CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Caroline S. Choi

Project Number

J2101

Project Title

Drugs in Our Waters Make Daphnia's Hearts Flutter: The Effect of OTC Medications on Aquatic Life

Abstract

Objectives/Goals

The purpose of this experiment was to determine whether exposure to over-the-counter medications (aspirin, acetaminophen, diphenhydramine, pseudoephedrine) adversely affects the health of aquatic life.

Methods/Materials

Four groups of five daphnia magna were exposed to the different medication solutions, with the concentration being the common dosage of each medication in 500 mL of water. The daphnia's heart beats were counted under the view of a microscope. The heart rate of each daphnia was measured in beats per minute after 10, 20, 30, 45, and 60 minutes of exposure to the medication. These heart rates were then compared to the daphnia's heart rate without exposure to medications.

Results

Pseudoephedrine elevated the heart rate of the daphnia by 12%. Aspirin, acetaminophen, and diphenhydramine slowed the heart rate of the daphnia by 29%, 12%, and 6% respectively. Furthermore, daphnia exposed to aspirin and acetaminophen were associated with arrhythmias, or irregular heart rhythms.

Conclusions/Discussion

All over-the-counter medications tested affected the daphnia's heart rate. However, the group of daphnia exposed to aspirin had the most decreased heart rate, while the group of daphnia exposed to pseudoephedrine had the most elevated heart rate. Because medications affect the health of daphnia - microorganisms at the bottom of the aquatic food chain - they will affect the health of all aquatic life. Medications that get into the aquatic system due to improper disposal and excretion in waste negatively affect the health of daphnia. Studies have shown that medications escape through waste-water treatment facilities and end up in rivers and oceans. This data suggests there needs to be increased public education on proper disposal of medications and methods to remove medications from waste-water need to be found.

Summary Statement

This project demonstrates that medications that enter waterways through waste-water and improper disposal harm the health of aquatic life, and measures must be taken to treat this source of environmental pollution.

Help Received

Mother timed heart-beat counts and helped crush medication tablets for dissolution.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Tanvi V. Gaitonde

Project Number
J2102

Project Title
Effect of Third Hand Nicotine on Daphnia magna

Abstract

Objectives/Goals
Objective: What is the effect of third hand nicotine on daphnia magna?
Purpose: Third hand nicotine is the residual nicotine left by smokers on many surfaces like clothes, carpets, etc. We know first, second and third hand tobacco smoke can harm you. But, can the nicotine harm people who are exposed to it? This experiment will test the effect of third hand nicotine on daphnia magna, to understand the effect on humans.

Methods/Materials
Materials: Live daphnia magna, E-cigarettes with nicotine solution (18mg/ml), microscope, and cotton cloth.

Method: For this experiment, the daphnia magna will then be divided into 3 test groups and 1 control group. Each group will have 3 or 5 daphnia magna, depending on the trial. 3 cloths with different nicotine concentrations will be placed into each of the test groups. I will measure the longevity and heart rates of the specimens in each group. I will complete 4 trials.

Results
After the experiment, I found that third hand nicotine actually harms living beings. The mortality rate of the daphnia magna was directly proportional to the nicotine concentration. In test groups 2 and 3, 100% of the specimens died within 7 days. In test group 3, 100% specimens died within 24 hours in three of four trials. In the control group, all specimens survived until the end in trials 1 and 2, and 40% survived in trials 3 and 4. Test groups 1 and 2 showed significant increase in heart rates over the period of 8 days. In test group 3, in trial 1, the daphnia magna had an increase of over 100 BPM in the heart rate. The heart rates of the control groups had varied results each day, probably because of factors like size, age, and reproduction in females. I also observed significant reproduction in the control group, very low reproduction in test groups 1 and 2, and no reproduction in test group 3.

Conclusions/Discussion
My experiment shows that third hand nicotine increases the heart rate and lowers the life span of living things. This experiment showed that nicotine causes a much higher chance of tachycardia, which is a disorder causing abnormally high heart rate. If I do this experiment again, I would like to use more daphnia magna and use a more accurate way of measuring heart beats rather than my eyes. All cigarette and e-cigarette users should try their best to stop smoking, not just for their health but for the health of the people around them.

Summary Statement
This experiment tests the effect of third hand nicotine on daphnia magna, to understand the effect on humans.

