CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Arian N. Akhavan

Project Number
J1701

Project Title
Electricity + Plants = Growth?

Abstract

Objectives/Goals
I had many goals to acheive through this project. One of my goals was to find the effect of electricity on plants. Another was to prove my hypothesis. My final goal was to see how far this project would carry me through competitions.

Methods/Materials
I used squash plants, a 6 volt dc battery, a wire, and a tape measure.
1. i placed the wire .25 in. away from the stem of the plant
2. i hooked the wire up to the battery
3. i left it there for a minute every day

Results
The results of the expirement was clear cut. the plants with electricity grew better.

Conclusions/Discussion
I conclude that the plants with electricity grew 7-20% better than the other plants. Also they had 50% broader leaves.

Summary Statement
The effect of electricity on plants growth.

Help Received
My dad helped glue the project

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Nasser M. Akkari

Project Number
J1702

Project Title
Moving to the Frequency!

Abstract

Objectives/Goals
For my project, I decided to find out if different pitches of sound affect the way a plant grows. My hypothesis was that the different pitches of sound would affect the way a plant grows.

Methods/Materials
I exposed the plants to 3 different sound pitches (low,medium,high) all at the same volume and all at 44.100 kilohertz. I recorded the plants' growth and health every other night at 7 o'clock P.M.

Results
After recording for 10 days, I found the medium pitch did the best in height (with an average growth of 5.93 centimeters) while the low pitch did the best in health (with an average health of 1.33).

Conclusions/Discussion
My hypothesis ended up being correct due to the fact that the growth of the plants were affected by different sound frequencies. The possible reason this happened was because the sound waves caused the plants to vibrate thus altering the way the plants grew.

Summary Statement
Will different sound frequencies affect the way a plant will grow?

Help Received
My mom helped me make a few decisions on what to use for the materials.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Zachary R. Bassi

Project Number
J1703

Project Title
The Wonders of Organic Fertilizer

Abstract

Objectives/Goals
To find the affects of the placement and concentration levels of an organic fertilizer on bean seed germination. I believe that this information will help farmers and gardeners produce higher quality crops and use less fertilizer in the process.

Methods/Materials
I applied the organic fertilizer to the bean seed by shaking it in a plastic bag with 100 seeds and 1 ounce of fertilizer and then planted the seed in sand on plastic testing trays 50 seeds at a time. I then planted 50 untreated seeds in the sand of another tray and sprayed that with the fertilizer that I had placed in a plastic spray bottle. Upon completing that, I planted 50 more untreated seeds in the sand of a separate tray. I made 8 trays of 50 seeds for each kind of treatment. After those trays were set up I doubled the concentration rate of the fertilizer by increasing the amount of it and repeated the process of adding fertilizer.

Results
The standard concentration level yielded the highest germination rate and the seed that was treated directly had the highest germination rate and the best looking plants as well.

Conclusions/Discussion
My results convey that a normal concentration rate of fertilizer placed directly on the seed is the best way to achieve the most abundant and high quality plants. By demonstrating that a targeted application with a standard rate of materials, growers can increase their yields and minimize excessive fertilizer use in the environment.

Summary Statement
My project is about finding a way to minimize fertilizer use and maximize seed germination rates through testing the concentration rates and placement of organic fertilizer on bean seed.

Help Received
Father helped collect data, Mother helped make board

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Elizabeth Bernal; Alec Simpson

Project Number
J1704

Project Title
A Prototype for a Lunar Plant Growth Chamber

Abstract

Objectives/Goals
Space travel is a major concern for the 21st Century. Astronauts will need to provide much of their own food for lunar habitats and deep-space travel. The engineering goal was to build a 4:1 scale prototype for a Lunar Plant Growth Chamber (LPGC). This project was inspired by the NASA Lunar Plant Growth Chamber Design Challenge. Multiple prototypes were built and evaluated. Each prototype was judged on a 48 point evaluation scale. The 48 criterions were divided into 5 sections (transportation, set-up, usage, harvest/store, production materials). Each criterion was judged on a 1-5 scale.

Methods/Materials
Three prototypes were designed for preliminary evaluation. They were then evaluated against the criteria and scored comparatively. Based on the results a final prototype design was synthesized from the best of these results. The final prototype was constructed and evaluated against the criteria. Sweet basil plants were grown in the chamber as a functional test.

A wide variety of materials were used in the construction of the final prototype chamber including: 3/8 and 1/4 acrylic sheets, aluminum electronics box, 12 volt battery, DC-AC inverter, switches, wire, rubberized canvas, LED light array, DC pump, plant nutrients, acid, plants. We found that the selection of materials is a non-random pursuit in developing an engineered product. Re-stated, material science plays a key role in the design of a LPGC.

Results
The final prototype design scored 35 more design points over the next highest prototype. The final prototype was superior in every evaluation criteria except for one. When the sweet basil plants were placed in the chamber all of the plants survived and grew as expected for a period of one week. On average the plants grew 2 cm and produced two more leaves. Other plants were also evaluated as potential plants for a hydroponic system used in the LPGC: bib lettuce, cinnamon basil, bell peppers, and watercress.

