference was 8.2%. The fourth experiment showed a difference of 15%. The fifth trial mean result was 9% different, and the sixth trial mean difference was 11%.

Conclusions/Discussion
In the control trial, no significant differences were observed between the plant growths in each box. In the next five trials when electromagnetic radiation at 2.4 GHz was introduced to one box, the plants exposed to electromagnetic radiation consistently had significantly lower mean plant heights. Not only were plant heights significantly lower, but differences were also evident in the greener color and more robust appearance of the control plants. In the sixth experiment when a water deprivation stress test was introduced, the plants exposed to electromagnetic radiation recovered more slowly.

Summary Statement
My project explores the effects of 2.4 GHz electromagnetic radiation on the growth of plants.

Help Received
Father helped construct Faraday boxes and wireless interface; science teacher for guidance; Dr. Kaslow for information on EMF meter.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Tara D. Falt

Project Number
J1709

Project Title
Caffeine Makes the Heart Go Boom!

Abstract

Objectives/Goals
My objective was to see if exposure to different levels of caffeine would alter the heart rate of Daphnia Magna. It is also to see if the heart rate would increase, decrease, or stay the same.

Methods/Materials
The materials I used included the following: Daphnia magna, Daphnia magna food, culturing tank, pipettes, scale, caffeine, test tubes, small bowls, timer, and a microscope. My entire experiment can be simplified easily. All I did was expose the water fleas to different levels of caffeine then observed and recorded their heart rates under a microscope. I counted the heart rate for fifteen seconds then multiplied by four to get beats per minute. Every time I saw the heart beat, I made a dot on a piece of paper then afterwards counted the dots and multiplied by four to get the heart beat per minute.

Results
The averages that were a result of my project include: 299.6 with no caffeine, 306.4 with 50 milligrams of caffeine, 347.2 with 100 milligrams of caffeine, 373.6 with 200 milligrams of caffeine, and 416.4 with 250 milligrams of caffeine. These results allowed me to fulfill my objective to find out if caffeine had an effect on the heart rate of Daphnia magna and it does.

Conclusions/Discussion
All of my data support my hypothesis and are results of my extensive research and careful experimenting. I hypothesized that with exposure to a higher amount of caffeine the heart rate would increase and as shown in my data, I was correct. The information I pulled from this project expands the knowledge of pharmacology/toxicology. Caffeine, a drug used for pharmaceutical reasons does have an effect on heart rate as other drugs can. As a result, drugs can have a negative and or positive effect on organisms.

Summary Statement
My project is the effect caffeine has on the heart rate of Daphnia Magna.

Help Received
Mother bought supplies and helped with board; Dad bought supplies; Mr. Briner answered questions; Mrs. Baham and friend answered questions

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jessica L. Flores

Project Number
J1710

Project Title
Nutrition and Its Effect on Horse Glucose Levels

Abstract

Objectives/Goals
This science fair project was done to learn more about the effect of nutrition on glucose levels of horses. The primary types of hay available are thought to have differing effects on a horses blood glucose. This experiment wanted to confirm the effect on the blood glucose and it also wanted to determine which type of hay would be best to feed if a horse had metabolic syndrome.

Methods/Materials
Methods:
4 horses were fed 3 different types (alfalfa hay, oat hay, and grass hay) of feed for 3 weeks. The type of hay was changed once per week, and after each week the horses glucose level was tested. To test the blood samples an at home glucose meter was used for the testing. One of the four horses was the control, and that horse stayed on grass hay the entire duration of the experiment.
Materials:
The materials for this experiment were alfalfa hay, grass hay, and oat hay. There was also the glucose meter, glucose strips, the hypodermic syringes, the cotton swabs, and the alcohol.

Results
The final result was that overall the alfalfa hay had the most effect on horse glucose levels, then oat hay, and lastly grass hay. This means that the grass hay would be best to feed a horse with metabolic syndrome.

Conclusions/Discussion
My results did support my hypothesis, showing that alfalfa hay had the greatest effect on the horses glucose level. This experiment increased my knowledge of the effect of nutrition on horse glucose levels. It also helped me understand how to feed a horse with metabolic syndrome.

Summary Statement
This project tests the effect of nutrition on horse glucose levels, and validates which hay would be best to feed a horse with metabolic syndrome.

Help Received
Assistance was received from Dr. Hanes (DVM). Dr. Hanes helped take the blood samples, and test them with the glucose meter.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Wade W. Frey

Project Number
J1711

Project Title
Fishy Fertilizer

Abstract

Objectives/Goals
The objective of this project is to determine what effect fertilizers have on aquatic life.

Methods/Materials
In this experiment I used nine one gallon graduated containers, and in each I put ten minnows and one tablespoon of duckweed. These represented aquatic habitats. After each habitat was set up, I placed one tablespoon of Miracle Grow soluble plant food in three containers, one tablespoon of urea concentrate used by farmers in three more containers, and left the remaining three containers devoid of man made substances for control. A cup of water was scooped out of each habitat and mixed with that tank#s designated substance. Once the contaminated water was mixed back in with the habitat, I started a stopwatch and took notes on what happened.