Help Received
My teacher, Mr. Lampard, helped me with statistical outputs. My father helped me order the materials and design the board.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jack T. Hays

Project Number
J2103

Project Title
Antibacterial Effect of Rosemary, Lavender, and Thyme Essential Oils on Dog Bacteria in Carmel, California

Abstract

Objectives/Goals
This experiment grew out of an interest in identifying natural ingredients that could potentially be used in dog hygiene products to manage bacteria proliferation.

Methods/Materials
Due to their aromatic and generally-alleged therapeutic natures, the following essential oils were tested against bacteria cultivated from the coats of two dogs in Carmel, California: rosemary, lavender and thyme. Each oil was tested for its ability to inhibit and/or kill bacteria cultivated from both dogs. Cultures (grown on agar in petri dishes) were checked for growth daily and all data was recorded. The experiment was broken into two Phases. In Phase I, cultures were cultivated and the essential oils were tested for their ability to inhibit and/or kill the cultures. Phase II of the experiment was aimed at confirming that inactive cultures in Phase I (presumed dead), were actually dead.

Results
Each essential oil showed an ability to inhibit the growth of new cultures. Only rosemary showed an ability to kill consistently, although thyme killed in 50% of the cases. Lavender did not appear to kill bacteria as effectively.

Conclusions/Discussion
Given the success of all three oils in inhibiting the growth of bacteria pulled from the dogs' coats, they would seem to be beneficial ingredients in dog cleansing products.

Summary Statement
This project tested the efficacy of certain readily-available essential oils in inhibiting and killing bacteria cultivated from the coats of dogs in Carmel, California.

Help Received
Mr. Woodward, my Science teacher, provided me with guidance, my dogs donated bacteria and my parents bought petri dishes and agar for the experiment.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jackson J. Humphrey

Project Number
J2104

Project Title
Effect of YO12N on Hymenochirus Eggs and Ankistrodesmus Algae

Abstract

Objectives/Goals
The object is to test if YO12N the affects Hymenochirus frog eggs and Ankistrodesmus algae growth.

Methods/Materials
Ankistrodesmus algae growth
40 test specimens; 10ea x 3 independent variables and 10 control group specimen. 30ml of Ankistrodesmus living algae will be placed in each of 40 individual 8oz plastic containers. YO12N will be diluted with water to 10ppm, 20ppm, and 30ppm, and then added to the algae specimen. A spectrophotometer will be calibrated to 540 nanometers. 7ml of algae will be drawn from each specimen and placed into spectrophotometer. Readings will be taken on day 1 and every 2 days for 15 days.
Hymenochirus frog eggs
40 test specimens; 10ea x 3 independent variables and 10 control group specimen. 10 eggs will be placed into each cup and the cups placed into a warm water bath. YO12N will be diluted with water to 10ppm, 20ppm, and 30ppm, and then added to the frog egg specimen. Frog egg hatch rates will be counted daily for 5 days.

Results
Ankistrodesmus algae growth
Control- 84.0, 1%-78.3, 2%- 83.0, 3%- 80.8
Hymenochirus frog eggs
Control- 5.80, 1%- 4.98, 2%- 4.10, 3% -3.02
The 2% solution had the lowest algae growth when compared to the other solutions tested, but did not show lower growth than the control. The 1% solution had the highest egg hatch rate when compared to the other solutions tested, with 85% of the control hatch rate.

Conclusions/Discussion
With our clean water supplies decreasing, a study of YO12N (Yellow Out#) as a remediation application for eutrophication is important. YO12N shows promise in reducing eutrophication without harming other species.

Summary Statement
Can YO12N be applied to an aquatic environment as a treatment for eutrophication?

Help Received
Borrowed spectrophotometer from Mr. Aalto, Sanger High School science teacher.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Joshua A. Lewis

Project Number
J2105

Project Title
Daphnia: Under the Influence

Abstract

Objectives/Goals
To find whether certain substances affect the heart rate of Cladocera Daphnia.

Methods/Materials
Water fleas, caffeine, alcohol, microscope.

I added small amounts of alcohol to the container of Daphnia and then extracted them from the container after a minute with a pipet. I then put them under the microscope and counted their heartbeats for 15 minutes, then removed the Daphnia. I repeated this process multiple times to get a more accurate sample size. I repeated the process again multiple times, but with caffeine instead of alcohol.

Results
When the Daphnia were introduced to caffeine, the more I gave them, the more their heart rate went down. The more alcohol I gave the Daphnia, the more their heart rate went down.