Conclusions/Discussion
The final prototype LPGC scored best against the 48 criterions as compared to the earlier prototype designs. The final prototype design proved to be effective at growing plants of potential use on the lunar surface. The engineering team believes that the prototype should be finalized as a design giving due attention to space qualified materials.

Summary Statement
The design of a prototype Lunar Plant Growth Chamber (LPGC) for use as a part of a manned lunar habitat.

Help Received
Dr. John C. Howe provided general mentorship and parents provided financial support.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
George M. Bushnell

Project Number
J1705

Project Title
Can We Make a Bigger Salad?

Abstract

Objectives/Goals
The Effect of Gibberellic Acid on the Growth of Lettuce Plants
Objective: The objective of this experiment is to see if lettuce sprouts will grow taller when gibberellic acid is sprayed on them.

Methods/Materials
Materials and Methods:
75 lettuce sprouts were sprayed with differing amounts of the acid (1000ppm, 500ppm, 0ppm). The plants were measured every day to determine the growth of the plant throughout the experiment.

Results
Results:
The plants with the highest concentrations (1000ppm) sprayed on them grew the fastest but the collapsed a 50mm height. The plants that grew the highest at the end of the experiment were the 500ppm plants with an average height of 57mm compared to the control which had an average height of 36mm.

Conclusions/Discussion
Conclusion:
At the end of the experiment the plants sprayed with the 500ppm solution grew on average 21mm higher than the plants that were not sprayed. Although the hypothesis was partially incorrect for it said that the plants sprayed with the 1000ppm solution would grow the tallest, but they collapsed. The hypothesis is correct in saying that the plant that were sprayed would grow taller. This knowledge helps when this hormone is being used to increase crop yield that to high of a concentration should not be sprayed because it will cause the plants to collapse and die.

Summary Statement
The experiment is to see if romaine lettuce plants sprayed with the hormone gibberellic acid will grow faster than those who have not.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kathryn R. Canepa

Project Number
J1706

Project Title
Fertilizer and Sweet Pea Growth

Abstract

Objectives/Goals
The objective of my experiment was to find out what fertilizer made sweet peas grow the most. I believed that the two conditions treated with worm compost tea and regular water would grow the most.

Methods/Materials
I planted sweet peas in a soil mix and treated 6 different groups: plain water, worm compost tea, and four different fertilizers: nitrogen, phosphorus, potassium, and micro-nutrients. There were five plants in each condition. I measured the height three times and calculated the difference in centimeters.

Results
The peas treated with worm compost tea grew the most.

Conclusions/Discussion
My hypothesis was proven accurate. The measurements were close between worm coompost tea and phosphorus fertilizer, and with more time for the peas to mature, a stronger conclusion might be reached. I learned that I cannot compare height if the plants are not the same height before I start to treat with different fertilizer.

Summary Statement
My experiment compared the growth of sweet peas treated with N-P-K, micro-nutrients, and worm compost tea.

Help Received
Mother helped me edit report

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Asta E. Davidsdottir

Project Number
J1707

Project Title
Albino Plants

Abstract

Objectives/Goals
The purpose of my project is to determine what effect aminotriazole (ATA), an herbicide, has on Oxalis. I also determined its effect on Elodea, a water plant. My hypothesis is that ATA will either damage the chloroplasts or chlorophyll in the Oxalis and Elodea, which turns the plants white.

Methods/Materials
Aminotriazole, Elodea, Oxalis (in woods behind my house), camera, computer, microscope, flasks, pectrophotometer, chromatography plates, chloroform/methanol, mortar and pestle, pipet

1. Mark out 1 square meter oxalis space
2. Make ATA solutions
3. Collect three leaves from oxalis area (control)
4. Spray oxalis with 1.0% ATA solution
5. Collect three leaves from oxalis after 1, 2, 3 and 4 days
6. Weigh leaves
7. Extract chlorophyll and measure with spectrophotometer at 660 nm (red light).
8. Cut 5 sprouts of growing Elodea
9. Put a sprout in each ATA solution and allow growth (0, 0.125, 0.25, 0.5, 1.0 percent ATA in water.)
10. Use microscope to count chloroplasts in each Elodea treated sample and take pictures
11. Extract chlorophyll and measure as in step 7.
12. Record results

Results
I determined the amount of chlorophyll (mg/g wet weight leaf tissue) every day for four (4) days after the ATA solution was sprayed on the Oxalis. There was no trend apparent in the chlorophyll content. However, the Elodea results showed that as the concentration of ATA increased, the chlorophyll content decreased. The average number of chloroplasts in Elodea cells also decreased after ATA treatment.

Conclusions/Discussion
The chloroplast count and chlorophyll content results for Elodea support my hypothesis that at higher ATA concentrations, fewer chloroplasts are present and the amount of chlorophyll decreases. This is expected because the chlorophyll is present in the chloroplasts, and therefore if there are fewer chloroplasts, there would be less chlorophyll. It is known that ATA inhibits protein synthesis in bacteria by blocking histidine synthesis, and probably in plants as well.

Summary Statement
My project shows how an herbicide works by inhibiting chloroplast protein synthesis.