Results
Based on my observations, none of the fertilizers had any effect on the duckweed. I was really surprised to learn that the minnows in the Miracle Grow soluble plant food tanks did not survive. The minnow#s activity inside the containers of the urea concentrate slowed dramatically. Only two minnows in this experimental group did not survive. The control group lost three minnows over all. Because of this, I can assume that the urea concentrate had no effect on the experimental group.

Conclusions/Discussion
Based on my results, my hypothesis was supported in that the Miracle Grow soluble plant food had the greatest effect.

Summary Statement
My project tests the effects of fertilizer on aquatic life.

Help Received
Mom and Dad helped me gather supplies.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Kristen F. Fukunaga

Project Number

J1712

Project Title

The Effects of Essential Oils on Canine Acne

Abstract

Objectives/Goals

Canine acne (furunculosis) is a common problem among short-coated dogs. It is usually found on the animal#s chin due to contact with bacteria around the food bowl. Veterinarians generally prescribe a 4-week antibiotic treatment when severe infections develop.

My objective is to determine if essential oils can be efficient to inhibit the growth of Staphylococcus epidermidis, Bacillus cereus, and Micrococcus luteus, bacteria involved in canine acne.

Methods/Materials

I made nutrient agar and prepared 30 petri plates. On these plates, I tested 10 essential oils, water, and Erythromycin antibiotic three times each on three different bacteria involved in canine acne. I used the Kirby-Bauer disk diffusion method and measured the size (in mm) of the zone of inhibition after 5 days. I also tested different methods to extract pomegranate seed oil.

Results

Staphylococcus epidermidis, Micrococcus luteus and Bacillus cereus were all resistant to grapefruit, water (negative control), chamomile, orange, rosemary, grape seed, and pomegranate seed oils. The three bacteria showed an intermediate resistance to eucalyptus and tea tree oils and were susceptible to clove and lemongrass oils and Erythromycin.

Conclusions/Discussion

The hypothesis that essential oils can be efficient to inhibit the growth of Staphylococcus epidermidis, Bacillus Cereus, and Micrococcus luteus bacteria is proven. Eucalyptus, tea tree, clove bud, and lemongrass oils showed antibacterial activity against the three bacteria. Lemongrass oil was even more effective than the antibiotic in all the trials and had the largest zone of inhibition. Essential oils can be an option for the treatment of canine acne to prevent the overuse of antibiotics, lessening the chance of antibiotic resistance. A future study can investigate the effects of essential oils on feline and equine acne.

Summary Statement

My project is about finding out if essential oils can inhibit bacterial growth and can be an efficient alternative to antibiotics in the treatment of canine acne.

Help Received

Dr. Gerald Oliver answered questions and gave suggestions about extracting essential oils and testing methods; my father supervised and my mother helped with the board layout.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jonathan F. Fung

Project Number
J1713

Project Title
Tachycardia, Intoxication, and Coma: The Physiological Effects of Caffeine on Daphnia magna and Humans

Abstract

Objectives/Goals
This project was developed to discover how caffeine would affect the physiology and heart rate of organisms. A survey made by Johns Hopkins University shows that 80% of adults in North America regularly use caffeine. If such a common drug has unsafe side effects, many people will be affected.

Methods/Materials
To execute my experiment, I made 6 solutions of caffeine and water: 2%, 1%, 0.5%, 0.1%, 0.05%, and 0.01% concentrations, in addition to a 0% control solution. I tested 3 Daphnia per caffeine concentration, and for each Daphnia, I held 3 trials of normal heart rate to act as the control and 4 trials of caffeinated heart rate. I then took the average beats per minute(BPM)of the trials and calculated the percentage BPM increase. Changes in physiology and behavior were noted.

Results
In the 0.01% caffeine solution, the percent increase in BPM was 7.89%. The 0.05% solution caused BPM to increase by 15.03%. In the 0.1% caffeine solution, the BPM percent increase was 28.75%, and the heart rate began to level off. The 0.5% solution increased heart rate by 31.98%. The 1% solution increased heart rate by 34.94%, and the 2% solution increased heart rate by 39.39%. The coma stage appeared in the 1% solution after the Daphnia was soaked in caffeine for 30 seconds, while intoxication occurred at 0.01%. In the coma state, the Daphnia appeared to be quite unresponsive and motionless, in contrast to the intoxication state, where the Daphnia was agitated and disoriented.

Conclusions/Discussion
My hypothesis about increasing heart rate and 2 stages of caffeine development was true. I learned that caffeine does increase the heart rate, and that heart rate levels off when caffeine intoxication is reached. After caffeine intoxication, organisms will become very active, confused and disoriented. The caffeine coma stage that comes after caffeine intoxication causes organisms to stop moving except for the heart and to be completely unresponsive to stimuli. Seizures also occur.
From this experiment, I was able to find out how much caffeine it would take for a human being to enter the state of a coma. According to the DSM-IV manual, 250 mg of caffeine will put a human in the caffeine intoxication stage. In my experiment, 10x the amount of caffeine required for caffeine intoxication made the Daphnia go in a coma state. Multiplying 250 mg by 10, I can conclude that 2.5 grams of caffeine is sufficient for a human to enter a coma.

Summary Statement
In this project, I use Daphnia Magna as a model to determine the physiological effects of caffeine on humans, including the caffeine intoxication stage mentioned in the DSM-IV manual criteria book and the caffeine coma stage.