Summary Statement
Testing whether caffeine and alcohol affect Cladocera Daphnia's heart rate.

Help Received
My mother helped time the experiments, and my dad bought the supplies. My math tutor helped me keep track of data.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Lynn Lu

Project Number
J2106

Project Title
The Anti-Cancer Effect of Green Tea and Ashwagandha

Abstract

Objectives/Goals
The object of this study is to investigate if there is a therapeutic benefit in combining green tea and ashwagandha, in the form of dietary supplements, to fight against cancer.

Methods/Materials
Three human cancer cell lines including breast cancer MCF-7, prostate cancer PC3 cells, and pancreatic cancer Hs766t cells were used. Two different concentrations of green tea (44.7 and 89.4 ug/ml) and ashwagandha (2.35 and 4.71 ug/ml) were used to evaluate the effect of the drug concentrations. The drug effect was studied by short-term MTT assay (immediate analysis of drug effect after 48 hour treatment) and long-term clonogentic assay. The experiment was conducted in duplicate to improve the accuracy of the results.

Results
For MTT assay, when combining green tea (44.7 ug/ml) and ashwagandha (2.35 ug/ml) together, the growth inhibitions are 71.9 %, <1% and 21.1% for MCF7, PC3 and Hs766t cells. When testing separately and combining green tea (89.4 ug/ml) and ashwagandha (4.71 ug/ml) together, the growth inhibitions are 82.7%, 64.0% and 76.6% respectively. For clonogenic assay, when separately testing and combining green tea (89.4 ug/ml) and ashwagandha (4.71 ug/ml) together, the decreases in colony formation are 89%, 99.9% and 83.2% respectively.

Conclusions/Discussion
The result first verified that green tea and ashwagandha had anticancer effects against three different cancer cells. Breast MCF-7 cancer cell line showed highest sensitivity followed by pancreatic cancer Hs766t cell line and finally the most resistant, the prostate PC3 cancer cell line. There were no synergetic effects observed in breast MCF-7 and PC3 cell line using the combination of the two drugs. The synergetic effects were observed in the pancreatic Hs766t cancer cell line using the combination at low concentrations.

Summary Statement
My project tests the anti-cancer effects of green tea and ashwagandha on breast MC-7, prostate PC3, and pancreatic Hs766t cell lines.

Help Received
Used lab equipment at Optimum Therapeutics under the supervision of Dr Ze Lu.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Michelle M. Nazareth

Project Number

J2107

Project Title

Inhaler Inhibitors? Comparing Steroid and Non-Steroid Asthmatic Treatment on the Growth of Drosophila melanogaster

Abstract

Objectives/Goals

My objective is to examine if a corticosteroid (Advair) and a non-steroid (Ventolin) will significantly affect Drosophila melanogaster's growth. Based on personal experience and scientific research, I hypothesize that Advair will significantly decrease the D. melanogaster's growth more than Ventolin, since corticosteroids are known to interfere with naturally occurring growth factors.

Methods/Materials

Currently, a data set of 38 flies have been conducted. The D. melanogaster were cultured and split into 3 groups. The control group received no medication. The second group was exposed daily to 1 puff of Advair (115/21mcg Fluticasone Propionate/Salmeterol) for 7 days. The third group was exposed daily to 1 puff of Ventolin (90 mcg of Albuterol Sulfate) for 7 days. On the 14th day of their lifespan, the flies were anaesthetized with FlyNap. Then, their wing length was measured from the articulation to the distal tip, and their full body length was measured, with a digital caliper,in mm. I also counted larval hatching of the flies.

Results

The first data point was the average wing length of D. melanogaster which was 2.76 mm for the Control group, 2.23 mm for the Advair group, and 2.25 mm Ventolin group. Ventolin reduced wing length by 18 % and Advair by 19% compared to the Control group. Advair decreased wing length by approximately 1% compared to Ventolin. The second data point was the average body length of the flies which was 2.97 mm for the Control group, 2.81 mm for the Advair group and 2.49 mm for the Ventolin Group. Advair reduced body length by 5.2% and Ventolin by 16% compared to the Control group. Ventolin decreased body length by 10.2% compared to Advair. The third data point were changes in larval hatching. Advair Group: 8 flies hatched, Ventolin Group: 25 flies hatched, Control Group: 35 flies hatched, clearly indicating that Advair significantly influenced larval development by a decrease in larval hatching.