Help Received
mother and father helped edit written pieces, used the lab of Dr.David Deamer (father) at UCSC

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jessica H. Davis

Project Number
J1708

Project Title
Plant Wars

Abstract

Objectives/Goals
My goal was to discover if oil in Purple Sage leaves is allelopathic and whether it inhibits the germination of the California Poppy or Fennel the most drastically. My objective was to either confirm or disprove the results of Cornelius Muller who was a prominent ecologist in the 1960s and believed strongly in allelopathy. My hypotheses were that the Purple Sage would prove allelopathic and the California Poppies would be less effected by the supposedly allelopathic oils due to possible adaptation since it is a native plant that grows in close proximity to sage. My goal was to, perhaps, find that by not clearing native chaperal, we could prevent the invasion of many nonative species.

Methods/Materials
Over the course of two trials I planted 1000 seeds (half Fennel, half California Poppy). My constant was the seeds I watered with distilled water and my variables were the plants treated with Purple Sage oil infused water, and for the second trial, nutrient enriched water. I made the allelopathic treatment by collecting Purple Sage and soaking it in water for a brief time to imitate rain falling through a sage canopy.

Results
I was very surprised with my results. The Purple Sage oil actually drastically benefitted the germination rate of my Fennel seeds and had no substantial affect on the California Poppies. After trial one, I hypothesesed the the increase germination could be due to nutrients in oils. However, after adding another treatment with nutrients for my second trial, I realized that the nutrients added actually lowered my germination rate. Moreover, I was unable to find any evidence of the controversial theory of allelopathy.

Conclusions/Discussion
Although in this experiment I was unable to prove the allelopathic affect, I believe there is still a good possibility it exists. For future experiments, I would test with volatile gases that some scientist believe plants emit. Also, I would limit the amount of water given to the seeds thus stressing them and perhaps causing them to demonstrate allelopathy for a competive advantage. There is much more research opprotunity in this area, because although allelopathy has been proven in labs, it is very hard to demonstrate in nature.

Summary Statement
The Allelopathic Effectiveness of the Oils in Purple Sage Leaves on Inhibiting the Germination of California Poppy vs Fennel.

Help Received
Mom edited report. Advisor provided interview information and references and helped determine how to extract oils.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Dayne K. Deppe

Project Number

J1709

Project Title

What Does Your Water Do? Find Out How Water Treated Six Different Ways Affects Houseplant Growth and Health

Abstract

Objectives/Goals

My objective was to learn how plant health/growth would be affected when watered with 6 different water types: microwave boiled (MB), stove boiled (SB), w/plant food (PF), spring water (SW), chlorinated water (CW) or Glaceau Multi-V Water (VW). A science fair project posted on the internet stated plants died when watered with microwave boiled water. I thought MB and CW would be harmful to plants, and water PF and SW would be the best for plants.

Methods/Materials

6 types of water in containers A-F; blinded. 120 cuttings 60- Philodendron (Phil) & 60 Bridal Veil (BV) potted in the same type of soil and pots; divided into 2 batches: 60 plants @ of 6 groups of 10 plants labeled A-F. 2 growing environments: warm/lighted vs. cool little light. Groups were watered the same amount from their lettered container. Two grading systems were made: Health and Growth. Plants were graded after 42days. BV plants were measured in inches. After grading, the type of water for each group was revealed. Each type of water was tested with a water test kit.

Results

No significant difference in health/growth was found when comparing BV plants watered with SP, MB, SB, PF, and CW. BV plants did significantly worse with VW and were stunted in low light and cool environment. BV plants grew between .8 to 1.5 inches in all groups except VW. No significant difference in health/growth for Phil plants for all water types. All plants liked lighter/warmer growing conditions.

Conclusions/Discussion

Plant cuttings watered with chlorinated, stove boiled, microwave boiled, spring water or plant food all grew about the same over 42 days. Cooled microwave boiled and stove boiled water did not kill plants which did not support my hypotheses or what I read on the internet. The plants watered with VW did significantly worse maybe due to the sugar and high acid. Initially, when comparing the plant groups growth, it looked like the chlorinated and microwave boiled water did better. Statistical analysis (SD and ANOVA) revealed that their health/growth was not significantly different, except for the VW. I concluded that houseplant cuttings can be watered with any type of water, boiled or not and the cuttings should have lots of light with warm growing conditions. To find out more I would run the study longer and look at root growth.

Summary Statement

My project compares the affects of 6 types of water on health and growth of two types of plant cuttings.

Help Received

Mother helped type, develop experimental design and which statistical analysis to use. Father helped with plant selection.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Ryan P. Dupras

Project Number
J1710

Project Title
Radiant Radishes

Abstract

Objectives/Goals
Discover effect that microwave radiation and heat from a conventional oven has on the germination of White Icicle radish seeds.
"If I place 10 White Icicle radish seeds into a microwave for 10 seconds, and 10 other white icicle radish seeds into a conventional oven at 250 degrees F for 10 minutes, which group of seeds will germinate over the course of 6 days?"