Help Received
Borrowed graduated cylinders and beakers and received advice from my teacher Mrs. Iyer. Thanks to my mom for purchasing powdered caffeine and Daphnia Magna.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Anita Garg

Project Number
J1714

Project Title
Water Pollution: The Effect of Cooking Oil on the Mass, Height, and Stomatal Conductance of the Ivy Plant (Hydra helix)

Abstract

Objectives/Goals
My project investigated the effects of cooking oil as a water pollutant on the height, mass, and stomatal conductance of ivy plants (Hydra Helix). I predicted that, the greater the volume of cooking oil added to a plant, the less the growth of the plant.

Methods/Materials
Three oil concentrations were tested on a total of 15 ivy plants. All the ivy plants were trimmed to an equal height of 13 cm at the beginning of the project. The 15 plants were divided into three groups: the control group, which was given no oil, the low group, which was given a low concentration (10 ml) of oil, and the high group, which was given a high concentration (20 ml) of oil. The plants were watered with 80 mL of water three times a week for four weeks. The stomatal conductance of each plant was measured using a leaf porometer every week for four weeks. At the end of the project, the height of the plants was measured. The plants were cut off at the base and dried in an Isotemp oven for a week. Then, the mass of the plants was measured.

Results
Stomatal Conductance: The average stomatal conductance for the control group of plants was 45.1 mmol/m2s over a period of four weeks. The high plants and the low plants showed a lower stomatal conductance of 38.3 mmol/m2s and 34.9 mmol/m2s, respectively.
Mass: The control plants had an average mass of 2.004 grams after 4 weeks of watering. The low plants had an average plant mass of 1.57 g. The high plants showed the lowest average plant mass of 1.504 g.
Height: The control group grew the fastest, achieving an average height of 14.76 cm. The low plants grew to an average height of 13.9 cm. The high plants had the lowest average height of 13.6 cm at the end of 4 weeks.

Conclusions/Discussion
My hypothesis that greater the concentration of oil as a pollutant, the less the stomatal conductance, height, and plant mass was supported by data. Vegetable oil as a pollutant should be considered when spills from distribution pipelines, commercial, and household use are being analyzed.

Summary Statement
This project shows that cooking oil as a water pollutant severely harms the growth and physiology of plants.

Help Received
Thankful for the support from my parents in getting me materials for this project.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Darby R. Hurlbert

Project Number
J1715

Project Title
Chemical Lightening/Dyeing Effect on the Structure of Human Hair

Abstract

Objectives/Goals
The purpose of this experiment was to see if hair lightening and dyeing would make human hair weaker or stronger than untreated hair.

Methods/Materials
I tested twenty-seven strands of hair, nine were untreated and served as the control group, nine were lightened, and nine were dyed. I purchased one box of hair lightener and one box of hair dye from a local store. I applied both the lighter and the dye according to the package directions. I measured how far each hair stretched and how much weight it took to break it. I did this by securing one end of each hair to the top of a box, and the other end to a Dixie cup. I placed two pennies in the Dixie cup every 30 seconds. Then I recorded how much weight it took to break the hair and how much the hair stretched before it broke.

Results
My data shows that untreated hair is the strongest, dyed hair is the most elastic or flexible, and lightened hair is the weakest.

Conclusions/Discussion
The lightening and dyeing of human hair changes the hair's structure because, as the data shows, the treated hair is weaker than untreated hair. If I pursued another experiment, I would test different types of hair, shades of lightener, and colors of dye.

Summary Statement
My project is about the chemical effects of dyeing and lightening on human hair.

Help Received
My mom gave me her hair from her hairbrush and helped me with the lightening and dyeing of the hair. My dad helped me decide on some of the ideas for my methods, gluing some of the hair, and formatting some of the text for my presentation board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Sarah A. Ibrahim

Project Number
J1716

Project Title
Perfumes: Detrimental to the Skin or Not?

Abstract

Objectives/Goals
The goal of my experiment is to test and compare six different types of perfumes three store bought alcoholic perfumes and three homemade nonalcoholic perfumes to see which is better for the skin.

Methods/Materials
1.Coconut Lime,Vanillas Berry and Bergamot White Tea essential oils 2.Three jars with lids 3.Water 4.Paper 5.Scissors 6.Black Sharpe 7.Dropper Kit 8.Asmall bottle of almond oil 9.Plastic gloves 10.Twenty-four apples 11.Four large plates 12.Love Rocks, Versace Bright Crystal, and Juicy Couture alcoholic perfumes 13.A small box of Q-tips 14.Blue Tape 15.Small clear cup.

Results
The alcoholic perfumes caused significant changes to the apple skins,especially the Versace Bright Crystal.The apple skins with the Versace Bright Crystal and Juicy Couture perfumes had bruises and brown spots in all three trials. Love Rocks perfumes was the only alcoholic perfume that did not affect the apple skins as much.In Trial 3,it had one spot on the skin. The spot was less than a centimeter.Overall,all three nonalcoholic perfumes did not have noticeable bruises. However, in Trials 1 and 2, the Bergamot White Tea nonalcoholic perfume had one bruise.In all three controls, they did not have any noticeable bruises. The apples stayed the same for one week, with no dryness, bumps, brown spots, or bruises.