Conclusions/Discussion

This experiment partially supports my hypothesis that asthma medication does statistically influence the growth of D. melanogaster. To my surprise, I found out that Advair affected their wing length only slightly more than Ventolin. However, Ventolin affected their body length much more than Advair! Furthermore, both of these asthma medications negatively influenced larval development, but Advair inhibited development to a greater extent.

Summary Statement

My project is about comparing the effects of asthma inhalers with a corticosteroid (Advair) and a non-steroid (Ventolin) on D. melanogaster growth and larval development.

Help Received

Dr. Khalaf advised me. She or Mr. Sean Carroll supervised me at Schmal Science Workshop. Drs. Anjuli Merhotra, Diane Suchet, Winston Coutinho answered my questions relating my findings to humans.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Laurel B. Norris

Project Number

J2108

Project Title

Swimming In Sweetness: The Effects of Artificial Sweeteners on Daphnia magna

Abstract

Objectives/Goals

The objective of this project was to see if daphnia are affected by artificial sweeteners since some of these compounds have been detected in waste water, landfill leachate, watersheds.

Methods/Materials

The following sweeteners were tested at 0.25 and 25 mg/l: sucrose, saccharine, aspartame, stevia, sucralose and Truvia#. Spring water and caffeine were used as controls. Daphnia heart rates were measure after exposure to 0.25 and 25 mg/l of sweeteners for either 2 min or 24 hours. Long-term survival and reproduction studies were preformed by culturing daphnia in 25 mg/l sweetener solutions for 1 week, counting the daphnia and starting a new culture with the 10 largest daphnia. This was done for a total of 3 weeks.

Results

In the 2 minute, 0.25 mg/l study, sucrose and aspartame decreased the heart rate, while saccharine, sucralose, stevia and Truvia# increase the heart rate compared to spring water alone. In the 2-minute, 25 mg/l study, all sweeteners decreased the heart rate with the exception of stevia. In the 24-hour, 25 mg/l study, all the sweeteners significantly increased the heart rate, with saccharine increasing it the most. The generational study proved to be inconclusive since daphnia are very sensitive to culture conditions. In the two studies, high temperatures caused bacteria growth in cultures and many died off before the end of the experiments. For the third test, temperatures were better for daphnia growth, and all cultures had high population numbers and survived through the third week.

Conclusions/Discussion

In the 2-minute, 0.25 mg/l study sucralose, saccharine and stevia increased the heart rate slightly more than predicted at 11.8%, 7.8% and 16.3%. Truvia# had a less dramatic effect on heart rate than predicted at 25.1%, but it had the greatest impact overall. Interestingly, aspartame decreased the heart rate by 12.1% in contrast to the 19% reported. The hypothesis of the 2-minute, 25 mg/l studies was that the higher concentrations of sweeteners would increase the heart rates more than the 0.25 mg/l solutions. However, the heart rates decreased by 3.2%- 11.9% except stevia, with saccharine having the most dramatic effect. In contrast, exposure for 24 hours led to dramatic increases in heart rates ranging from 22.2%- 42.4%, suggesting stressful environments for the daphnia. The long-term generation studies were inconclusive due to limited results at optimal culture temperatures.

Summary Statement

A study on the effects of artificial sweeteners and natural non-nutritive sweeteners on Daphnia magna.

Help Received

Dad created app to slow recorded heart beat videos; Borrowed microscope from Marshall Middle; Mom helped with back ground literature and editing paper.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Laura L. Powers

Project Number
J2109

Project Title
How Does Crumb Rubber Leachate Affect Paramecium?

Abstract

Objectives/Goals
Crumb rubber is used is playgrounds and turf fields because of its elasticity which provides a cushion for breaking falls. However, rubber has been found to contain many harmful chemicals that could lead to cancer and other birth defects. If the rubber leachate has an adverse affect on paramecium, it increases the chance that it also has an adverse effect on humans. Also, if rubber has a negative effect on paramecium, it would have a negative effect on the entire food chain.
I believe aged and ultra baked rubber leachate will cause the greatest drop in paramecium population. I think that direct contact with rubber will cause the 2nd largest drop in population. I think that soaked and filtered rubber will not have a great effect on the paramecium.