Methods/Materials
White Icicle Radish Seeds, oven, microwave, napkins, marker, tape, clear Zip-lock bags, water and a dropper, sunny window, microwave safe dish, cookie sheet, timer, and hot mit.
Pre-heat oven to 250 degrees F. 2nd, with marker label 1 each of bags Control, Microwave 10 seconds and Oven 10 Minutes. Add 8 drops of water to each napkin in bag. Next set up Control group. Use 10 white icicle radish seeds and place on control bag napkin. For microwave group a small microwave dish and ten white icicle radish seeds. Place 10 white icicle radish seeds into microwave dish. Place dish in microwave and cook for 10 seconds. Before starting Oven group, place 10 white icicle radish seeds into tray put tray onto cookie sheet. Place seeds in a horizontal line on one side of napkin in bag labeled Oven 10 Minutes. Seal all bags closed, tape to sunny window. Leave bags taped to window 6 days. After the 6 day period note number of sprouted and un-sprouted seeds on the bag. Finally, document results in graphic form.

Results
In the 3 trials conducted in this experiment the control group had no seeds germinate on the 1st day. On the 2nd day this group had a total of 4 seeds germinate over the 3 trials. On 3rd day a total of 24 seeds germinated and by 4th day all 30 seeds had germinated in group. The microwave oven group had no seeds germinate on 1st day of any trials. On the 2nd day this group had a total of 2 seeds germinate, and on 3rd day it had 27 seeds germinate. On 4th day all 30 seeds had germinated. The conventional oven group had no seeds germinate at all in any of the trials on any of the days.

Conclusions/Discussion
It was noted in 1/2 the time that it took to finish each trial for each group that the conventional oven seeds would not germinate. All other seeds from other trials did not even need 6 days for seeds to germinate. So, my hypothesis was proven valid. Microwave oven seeds will germinate more than conventional oven seeds. They not only germinated, but conventional oven seeds did not germinate at all.

Summary Statement
My project is to determine the effect of heat and radiation on radish seeds.

Help Received
Dad assisted with materials purchase, graphic display,and supervision of project.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Eric P. Fuller

Project Number
J1711

Project Title
Do Carbon Dioxide Levels Affect the Germination and Growth of Plants?

Abstract

Objectives/Goals
I am interested as to whether increased carbon dioxide levels (due to natural or man made causes) will affect germination and growth of plants. Because plants naturally use carbon dioxide through photosynthesis, my hypothesis is that seeds planted in containers with elevated atmospheric carbon dioxide will germinate sooner and grow better than seeds planted in containers open to the air.

Methods/Materials
I selected four rapidly growing seeds (radishes, alfalfa, wheat grass, and soybeans) to grow in containers to which commercial potting soil was added. I added 0.2gm and 0.4gm of "dry ice" to test containers which when evaporated, give 1.0 and 2.0 liters of carbon dioxide gas respectively. I compaired growth of seeds to those grown in an open and a closed atmospheric air container. My constants were potting soil, container size, temperature,length of sunlight and seed type. My controls were containers open to the atmosphere and containers closed with no added carbon dioxide. My independent variables were the addition of 1.0 and 2.0 liters of carbon dioxide. My dependent variables were length of germination and rate of growth, measured by plant height, over 14 days.

Results
My results demonstrated that the length of germination was not affected for any seed type. Elevated carbon dioxide levels had a positive effect on the growth of radishes and soybeans. Elevated carbon dioxide levels had a negative effect on the growth of alfalfa and wheat grass.

Conclusions/Discussion
Because there are concerns raised regarding whether increased carbon dioxide levels are occuring around the world, it is important to understand how they may affect the ability of mankind to grow food. My hypothesis that seeds exposed to elevated carbon dioxide levels would germinate faster was incorrect. My hypothesis that elevated carbon dioxide levels would increase plant growth was only partially supported. I would need to carry out the experiment several more times to make sure this is not a random result. If my results were repeated, I could then assess why this occured.

Summary Statement
To see if elevated Carbon Dioxide levels helped or hindered germination and growth of plants.

Help Received
My father helped take pictures and set up the computer generated graphs.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Roy Goldstein

Project Number
J1712

Project Title
Does Size and Mass Matter?

Abstract

Objectives/Goals
The objective was to find out if size and mass affect the growth of a bean's plant.

Methods/Materials
Various sized lima beans were placed into different categories defined by size and mass. These lima beans were placed in different vases and watered daily. Observations were recorded in a journal.

Lima beans, vases, sunshine, electric light, water, soil.

Results
The small sized bean did not grow at all. The medium sized beans' plants came in first place and the large beans's plants came in second place.

Conclusions/Discussion
If a lima bean is too small then no plant will grow from it. A lima bean must be a certain size for a plant to come from that bean.

Summary Statement
My project involves lima beans and how size and mass could affect a bean's plant's growth.

Help Received
My Dad helped correct my grammar and helped me type my topic information into Word. My mother helped me water my plants and helped me glue my material to my board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Seanna M. Griffis

Project Number
J1713

Project Title
Fuel Moisture, Top to Bottom: The Effect of Position within a Plant on Fuel Moisture

Abstract

Objectives/Goals
The objective of the investigation was to see if relative positioning within a Manazanita plant has an effect on the fuel moisture content. The hypothesis was that the fuel moisture would be higher in the upper one third.