Conclusions/Discussion
Overall,the results indicated that the homemade nonalcoholic perfumes did not affect the apple skins. There was no noticeable dryness or bruises on the apple skins.However, in trials one and two, the Bergamot White Tea nonalcoholic perfume had bruisingless than 1cm, but no dryness.On average, all three alcoholic perfumes did have some noticeable dryness and bruises on the apple skins. The apples with the alcoholic perfumes became dry in oneday.Theydeveloped bruises.In trial one,the apple with Versace Bright Crystal,alcoholic perfume had many bruises, brown spots and became soft. Although, the only alcoholic perfume that did not affect the apple skins was Love Rocks perfume. The only trial that had the most brown spots was in trial one. In trial one, there was only one brown spot. The brown spot was less than one centimeter. The apple skins with Juicy Couture alcoholic perfume became dry and had a couple of brown spots. In all three trials,the spots were between one to two centimeters long. The controls had no noticeable damages to the skin. The apples skins stayed the same for one week.

Summary Statement
The purpose of this experiment is to determine what kind of perfumes (alcoholic perfumes or non alcoholic perfumes) are better for the skin.

Help Received
I would like to thank my parents for buying my materials for my project and my former teacher, Sr. Jennet for her guidance and support. I would also like to thank my teacher Sr. Reham for helping me decorate my board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Frankie Johnson

Project Number
J1717

Project Title
The Effects of Ethanol on the Seed Germination Rates of Vegetables at Varying Concentrations

Abstract

Objectives/Goals
I wanted to explore the possible effects that ethanol, at varying concentrations, may have on the germination rates of different vegetables. I believe that as the concentration of ethanol increases the germination rate of the seeds will decrease.

Methods/Materials
Four varieties of vegetables (radish, spinach, arugula, broccoli) were selected due to their relatively short germination time. Vodka(40% ethanol) was utilized as the ethanol source. The alcohol concentration of the vodka was reduced to 1%, 5%, and 10% for the experimental groups, with the control group being water only. Two seeds were planted in each Jiffy Greenhouse disc for a total of 36 plants in each of the 4 groups. Total number of seeds used in the experiment was 576. The seeds were watered with 2.5mL of solution every other day and observed. A postive germination was noted when a plant was visible. Observations were conducted for 22 days.

Results
The greates rate of germination occurred with the 1% alcohol group. The control group was next greatest. The rate of germintion dropped significantly at 5% alcohol and there was no germination at 10% alcohol.

Conclusions/Discussion
It appears that at low concentration (1%) there was an increase in germination rate when compared to the control. This was in contradiction to my hypothesis. My hypothesis was confirmed at 5% and 10% concentrations. This experiment seems to support previous research that states there may be some benefits to ethanol at low concentrations. However, any benefits of ethanol seem to disappear quickly at 5% or above. This implies that even moderate use of ethanol in humans may have negative effects, especially in young who are quickly growing/developing, much like a seed.

Summary Statement
The effects of ethanol, at varying concentrations. on germinating seeds.

Help Received
My father helped in selection of materials and supervised the use of the ethanol.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Ohad R. Koronyo

Project Number
J1718

Project Title
How Do Increased Concentrations of Salt and Baking Soda Affect the Repellent of Ants?

Abstract

Objectives/Goals
The objective of this experiment is to determine which non-toxic compound, salt or baking soda, is more effective in repelling ants and establish an optimal concentration for the material.

Methods/Materials
Ants were attracted to cotton balls soaked in 20% sugar solutions. Cotton balls were soaked in pure water, 10%, 40%, and 70% concentrations of salt or baking soda solutions and placed in the center of fresh petri dishes. Ten ants were placed on top of the soaked cotton ball. After 5 minutes, the amount of ants repelled from the cotton ball were recorded. This procedure was performed for all 7 concentrations and repeated 4 times for each concentration.

Results
Increases in concentrations of either salt or baking soda repelled ants in greater numbers. Concentrations of 40% baking soda and 70% salt were the most effective solutions to repel ants, while 70% salt seemed better. A control group, with only water, showed that only 1 or no ants were repelled. The other three salt and baking soda concentrations repelled between 4.3 and 6.3 ants on average.

Conclusions/Discussion
These results proved the hypothesis, partially correct. Increasing concentrations of salt and baking soda solutions increased the effectiveness of repelling local Odorous house ants. The results also suggested that salt is a more effective ant repellant than baking soda. Baking soda at higher concentrations, seemed to impact ants# movement, and eventually caused death. These results provide a feasible #green# way to help keep ants out of houses and control their population.

Summary Statement
This Project determines which non-toxic compound, salt or baking soda, is more effective to repel ants and establish its optimal concentrations.

Help Received
Mom and teacher helped edit project; Dad helped collecting ants for the experiment; Brother helped time trials.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
David E. Kranker

Project Number
J1719

Project Title
Heart Stopping Red Bull

Abstract

Objectives/Goals
This experiment was done to find out how Red Bull effects the heart rate of Daphnia. I found out that Red Bull increases the heart rate of Daphnia. As I increased the concentration of Red Bull that the Daphnia were exposed to, their heart rate increased.