Methods/Materials
I cultured paramecium to get a big enough supply. To make my measurements, I made a microscope slide with a grid and well to hold my culture sample. I had 7 tests and a control. I first treated the rubber and then soaked it in water to get the leachate. I let plain rubber soak for 2.5 weeks (Soaked Rubber), I poured water over rubber in a coffee filter (Filtered Rubber), I heated and tumbled rubber (Aged Rubber), I put rubber in the paramecium culture (Direct Contact), I heated rubber at a high temperature (Ultra Baked Rubber), and I had a Positive Control where I put vinegar into the paramecium culture.

Results
The Direct Contact and Control increased 40% after 48 hours. At 120 hours, both tests decreased down to 20%. Old Rubber, Filtered Rubber, and Soaked Rubber all had similar changes, fluctuating between only -15% and 24%. Both Ultra Baked and Positive Control decreased immediately going down to about -40% in the first 24 hours and the Ultra Baked to almost -80% by the end.

Conclusions/Discussion
My hypothesis was partially correct. Paramecium reproduce asexually but in a stressful environment, paramecium reproduce sexually, which is slower. This is why Soaked, Filtered, and Old rubber tests seemed to have an effect causing them to have flat growth rates. Direct Contact and Control grew until they reached a population limit, meaning there were too many paramecium for the amount of food available. Ultra Baked Rubber and Positive Control directly killed the paramecium. My project showed rubber had a negative effect on paramecium.

Summary Statement
If the rubber leachate has an adverse affect on paramecium, it increases the chance that it also has an adverse effect on humans and the environment.

Help Received
My father helped me to heat the rubber.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jennifer Quito Alvarez

Project Number
J2110

Project Title
The Effect of Nail Polish on Nail Growth

Abstract

Objectives/Goals
The purpose of this experiment was to determine if nail polish affects nail growth.

Methods/Materials
Before the project was performed a hypothesis was formed stating that the nails with the directly applied nail polish would grow more than the nails without any polish. Thirty girls and boys within the ages of twelve and fourteen were asked to measure three selected nails from their dominant hand and record their growth in centimeters before and after a week of growing with both painted and bare nails. One nail would be painted with only nail polish, the second nail would first be coated with base coat then with polish, and the third nail would be left bare.

Results
After one week the results showed that the nails with directly placed nail polish grew less, with an average growth of .7 mm, and the bare nails grew the most, with an average growth of 1.2 mm.

Conclusions/Discussion
Therefore it is concluded that nail polish does have a negative effect on nail growth.

Summary Statement
This project was conducted in order to determine if nail polish has a negative effect on nail growth.

Help Received
Dad helped with adjustment of model; Mom helped with cutting board paper to size.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Ananya J. Rao

Project Number
J2111

Project Title
Is the Solution Worse than the Problem? Comparing the Effects of Natural and Chemical Oil Dispersants on Brine Shrimp

Abstract

Objectives/Goals
The objective was to compare the effects of natural and chemical oil dispersants on the survival rates of brine shrimp. The goals were to find the lowest concentration of chemical oil dispersants that had a significant impact on the survival of the test organisms, and to demonstrate that natural oil dispersants are a better alternative to chemical oil dispersants.
The hypothesis for this experiment was that the presence of chemical oil dispersants would start to impact the survival of brine shrimp starting at a concentration of 30 mg/L and that natural oil dispersants will have no impact on the survival of brine shrimp even at the highest tested concentration of 100 mg/L.

Methods/Materials
Live adult brine shrimp, cactus powder, chemical dispersant, and diesel were purchased. 13 glass beakers with 400 mL capacity were used to hold the seawater, brine shrimp, diesel, and varying concentrations of natural or chemical oil dispersant (10 mg/L to 100 mg/L). In all trials, the adult brine shrimp were counted at 12, 24, 36, 48 hours.

Results
An average of 78% of the brine shrimp survived with the highest tested concentration of 100 mg/L of cactus powder at 48 hours. About 29% of the brine shrimp survived when exposed to diesel and the highest tested concentration of cactus at 48 hours. About 25% of brine shrimp survived when exposed to just diesel at 48 hours. 45% of brine shrimp survived at the highest tested concentration of 100 mg/L of sorbitan oleate after 48 hours. Only 20% of brine shrimp survived when exposed to both diesel and chemical dispersant at 48 hours.