Methods/Materials
Five locations with large Manzanita fields were identified throughout Western Nevada County. At each location, several specimens were taken from at least five randomly selected bushes. Each bush was visually divided up into three levels: upper, middle and lower thirds. Samples from the upper one-third were collected from each of the randomly selected bushes and placed in a sample can. The can was sealed and its number was recorded on the field notes. This process was repeated for each of the three levels at each of the five sites. The samples were weighed, their weights were recorded, the lids were removed, and the containers were placed in a drying oven set to 100C. After allowing to #cook# for twenty-four hours, the cans were removed, the lid was replaced, the container was weighed again, and the weight was recorded. This process provided the difference between the wet and dried weight of the sample.

The equipment needed for this experiment included a fifteen metal 1qt cans w/lids, a scale that measures to 1/10 gram, pruning shears, and a drying oven.

Results
The results showed there was no significant difference across the levels. Based on this information, at least during this time of the year, those sampling fuels can gather their samples from any portion of the plant that has leaves on it.

Conclusions/Discussion
The hypothesis was wrong. The fuel moisture was consistent throughout the plant. This test should be repeated throughout the growing cycle to see if it holds true all year.

Summary Statement
How relative position in a plant effects fuel moisture percentage.

Help Received
Father drove me to the locations and supervised while I used CALFIRE equipment for measuring & drying fuels.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jotthe Kannappan

Project Number
J1714

Project Title
Paper Chromatography: Testing Leaf Pigments

Abstract

Objectives/Goals
HOW TO IDENTIFY THE PIGMENT OF A LEAF USING PAPER CHROMATOGRAPHY?

Methods/Materials
MATERIALS:
ACETONE, A RULER, PENCILS, A SMALL WIDE-MOUTH JAR, SPINACH LEAVES, ICEBERG LETTUCE LEAVES, GREEN CHARD LEAVES, SEVERAL SMALL PIPETTES, FILTER OR CONSTRUCTION PAPER
PROCEDURE:
GRIND UP ROUGHLY EQUAL SAMPLES OF EACH OF THE DIFFERENT PLANT LEAVES AND DISTRIBUTE THEM INTO LABELED TEST PLASTIC CUPS. ADD ENOUGH ACETONE TO SUSPEND THE GROUND UP LEAVES. LET THE ACETONE/LEAF MIXTURE SIT FOR 24 HOURS. TAKE AN ALREADY CUT PAPER STRIP AND USE THE RULER TO DRAW A HORIZONTAL LINE 2CM ABOVE THE EDGE OF THE PAPER (THIS IS THE ORIGIN LINE). LABEL WHAT SAMPLE IS BEING TESTED IN PENCIL. FILL THE JAR TO A DEPTH OF 1 CM WITH ACETONE. TAKE ONE OF THE SMALL PIPETTES AND FILL WITH ONE OF THE SAMPLES. SPOT THE SAMPLE IN THE MIDDLE OF THE ORIGIN LINE AFTER PRACTICING A FEW TIMES TO GET A NICE ROUND SPOT. PLACE THE STRIP OF PAPER INTO THE SOLVENT CHAMBER. PLACE A PENCIL ACROSS THE TOP OF THE GLASS AND TAPE THE PAPER TO IT TOKEEP IT IN PLACE. TAKE OUT THE PAPER STRIP AFTER TEN MINUTES. MARK HOW FAR THE SOLVENT SOAKED UP THE STRIP WITH A PENCIL. TRACE AROUND THE NEWLY MOVED SPOTS SO THAT IF THEY FADE, YOU CAN STILL USE THEM TO COLLECT DATA. CALCULATE THE RETENTION FACTOR VALUE FOR EACH SPOT. REPEAT THIS EXPERIMENT FOR EACH TYPE OF PLANT LEAF. USE SAME SIZE PAPER STRIPS AND ALLOW TEN MINUTES TO SOAK FOR ALL TRIALS.

Results
RESULTS:
THE RESULTS OF MY EXPERIMENT ARE:
SPINACH LEAVES
AVERAGE RETENTION FACTOR: 0.50
GREEN CHARD
AVERAGE RETENTION FACTOR: O.424

Summary Statement
My project is about the testing of leaf pigments using the analytical procedure of paper chromatography.

Help Received
My father and grandfather helped me assemble my board. My father was my supervisor for the handling of acetone during the experimentation.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Taylor M. Krilanovich

Project Number
J1715

Project Title
Sudden Oak Death

Abstract

Objectives/Goals

Does the proximity to redwoods (Sequoia sempervirens) and their duff protect oaks and kill the pathogen that causes sudden oak death?
Does ash burnt from redwood firewood protect and help trees to recover from sudden oak death?

The objectives of this investigation are to find out if the proximity of oaks to redwoods prevents sudden oak death and if so,how.I think that this may be a lead to find a cure to sudden oak death,and if this cure is natural in origin,all the better.If the cure is indeed redwood ash,then it would save a lot of mucking about with artificial chemicals,so the environment not only wins due to the absences of an exotic pathogen,but also due to the lack of man made toxins.