Methods/Materials
I had four test tubes that I filled using different percentage solutions of red bull. The first test tube had all distilled water. [0% solution] The second test tube had a mixture of 10 ml of Red Bull and 90 ml of distilled water [10% solution]. The third test tube had a mixture of 50 ml of Red Bull and 50 ml of distilled water [50% solution]. The fourth test tube had all Red Bull [100% solution]. I placed the Daphnia in the first test tube and let them sit for 15 minutes. I then placed the Daphnia one at a time on a microscopic slide. I used a compound microscope to look at the Daphnia and count the heartbeats for 60 seconds. I had a helper tell me when the 60 seconds were up. I recorded my results on a chart. I repeated the process for the rest of the test tubes with the different concentrations of Red Bull.

Results
Average Daphnia heart rate per minute in Mountain Spring water was 169.1.
Average Daphnia heart rate per minute in 0.10 % solution of Red Bull was 215.4.
Average Daphnia heart rate per minute in 0.50 % solution of Red Bull was 339.3.
Average Daphnia heart rate per minute in 1.0 % solution of Red Bull was 289.3.

Conclusions/Discussion
The data I collected showed that Red Bull sped up the heart rates of the Daphnia. The average heat rate of the Daphnia went from 169.1 per minute in Mountain Spring water to 215.4 per minute in the 0.1 solution to 339.3 per minutes in the 0.5 solution. The average heart rates in the 1.0 solution decreased; but I think that happened because the Daphnia were dying. Based upon my findings I cannot think of there being any alternative explanations for my results.

Summary Statement
My project tested the effect for Red Bull on the heart rates of Daphnia.

Help Received
My Tutor used a timer to let me know when the 60 seconds was up. My Father and Mother helped set up the columns and tables to record and present the data.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Sierra E. LeBeau

Project Number
J1720

Project Title
What Laundry Detergent Is Best for the Environment?

Abstract

Objectives/Goals
My objective was to determine if the laundry detergent in our soil affects the life of worms (environment).

Methods/Materials
I labeled five cups for each laundry detergent (Tide and Eco-Friendly) with dilution series percentages: 0%, 25%, 50%, 75%, and 100%. The 0% had just water, 25% had 25 mL of laundry detergent and 75 mL of water, 50% had 50 mL of laundry detergent and 50 mL of water, 75% had 75 mL of laundry detergent and 25 mL of water, and the 100% had just laundry detergent. I then put 10 mL of each dilution series in each cup of soil with its correct label. In each cup I added three worms and left them in there for five days. To determine how the laundry detergent dilutions effected the environment, I recorded if the worms survived or not.

Results
In the cups with just water, all the worms survived. For the eco-friendly laundry detergent the 50% had the most amount of worms survive and the 100% had the least amount of worms survive. For the Tide, the 25% had the most worms survive and the 75% and 100% had the least.

Conclusions/Discussion
Although the most worms survived in the soil with the eco-friendly detergent, after reviewing the results, I concluded that no matter what kind of laundry detergent you use, they are both harmful to the environment.

Summary Statement
My project is about determining if laundry detergent found in our grey water effects the soil in our environment.

Help Received
Mother helped proofread and correct typed mistakes; My science teacher, Kristen Hager, helped me edit my project.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Diego J. Magana

Project Number
J1721

Project Title
Drugs and Their Effects on the Body

Abstract

Objectives/Goals
This experiment will explore the science of drugs and their physical and biochemical effects on the human body using Daphnia magna as a living model. It will show people who smoke or heavily drink, the negative effects they have on the body.

Methods/Materials
If I expose the Daphnia magna to the same amount of three different drug solutions: caffeine, alcohol, and nicotine, for one minute, then nicotine will increase heart rate the most, alcohol the second most, and caffeine the least. In that, the independent variable is the different drug solutions, and the dependent variable is the heart rate of the Daphnia magna. To keep things fair and balanced, controls were set on the Daphnia species, type of water, amount of each drug solution, place in room, type of microscope, same amount of time each trial, and the same concentration in the caffeine, alcohol and nicotine solutions.

Under a microscope, the heart rate of the flea is measured and recorded. Then the water is removed from the slide, replaced with a caffeine solution, and the pulse is taken again. After four more trials using caffeine, repeat the same procedure using alcohol and nicotine.

Results
Caffeine accelerated the heart rate with average increase of 16 beats per minute. The alcohol decreased the heartbeat radically to an average difference of 139.2 beats per minute. Nicotine increased heart rate twice as much as the caffeine solution, and the average difference was 36.8 beats per minute.

Caffeine caused the Daphnia to become jittery, active, and evident in tachycardia. Alcohol made it less animated and caused arrhythmia, and bradycardia. Nicotine paralyzed the flea but sped the pulse significantly.

Conclusions/Discussion
A minor problem in the experiment was that the cigarette company could not provide me with the nicotine content information, claiming that their sources were unreliable, therefore, the concentration of the nicotine solution may not be equal to the concentrations of the other solutions.

Further investigations include noting brain activity, observing how long it would take to recover from each drug, and exposing the same Daphnia magna to different drugs to study drug interaction.

Summary Statement
This experiment will explore the science of drugs and their physical and biochemical effects on the human body, particularly the heart, using Daphnia magna as a living model.