Conclusions/Discussion
Brine shrimp had a higher survival rate with natural dispersant than with chemical dispersant. In the presence of diesel, at lower exposure times, brine shrimp had higher survival rates when either chemical or natural dispersant were present. It was observed that diesel oil bubbles or chemical dispersant particles surround the appendages of newly hatched and adult brine shrimp. It is possible that this in turn has a negative effect on locomotion, respiration, feeding, and blood circulation, which leads to death.

Summary Statement
Natural oil dispersants are much less harmful to marine microorganisms than chemical oil dispersants.

Help Received
I received encouragement and guidance on the project from Mrs. Gillum. Dr. Aluwihare (Scripps Institute of Oceanography) provided mentoring. My parents provided support with proofreading and statistical calculations.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Tia N. Salika

Project Number
J2112

Project Title
The Effects of Salt Intrusion on Plant Growth

Abstract

Objectives/Goals
My objective was to see the effect of salt on plant growth.

Methods/Materials
I planted 40 snap peas with 10 in each section (in total there were 4 sections). Once a week I measured the height, number of leaves, and coloration. Also once a week I gave each section equal amounts of 1liter of tap water with salt added (no salt was added to the control group). Two times a week I collected soil samples, let them sit overnight with the lids off to dry, measure out 500 grams of dried soil, them add 100 ml of distilled water and measured the salinity, pH, and temperature.

Results
Overall, control had the most leaves, treatment 4 had the highest height, and treatment 4 all had brown leaves at the bottom.

Conclusions/Discussion
I noticed that by the end of my experiment all of treatment 4#s plants had brown leaves. The conclusion I drew from that was: salt will kill the plants because of buildup of salt in the plant.

Summary Statement
The affects of salt on snap peas.

Help Received
Dad found articles online and helped me use Numbers correctly.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jasmine P.L. Sinchai

Project Number
J2113

Project Title
Microwave Oven: A Cooking Companion or a Dangerous Device?

Abstract

Objectives/Goals
The objective is to determine the effects of microwave radiation on the seed germination and growth of a bean plant.

Methods/Materials
Forty-two bean seeds were placed into 7 groups with 6 seeds (or trials) per group. Group 0 was the control group--no exposure to microwave radiation. Groups 1 through 6 were the experimental groups--exposure to microwave radiation for 10, 20, 30, 40, 50, and 60 seconds, respectively. Seeds were grown in cotton balls and germination was assessed. Those that germinated were transplanted into coffee cups filled with soil. Plant growth was assessed by measuring the hypocotyl, epicotyl, and primary, secondary, tertiary, quaternary, and quinary stems. Plant characteristics were observed and the number of bean seeds produced was recorded.

Results
All six seeds (or trials) in Group 0 and Group 1 germinated. The radicle growth rate of Group 0 was the fastest. All the seeds from Group 4, 5, and 6 did not germinate except for 1 seed in Group 5. The plant growth of Group 0 surpassed those bean seeds exposed to microwave radiation except for the hypocotyl growth. Several physical abnormalities occurred in those seeds exposed to microwave radiation, i.e. shorter height, thinner stems, and leaf and stem abnormalities. On Day 40, Group 1 produced the most bean seeds (40) and Group 0 produced 34. Seeds exposed to microwave radiation for greater than 20 seconds produced at most 21 beans.

Conclusions/Discussion
Microwave exposure significantly affected the normal process of seed germination and overall growth of the bean plant. However, it is still unclear whether the microwave radiation itself, the heat from the microwave, or both affected the growth of the bean seeds. This project has definitely made me more aware of using the microwave. I hope this will encourage more research in understanding the possible health risks of microwave radiation.

Summary Statement
My project investigated the effects of microwave radiation on the seed germination and growth of a bean plant.

Help Received
Mother helped type the report. Neighbor helped water the plants.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Bailey J. Steelman

Project Number

J2114

Project Title

The Effect of Ibuprofen on Physarum polycephalum

Abstract

Objectives/Goals

The goal of this experiment was to find the effect of Ibuprofen on Physarum Polycephalum's (P.P.) speed and microscopic makeup. The hypothesis states that if Ibuprofen is given to slime mold, then it will grow less than the slime mold given regular water.

Methods/Materials

The scientist set up the experiment by separating sixteen petri dishes into four groups of four. Eight petri dishes were in each group. Four petri dishes in the control and variable groups were specifically set up to be observed microscopically and the other four in each group were set up so speed could be observed.