Methods/Materials

Oak trees were identified, health measured using my scale, and the distance from the nearest redwood measured. The ash treated oak grove was compared to the untreated using my scale of health.

Data sheet
Tree species identification books
Graphing calculator
Measurement wheel(1.977 m)
Digital camera
Binoculars
Approx. 44 L redwood ash
Bleach

Results

The tan oals seemed to have gained more benefits from being close to redwoods than the live oaks did. The oaks treated with redwood ash were far healthier than the untreated oaks.

Conclusions/Discussion

This study taught me that oaks do indeed seem to benefit from the application of redwood ash and being near redwood duff. This seemed especially true for Tanoaks. It was not clear if Live Oaks benefited from being near redwoods. If I did this study again I would have had more study sites, more variation in the oak species, and include more trees. I feel that this study has many more allyways of knowledge for me to explore.

Summary Statement

My project investigated the potential positive effects of redwood trees on protecting or helping heal oak trees infected with P. ramorum, sudden oak death.

Help Received

My parents trasported me to my five study sites and my father helped me create my measuring wheel.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Ramona T. LaBolle

Project Number
J1716

Project Title
The Effect of Fire on the Seed Bank of Lupinus arboreus

Abstract

Objectives/Goals
The objective of my project was to study how fire effects the seedbank of Yellow Bush Lupine (Lupinus arboreus). Yellow Bush Lupine is an invasive non-native plant found on the sand dunes of Humboldt County beaches. It is harmful to both the physical structure and plant ecology of the dunes. I wanted to find out if fire kills the seeds or helps them to germinate. If fire kills the seeds or prevents them from germinating this could be helpful because fire could be used as one way to remove Yellow Bush Lupine from the dunes.

Methods/Materials
A test box containing an artificial sand dune was constructed. Lupine seeds were buried at different levels in my sand box with a thermometer at each level. Branches, litter, and duff collected from beach dunes were placed on top of sand and burned. Temperatures were recorded at each level in the sand. Seeds were recovered and then incubated to determine germination rates.

Results
In the top layer of sand the temperature increased rapidly. In the lower levels the temperature stayed the same (as starting point) for a long time and only rose slightly after an hour or more. The results showed that most seeds in the shallowest layer (2") were killed by fire and that seeds buried deeper were not effected by the heat.

Conclusions/Discussion
A major problem with the physical removal of Yellow Bush Lupin from the dunes is that the large seed bank that Lupines produce remains to start new plants. My experiment showed that fire will kill the seeds in the top layer of the sand, and this could reduce the number of plants that grow and need to be pulled from the dunes.

Summary Statement
I studied the use of fire as a tool for removing non-native Yellow Bush Lupine from Humboldt County sand dunes.

Help Received
My mom helped me with editing and setting of the backboard. My dad helped me with developing the idea, providing tools and equipment and supervising me while using them. My principal, Lynda Yeoman coached me for my county interview.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kenneth Y. Lee

Project Number
J1717

Project Title
Cut or Not to Cut? A Study of Agricultural Efficiency of Bulb Plants

Abstract

Objectives/Goals
To design a new growing technique to speed up the growth of bulb plants around the world and help solve the world hunger problem by growing vegetables at a faster rate.

Methods/Materials
I removed three centimeters from the tops of five double daffodil (Narcissus) and left another five unchanged. I then planted them under the same growing conditions, with full sunlight and the same amounts of water, and recorded the average heights of each group of plants and the average amounts of growth of each group for the week. I continued the regular growth process of these plants for six weeks.

Results
I found that the manipulated group did grow to a higher average in height, and therefore at a faster rate than that of the controlled group.

Conclusions/Discussion
My results did support my hypothesis that the manipulated plants would grow at a faster rate than the controlled. By testing these plants, I found that I could use this technique to plant onion sets and garlic cloves to grow onions and garlic at a faster rate.

Summary Statement
My project is about finding a way to increase the speed of growing bulb plants and distribute vegetables grown from them to hungry and sick people in need.

Help Received
Dad helped get materials; Teacher guided me.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alicia L. Lovelace

Project Number
J1718

Project Title
Legumes with Nitrogen and CO(2): A Murder Mystery

Abstract

Objectives/Goals
The goal of this project is to figure out whether plant growth is more dependent on nitrogen or CO2 and whether plants grow stronger and faster when both of these variables are increased together. I hypothesized that plant growth is more dependent on nitrogen than CO2 because if a plant has extra CO2 in its atmosphere what good will it do the plant if it doesn#t have the nutrients (nitrogen) to break that extra CO2 down with? I also hypothesized that the plants grown with extra CO2 and nitrogen would grow the best.

Methods/Materials
I tested this by having plants grow in four groups of several separate sealed containers (all in sandy soil at room temperature and watered the same amount). In one group, plants were tested for growth with double the amount of CO2, with nitrogen in the soil in another, both doubled CO2 and with nitrogen in the soil together in another, and as my control, without nitrogen or extra CO2. I did one set of tests with pea plants (a nitrogen fixing legume) and one set of tests with lettuce plants (a legume).