Help Received
Mother helped by ordering Daphnia magna and depression slides; Brother and Sister helped as lab assistants; Father paid for supplies and edited report; Miss Renee Rakestraw and Miss Michelle Mullen helped me as advisors

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jake M. McFarland

Project Number
J1722

Project Title
The Effects of Electromagnetic Fields on Developing Garden Bean and Radish Seedlings

Abstract

Objectives/Goals
The purpose of this experiment was to answer the following question. Will the exposure of electromagnetic fields(EMF) on plants effect their overall growth? It was hypothesized that if a plant seedling is exposed to an electromagnetic field, then its overall growth, including shoot length, leaf length, and leaf diameter will be decreased because the plant will undergo less cell division and cell enlargement.

Methods/Materials
In this experiment, forty radish seeds and forty bean seeds were grown in individual peat pots. Peat pots were filled with soil and seeds were placed about two centimeters from the surface of the soil. Each plant received the same amount of sunlight and water. In the experimental group, there were twenty radish and twenty bean seedlings that were exposed to electromagnetic fields emitted from an electric blanket for six hours a day. Another twenty radish and twenty bean seedlings served as the control group and were not affected by electromagnetic fields. Five external temperature readings were taken and recorded to rule out the heat of the blanket as a confounding factor. Shoot length, leaf length,and leaf diameter measurements were taken in both the control and experimental group. Plants were taken to a pathology lab and made into slides. Cross sections were stained and the plant cells were observed.

Results
The hypothesis made was proved incorrect by the results. The experimental group had greater shoot length, leaf leangth, and leaf diameter than the control group. This proved true for both the radish plants and the bean plants.

Conclusions/Discussion
The cells in the experimental group were darker. It was concluded that this was because the ribosomes in the experimental group had changed. It was concluded that the productivity of the ribosomes had been increased because of the electromagnetic fields. This increased the amount of proteins that the plants could make and made them bigger and stronger. It appears that exposure to electromagnetic fields affects plants on a cellular level. More research needs to be done to find out whether or not this also affects humans and animals on a cellular level.

Summary Statement
This experiment was conducted to observe the effects of electromagnetic fields on plants.

Help Received
Dr. Mimose helped observe the cells; my dad helped plant seeds; my mom helped edit the report; Mr Harrington helped guide my research.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Brissa G. Rodriguez

Project Number
J1723

Project Title
Determining the Effects of Battery Acid on the Growth of Radish Plants

Abstract

Objectives/Goals
My objective is to determine if planting seeds and plants in soil contaminated by battery acid will increase both the germination and growth process. I believe that planting seeds and plants in soil contaminated by battery acid will increase their growth rate.

Methods/Materials
Radish seeds were planted into 10 small pots safely filled with soil contaminated by old batteries with visible acid leakage. A set of 10 small radish plants were planted in soil contaminated with battery acid. The seeds and plants were watered as needed with tap water which was also contaminated with battery acid. The growth of both seeds and plants were measured with a centimeter ruler and recorded over a period of 30 days.

Results
Test Variable #1: The seeds in contaminated soil grew an average of 7.75 centimeters over a period of 30 days. Seeds planted in soil contaminated with battery acid grew an average of 40% more than that of the control group. The leaves grew an average of 25% more than the control group leaves.
Test Variable #2: The results of the plants appeared very healthy with colorful leaves. The plants steadily increased in growth over a period of 20 days. Plants in contaminated soil grew an average of 1.37 centimeters over a period of 20 days. Plants planted in soil contaminated with battery acid had less than 10% of leaves affected by insects.

Conclusions/Discussion
Battery acid does have an effect on plant growth. Based on my experiment, germinating seeds in soil contaminated by battery acid increased the growth process. It is possible that the battery acid in the soil creates more space between the soil particles which allows more oxygen to get to the roots which in turn allows the plants to grow faster. Once the seed becomes a plant, growth becomes less of a factor. Differences in the leaves and the general health of the plants were observed and noted. The soil is contaminated with toxic battery acid which may have contributed to the unexpected findings of my experiment.

Summary Statement
The purpose of my science project is to investigate the ways in which battery acid affects plant growth.

Help Received
Mother helped type report; Father helped glue title on board

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Anin Sayana

Project Number
J1724

Project Title
A Novel Configuration of Carbon Nanotubes to Selectively Target Chemotherapy-Resistant Cancer Stem Cells

Abstract

Objectives/Goals
Current chemotherapy methods to treat cancer do not eradicate all of the cancer cells, and a relapse of the tumor often occurs because of a subpopulation of self-renewing and self-differentiating cells called cancer stem cells (CSCs). CSCs express the surface marker CD133 and the membrane transporter protein ABCG2, which induces chemotherapy resistance. I hypothesized that chemotherapy drugs can be made more effective in targeting CSCs by loading the chemotherapy drug and the ABCG2 inhibitor Imatinib into a multi-wall carbon nanotube (CNT) conjugated with the CSC-specific anti-CD133 antibody.