Results

The control trial in the second group, group B, had the most growth, being an average of 9.8 mm longer than the variable group with an average of 1 mm of growth within three days.

Conclusions/Discussion

In three days with two drops of water every twenty four hours, the control trial, group B, on average grew 10.8 millimeters. Under the same conditions, the variable trial, also group B, only grew 1 millimeter in three days. My hypothesis is accepted.

Summary Statement

The central focus of the experiment was to find how Ibuprofen reacts with Physarum Polycephalum's speed of growth.

Help Received

None

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Sarah Sumner

Project Number
J2115

Project Title
Will Certain Spices Increase or Decrease an Organism's Heart Rate?

Abstract

Objectives/Goals
My objective was to investigate how natural spices effects an organisms heart rate. My second objective was to see if the heart rate stayed constant.

Methods/Materials
The materials needed for this projects were: 1. Daphnia Magna; 2. Bottled spring water; 3. Fresh Ginger; 4. Powdered Cinnamon; 5. Powdered Turmeric; 6. Minced Garlic; 7. 5 Clear Bowls; 8. 20x Microscope; 9. Yeast; 10. Timer; 11. Small cap to measure the spice.

For this project I put six daphnia into five small bowls with 1 1/2 cups of water. Then I added a very small amount of the test spice to container with live daphnia. There was a wait time of 24 hours for test spice to defuse into water and to ensure the environment would be sufficient for the trial. After that, I placed daphnia onto a microscope slide and counted the daphnia heartbeat by taping in rhythm for 1 minute on 2 daphnia per each sample and averaged the two. I repeated this test four days for each of 7 trials (280 readings).

Results
After 280 heart rate readings of all five samples, the daphnia heart rate in the ginger sample showed an average increase of 10.11 beats per minute as compared to the control sample that was just placed in spring water with yeast as a source of food, the tumeric sample showed an increase of 4.23 bpm, the cinnamon sample showed a decrease of .39 bpm, and the garlic sample showed a decrease of 1.55 bpm. I noticed a pattern in the readings in each 4 day trial. Measurements taken on day one of each trial showed a change from the measurements taken on day four. This could possibly be because the spice's effectiveness started to wear off during the four day trial.

Conclusions/Discussion
After completing my investigation on the spice effects on the daphnia heart rate, I found my first hypothesis was correct. My hypothesis stated that ginger would have the greatest effect on the daphnia heart rate. The results showed that ginger did the greatest effect on the heart rate. My second hypothesis was incorrect. It stated that there would be a consistent change in the heart rate from being exposed to a specific spice for four days. Although ginger and tumeric had a consistent change, both garlic and cinnamon had large fluctuations throughout the continuous four day observation.
This information could be helpful to the medical community, since over 600,000 people die from heart disease in the United States each year.

Summary Statement
Over 600,000 people die from heart disease each year in the U.S., but certain spices could be benificial in helping to maintain a healthy heart.

Help Received
My mother helped my with my board, and a teacher helped me create a complicated chart.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Haidyn N. Washburn

Project Number
J2116

Project Title
Evaluation of Wood Ash Amended Soil on the Toxicity and Longevity of a Pesticide

Abstract

Objectives/Goals
The objective of this project is to determine if adding wood ash to top soil will adversely affect pesticide by making it more toxic or allowing it to last longer in the soil.

Methods/Materials
Control Group: 1 cup of soil per container; this was repeated for a total of 10 containers.
Test Group 1: 10 cups of soil was mixed with 10 tsp. of wood ash and then 1 cup of the test soil was added to each of 10 containers.
Test Group 2: 10 cups of soil was sprayed for 5 seconds with the #Ortho Bug B Gon# pesticide (as per pesticide instructions)and mixed. Then 1 cup of the test soil was added to each of 10 containers.
Test Group 3: 10 cups of soil was sprayed for 5 seconds with the #Ortho Bug B Gon# pesticide and 10 tsp. of wood ash was added to the soil and mixed. Next, 1 cup of the test soil was added to each of 10 containers. In every container a cricket and a wax paper with cricket drink was placed for proper nutrition of the test cricket.

Results
After 51 days of testing the Control group had an overall average life span of 13.3 days per cricket.
Test Group 1 had an overall average lifespan of 6.5 days per cricket.
Test Group 2 had an overall average lifespan of 5.3 days per cricket.
Test Group 3 had an overall average lifespan of 4.7 days per cricket.