Results
When the CO2 in a pea plant#s atmosphere was doubled, the plant grew about 10% taller (in three weeks) than when there was a regular amount of CO2. The pea plants grown with doubled CO2 were also thicker, healthier, and had deeper root systems than those of the control plants. The lettuce plants grown with doubled CO2 grew an average of 45% more (in weight) than the control and had slightly longer root systems. The plants, both pea plants and lettuce plants, with nitrogen in the soil and no extra CO2 all died. However, in the containers with a doubled amount of CO2 and with nitrogen, the plants survived and, although they didn#t grow as well as the control group, grew fairly well.

Conclusions/Discussion
From this project, I can conclude that plants grown with a higher amount of CO2 grow healthier, taller, and structurally differently than when without. I think the plants with nitrogen in the soil died because there was too much of the nitrogen. It was interesting to see that the plants with nitrogen in the soil and a doubled amount of CO2 survived. This just goes to show how important CO2 is in plant growth (and survival), and unlike my hypothisis, plants without nitrogen seemed to grow just fine, especially with extra CO2.

Summary Statement
This project showed that plants grow bigger and healthier with a doubled amount of CO2 even if there are no nitrogen nutrients in the soil and that CO2 can save a plant grown in toxic soil.

Help Received
My science teacher Ms. Chu helped me proofread my report. My parents helped me financially and by driving me around town to get materials and the board for my project. My dad helped me set up the plant lights and supervised the CO2 injections.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Joan O. Moorehead

Project Number
J1719

Project Title
Which Method Is Best for Sustaining Flower Color?

Abstract

Objectives/Goals
Goal: To find which method of preserving flowers is best for sustaining the true color of the flower.

Methods/Materials
I used four different methods to preserve the flowers: hanging, smashing, sand , and micro-waving. I took the flowers to the Behr Color Smart machine at Home Depot to test the color before and after I preserved them. I charted the level of color change using the sample color chart.

Results
The results proved my hypothesis correct. The flowers that were micro-waved stayed truest to their original color.

Conclusions/Discussion
The micro-waved flowers' color did not alter as much as the flowers preserved using the other methods; but the shape and strength of these flowers were changed dramatically. The flowers that were hung darkened by several hue levels, but they stayed closest to there original shape and strength.

Summary Statement
My project was focused on preserving the color in flowers.

Help Received
I used the Behr Color Smart machine at Home Depot

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Omar B. Ozgur

Project Number
J1720

Project Title
Plants: Vitamins vs. Fertilizers

Abstract

Objectives/Goals
My objective was to learn if vitamin C, vitamin E, or fertilizer has a greater effect on plant growth.

Methods/Materials
Four groups of 10 planted lima beans were used. The first group was the control group, which was given only water. The second group was given a solution of water with added vitamin C. The third group was given an equal solution of water with added vitamin E. The fourth group was given fertilizer and water.

Results
The plants that were given only water grew tallest by far. The group of plants given vitamin C grew second tallest. The third tallest group of plants were those given fertilizer. The group that had the least amount of growth was the one given vitamin E.

Conclusions/Discussion
My conclusion is that water alone had the greatest effect on lima bean plant growth.

Summary Statement
My project was done to test if vitamin C, vitamin E, fertilizer, or water alone had the greatest effect on plant growth.

Help Received
Mother helped get materials; mother helped with placement of some items on board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Christina M. Regan

Project Number
J1721

Project Title
The Effects of Microwaved Water on Basil Plant Growth

Abstract

Objectives/Goals
In this experiment, I tested fifteen basil plants to see if watering them with microwaved water had any effect on their growth. This question is important because if the microwaved water has a negative effect on the basil, then it is possible that the microwave has a negative effect on the food that I eat!

Methods/Materials
I watered fifteen basil plants over a period of twenty-eight days. Five plants were given water that had been boiled in the microwave. Five plants received water that had been boiled on the stove. The last five plants were given water that had not been boiled at all. All of the other variables were the same for each plant.

Results
All of the plants were in the same condition when I started the experiment. But, by day twenty-eight I noticed some important differences. On average, the plants that were given microwave-boiled water had almost three times as many dead leaves as the plants that received stove-boiled water, and nearly four times as many dead leaves as the plants that were given non-boiled water.

Conclusions/Discussion
The results of my experiment showed that the microwave did have an effect on the growth of basil plants. The reason for these results could be due to the way the microwave heats water. When water is heated in the microwave the friction causes the molecules to crash into each other. It is possible that the structure of the molecules becomes damaged in this process. I think that the plants that were given this water became weak and prone to disease, which caused their leaves to die.

Summary Statement
My project examines whether microwaved water has any effect on the growth of basil plants.

Help Received
Uncle helped me decide which type of plants to test in experiment; Mom helped type parts of report after I had written them and helped me take pictures.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Brooke J. Rothschild-Mancinelli

Project Number
J1722

Project Title
Plant Growth Flexibility: Phototrophy vs. Heterotrophy

Abstract

Objectives/Goals
Plants normally produce sugar through photosynthesis. I asked the question, does a plant prefer to metabolize like an animal and use sugar (heterotrophy), or does a plant prefer to photosynthesize (photoautotrophy)? I hypothesized that if plants were given sugar they would prefer to use it than photosynthesize, because it would save energy by not requiring the energy for carbon fixation. I also hypothesized that if the plants were given sugar they could survive without light.