Methods/Materials
L1210 Leukemia Cells were grown in 30 flasks for three weeks in DMEM+FBS+Penicillin/Streptomycin. A FACS flow cytometry test was conducted, in which 1x10^4 cells were conjugated with the FITC anti-CD133 antibody and analyzed to determine the percentage of CD133-expressing cancer stem cells. Additionally, 2.5x10^4 cells were tested for chemotherapy resistance, a property of CSCs, using ethidium bromide. To test for destruction of CSCs, CNTs were conjugated with the anti-CD133 antibody, Imatinib (IM), and ethidium bromide (EB). Cells were treated with this configuration and 10 combinations of EB, IM, CNT+Anti-CD133 Antibody, using 2.5x10^4 CSCs per test. Each test was repeated four times, for a total of 40 tests. Healthy cells with the CNT combination were tested for cell viability. Finally, a SEM analysis and student t-test were conducted.

Results
CSCs identified by flow cytometry expressed chemotherapy-resistance, as < 1% of the cells were nonviable when treated with EB and EB+IM. For CSCs treated with CNT+Anti-CD133+EB+IM, > 99% of the CD133+ expressing CSCs were nonviable, while healthy cells were viable. The nonviability rate of CNT+Anti-CD133+EB was 7.5%, Imatinib alone was 5.5%, and CNT+IM+Anti-CD133 was 5.75%. The SEM images proved the binding of the CNTs to the cells. A p-value of $p < 0.001$ from the student t-test showed an extremely significant statistical difference between the values.

Conclusions/Discussion
The FACS and the chemotherapy resistance tests identified the CD133+ cells and proved them to be chemotherapy resistant, and the novel CNT configuration successfully destroyed the cancer stem cells. The incorporation of the Anti-CD133 antibody, ABCG2 inhibitor imatinib, and chemotherapy drug in carbon nanotubes shows promise for the treatment of conventional-cancer-therapy-resistant CSCs.

Summary Statement
I identified a population of chemotherapy-resistant CD133+ cancer stem cells, created a carbon nanotube configuration to selectively target the CSCs, and tested this combination's effect on cancer stem cell viability.

Help Received
Dr. Ali Haghihigi for advice and supervision of use of lab equipment; Dr. Megan Suhoski from Stanford University for advice on initial research; The Nanomaterials and Nanostructures Laboratory for use of the SEM; Dr. Han-Shui Hsu for providing research articles; my science teacher and parents for support.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Akshay K. Srivastava

Project Number
J1725

Project Title
The Effects of 1,3,7-Trimethylxanthine on Multiple Generations of Drosophila melanogaster

Abstract

Objectives/Goals
This project aimed to observe how 1,3,7 trimethylxanthine affects the population size of D. Melanogaster. It also aimed to observe what percent of caffeine; five, ten, or forty, if any, would be enough to cause a significant difference in the reproductive success of the flies.

Methods/Materials
Eight vials were created for this experiment, two for each of the four caffeine solutions. Each vial contained an equal amount of media mixed with approximately 15 mL. of caffeine solution. Five male and five female D. Melanogaster of the same age were then placed into each vial. These vials were then exposed to the exact same conditions for about a month. When significant changes in population size were observed, the flies were sedated using Flynap, a sedative known to have no side effects on D. Melanogaster, and then counted. When the media supplies ran low, the populations were transferred into fresh vials containing new media.

Results
It was found that the reproductive success of the flies exposed to caffeine was significantly better than that of the control flies. The five percent solution vials performed the best followed by the ten percent solution vials and then the forty percent solution vials. The control group had the smallest population of all of the vials. At the last observation, the difference between the control group and the caffeine solution groups was quite significant.

Conclusions/Discussion
This experiment was conducted to demonstrate how caffeine affects the reproductive success of D. Melanogaster. Contrary to my hypothesis, it was found that small doses of caffeine are actually beneficial to D. Melanogaster populations. To prove these results, however, I believe that further testing is required in a more controlled environment for longer periods of time. Because this experiment was performed without the aid of a laboratory, it was affected by fluctuations in the environment.

Summary Statement
My project aimed to observe the effects of caffeine on the reproductive success of D. Melanogaster.

Help Received
Chemistry teacher, Mrs. Meyer, helped to obtain Flynap.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Santino N. Valiulis

Project Number
J1726

Project Title
Natural vs. Chemical Herbicides

Abstract

Objectives/Goals
The objective of this project was to find which of the herbicides (Roundup, cinnamon oil, lavender oil, or vinegar) was most effective at inhibiting the color, growth, and number of leaves of St. Augustine grass and Dichondra grass.

Methods/Materials
First prepare 5% solutions of cinnamon oil and lavender oil in water to match the 5% concentration of white distilled vinegar and 5% concentration of Roundup. Put the herbicides in spray bottles. Then prepare 50 pots, 25 of which have St. Augustine grass, and the other 25 have Dichondra grass. Once a week, spray 5 of each plant with one of the herbicides except for the control group, which is not sprayed. Every other day document the color, growth, and number of leaves of each plant.

Results
The results of the experiment show that Roundup is the most effective herbicide. The means show that after five weekly applications, Roundup had a mean of 0 in all areas (growth, color, and number of leaves) for both types of plants, which means that the plants were entirely dead. However, cinnamon oil was very quick at affecting the plants, and within the first two days there were visible results. Lavender and vinegar also inhibited the color, growth, and number of leaves of the plants, but did not kill them as thoroughly as Roundup.