Conclusions/Discussion
The results of this study determine that mixing wood ash into the soil does slightly increase the toxicity and longevity of the Ortho Bug B Gon pesticide. These findings were based on the average lifespan of a cricket in test group 3 (wood ash & pesticide exposure) being 4.7 days. Also, test group 3 had the highest cricket mortality rate with 99 deaths in the 51 day testing period.
However, research suggests that a portion of the waste wood being chipped and used as biomass in the U.S. Department of Energys move towards green, renewable energy has been treated with CCA. Wood ash generated from burned CCA pressure-treated wood, has a high concentration of arsenic and other potentially toxic materials. Long term studies are necessary to evaluate the practice of amending soil with wood ash to determine environmental impact of wood ash with high arsenic content, wood ash with high carbon content, and the possible impact these will have on aquatic environment due to water runoff and soil erosion, as well as the possibility of hazardous chemicals leaching into food because of agricultural use.

Summary Statement
Pesticides are risky, but their benefits are proven in the abundance of food we grow. However, the possible health threat to humans and the environment makes it imperative to determine any risks involved with mixing wood ash and pesticide.

Help Received
My mom took pictures

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Joshua B. Weinerth

Project Number
J2117

Project Title
The Effect of Neonicotinoid Chemicals on Bee Health

Abstract

Objectives/Goals
To determine the effect of neonicotinoid chemicals on the health of honeybees.

Methods/Materials
Varying levels of neonicotiniod chemicals were given to 11 different groups of caged bees via a food solution. Resulting changes in health were recorded.

Results
I found that the greater the concentration of neonicotinoids, the faster the bees were killed.

Conclusions/Discussion
My experiment did indeed show that neonicotinoid chemicals harm bees. However, I did not expose the bees to the chemicals the same way the bees would be exposed in nature. I believe that an interesting follow up to this experiment would be to use the same concentration of neonicotinoids that would be found in plant nectar after the plant had chemical applied to it. This would prove if the chemicals are fatal to honeybees at recommended applications levels.

Summary Statement
My project is about the effect of neonicotnoid chemicals on the health of honeybees.

Help Received
I received help from my dad, grandpa, and science teachers Ms. Phillippe, and Mrs. Ransom

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Ali Zia

Project Number
J2118

Project Title
Plants Beware! Effects of Electromagnetic Radiation on the Growth of Radish Plants

Abstract

Objectives/Goals
The purpose of this experiment is to determine the effects of electromagnetic radiation on the growth of radish plants.

It was hypothesized that the shorter the wavelength of radiation exposure, the shorter the average plant length would be. It was also hypothesized that within each radiation group, the longer the time of exposure, the shorter the average plant length would be.

Methods/Materials
Radish seeds were exposed to gamma, x-ray, ultraviolet, infrared, and microwave radiation for periods of 30, 60, and 90 seconds. Each group of seeds was planted and the growth of each plant was recorded once a week for three weeks.

Results
It was discovered that the shorter the wavelength of exposure, the shorter the radish plants grew; the growth of the plants (dependent variable) increased as wavelength (independent variable) increased. However, the only group that did not follow this pattern was the microwave group; the microwave group had the shortest average plant length, when it was expected that they would have the longest average plant length (because microwaves have the longest wavelength). This can be explained by the fact that microwave ovens release extra heat, which damaged the radish seeds.
Additionally, the results of the experiment show that within each radiation group, there was no pattern or consistency in terms of the time length of radiation exposure. There was no relationship between the time of exposure (independent variable) and the length of the plants (dependent variable).

Conclusions/Discussion
The results of my experiment partially support my first hypothesis, which was that as the wavelength of exposure decreases, plant growth would also decrease. However, the results do not support my second hypothesis, which was that within each radiation group, the longer the time of exposure, the shorter the average plant length would be.
This project shows that radiation does in fact have negative effects on the growth of radish plants. Although the exposure time did not affect the plant growth, it can be concluded that electromagnetic radiation still does inhibit the growth of radish plants. This project demonstrates the fact that electromagnetic radiation has the potential to damage and negatively affect the growth of plants.

Summary Statement
The purpose of this project is to determine the effects of electromagnetic radiation on the growth of radish plants.

Help Received
Dr. Nabila Patel helped by exposing the radish seeds to x-rays; Ms. Moinuddin gave me advice and guidance