Conclusions/Discussion
The objective was completed and Roundup was found to be the most effective herbicide. However, over a shorter period of time the cinnamon oil and vinegar were more effective than Roundup. As natural alternatives to chemical herbicides, vinegar or cinnamon oil could be used as potential substitutes to chemical herbicides. Vinegar and cinnamon oil would require repeated applications because the plants would come back over time. Home gardeners or farmers could investigate use of natural herbicides. Research has shown that Roundup can cause birth defects in livestock and may go into ground water and runoff. Further research could go into mixing the natural herbicides, for example a mix of cinnamon and lavender oil.

Summary Statement
My project compares three natural/organic herbicides (cinnamon oil, lavender oil, and vinegar) and one chemical herbicide (Roundup) to determine the effectiveness of inhibiting color, growth, and number of leaves on certain grasses.

Help Received
My mother helped with assembling the poster board, proofreading, and preparing the pots. My teacher helped edit my report.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Emma C. Williams

Project Number
J1727

Project Title
How Will Vinegar Damage Vinca major in a Wild Environment?

Abstract

Objectives/Goals
The goal of my project was to find out if the invasive species Vinca major (V. major) can be damaged in a wild environment using vinegar. Vinca major poses a threat to native plants, it leaches important nutrients out of the soil. Many people are trying to kill V. major, but they are using harmful herbicides such as 2-4D and Round-Up. These herbicides are harmful to the people who use them and are very harmful to the surrounding environment, especially nearby aquatic life. I hypothesized that when I sprayed vinegar on the V. major they will become damaged.

Methods/Materials
Three equal sized plots of V. major were sectioned off and split into thirty-six cells each. Cells were randomly chosen, three were designated vinegar, three water, and three plain V. major controls, per plot. The nine chosen cells were then photographed; all water and vinegar cells were then sprayed with 350mL. A week later the cells were photographed again and re-sprayed with water and vinegar. The photographs were printed out and assigned random numbers, a person without knowledge of the cells true number counted the amount of damaged and undamaged leaves. The results were then averaged according to treatments and plot, and the standard deviation of treatments was also calculated.

Results
After counting all the leaves, both damaged and undamaged, I used the numbers to figure out the mean for each treatment in each plot and I used standard deviation to describe the variation. The control average was a percentile of 0.410 with a standard deviation of 0.354; Plot A had a percentile of 0.557, Plot B, 0.599, Plot C, 0.073. Treatment group water had an average of 0.210 and a standard deviation of 0.161. Plot A#s average was 0.207, Plot B, 0.338, Plot C 0.086. The plots that were sprayed with vinegar had an average damage of 0.715 with a standard deviation of 0.268, Plot A was an average of 0.715, Plot B had an average of 8.46, and Plot C, 0.274. These damage percentiles show how vinegar affects V. major.

Conclusions/Discussion
My hypothesis was correct, the vinegar did damage the V. major. I conclude that spraying V. major with vinegar will damage the plant and cause a higher percentile of damaged leaves.

Summary Statement
My project is about using vinegar to damage Vinca major, an invasive species, in a wild environment, instead of using harmful herbicides.

Help Received
My mother edited my text, my father drove me to Big Creek and assisted me with my experiment, and Mark Readdie, the Landels-Hill Big Creek Reserve Director, provided guidance.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Keegan P. Wright

Project Number
J1728

Project Title
Going Green with Grey Water

Abstract

Objectives/Goals
My project tested the survival rate of red worms to seven dilutions of 4 dish soaps (2 conventional and 2 eco-friendly)to determine if grey water with eco-friendly soap residue allowed for a higher worm survival rate.

Methods/Materials
4 liquid dish soaps, 2 conventional and 2 eco-friendly. Each soap was divided into 7 categories of 100ml: 100% soap; 50% dilution; 25% dilution; 12.50% dilution; 6% dilution; 3% dilution; 100% water. Each of the 28 samples were mixed individually with 4 oz of potting soil in a 16 oz paper container. 4 live red worms were added to each of the 28 containers then covered with the vented lids after making 4 additional perforations with a toothpick to insure adequate air flow. The containers were placed on a patio table outside for 5 days.

Results
Palmolive Eco - 100% survived at dilutions of 0%, 3%, 6%, 12.5%, 25%. 25% survived at 50% dilution. 0% survived at 100% soap. Green Works - 100% survived at dilutions of 0%, 3%, 6%. 25% survived at 12.5% dilution. 0% survived at 25% and 50% dilutions. 0% survival at 100% soap. Dawn - 50% survived at 0% and 12.5% dilutions. 100% survived at 3% dilution. 75% survived at 6%. 0% survived at 25%, 50% dilutions and 100% soap. Palmolive Conventional - 100% survived at 0% and 3% dilutions. 50% survived at 6% dilution. 0% survived at 12.5%, 25%,50% dilutions and 100% soap.

Conclusions/Discussion
The worm survival rate was higher for the eco-friendly soaps, especially in dilutions of 25% or greater. This suggests that grey water from eco-friendly soaps sufficiently diluted could be used for irrigation and toilet flushing, which would reduce potable water use.

Summary Statement
How to reduce fresh water use by reusing and recycling grey water.

Help Received
Mom helped with the tri-fold layout and Dad showed me how to research at the library and on the internet.