Methods/Materials
For the first two experiments I used two types of seeds, radish and rye grass (n=30 in each treatment). For each plant I did dark and light experiments with distilled water (control), and 25 mM solution of D-glucose and sodium acetate (independent variables). For experiment 3 (n=15 in each treatment), I made five different concentrations of glucose, with water as a control. I grew the seeds in their imbibing solutions. I added more of the solution as needed to keep the seedlings covered. On days 3 and 6 I measured their length.
For experiment 4 (n=15 in each treatment), I imbibed the seeds in their proper solutions for one hour then set them up. To set them up I took sheets of plastic then cut them. Chromatography paper was put on one piece of plastic and a bit hanging down. The seeds are then placed in the chromatography paper. Another strip of plastic is placed on that and held in place with duct tape. All of the experiments were in the light.

I measured the time to germinate and plant length after germination.

Results
My results showed that plants treated with water grew to the longest lengths. Experiment 3 suggested that the D-glucose does enhance growth in the dark with a 100 µM concentration. However, in the light the water had the longest seedling length. The first experiment I did 30 replicates for each treatment and the second and third time I did 15. Experiment four showed that radish plants grew longest in 100 µM D-glucose and rye grass seeds in DI water.

Conclusions/Discussion
From this I conclude that radishes prefer to take in low amounts of exogenous sugar and rye grass prefers to make its own sugar by taking in the water.

Summary Statement
To find out whether when plants are given fixed carbon if they will use that for growth rather than photosynthesizing their own sugar.

Help Received
Mother got the supplies and helped with the original idea.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Michael R. Schiffer

Project Number
J1723

Project Title
Got Growth?

Abstract

Objectives/Goals
My objective was to determine how an increased level of carbon dioxide in the air effects the growth and development of agricultural crops. My belief was that an increased level of carbon dioxide would have a positive effect on plant growth and overall health.

Methods/Materials
My methodology consisted of planting seeds of various agricultural crops, dividing the plantings into two groups, exposing the one group of plants to carbon dioxide everyday and charting and documenting both groups progress.
Materials: 2 pieces of plywood,2 portable greenhouses,1 roll of silver duct tape,4 trays lined with plastic bags,1 plastic box,2 humidguide/thermometers,40 planter pots,seed starter soilmix,crop seeds,spray bottle,scale,measuring cup, measuring teaspoon, 2 liter plastic bottle, 4 plastic bags, 1 roll saran wrap, vinegar,baking soda,water,labels),notebook,pencil,calculator,digital camera.

Results
My project provided me with evidence that I was incorrect in my hypothesis, I predicted that the carbon dioxide group would absorb this gas in the process of photosynthesis and grow taller, faster and healthier. This was not the case. My results were that the exposure to carbon dioxide actually harmed the agricultural crops.

Conclusions/Discussion
I understood at the start of my project that plants use carbon dioxide to make their food through photosynthesis. I didn't realize that too much of it could hinder the crops growth and healthfulness. I think the plants reached a point where the increased level of carbon dioxide was not a benefit but rather a hindrance. Just as plants consume carbon dioxide to grow, humans consume food to grow. However, if a person eats too much food, they can become sick and unhealthy much like the plants. As a result of this experiment, I have realized that if carbon dioxide levels increase over time, the world's crops might turn out the same way my experiment did. This would be a catastrophic event as it would significantly reduce the world's food sources.

Summary Statement
My project examines the effects that carbon dioxide in the air has on the health of agricultural crops.

Help Received
None received

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Elizabeth A. Schmall

Project Number
J1724

Project Title
Jack and the Fertilized Beanstalk

Abstract

Objectives/Goals
In the fairytale, Jack#s angry mother just threw the bean seeds out the window and the beanstalk grew all the way to the clouds with no fertilizer at all! # Realistically, does using fertilizer have an effect on a plants growth? If so, will a bean stalk grow taller using a chemical fertilizer or an organic fertilizer? Hypothesis: I predict that using some type of fertilizer will grow beanstalks taller. I also predict that the steady supply of nutrients that the organic fertilizers provides will grow the beanstalk taller than the higher nutrient but not long lasting chemical fertilizer.

Methods/Materials
Materials: 27 bean seeds, Miracle-Gro All Purpose Fertilizer, Dr. Earth Organic 5 Fertilizer, 3 identical plant containers, Water, Sun, Potting soil, Measuring cup, Measuring tape, Calculator, Gallon container to mix fertilizer, Camera

Procedure: A. Prepare 3 identical pots for planting, with 9 seeds in each pot and label. B. Add Miracle-Gro to chemical pot and Dr. Earth to the Organic pot. C. Each pot receives the same amount of sun and water daily. D. Begin recording data when first beanstalk sprouts and continue recording for the next 7 days. Measure all beanstalks heights in a pot, total the measurements and divide by 9(seeds per pot) to get the average. Do this for each pot. E. Take notes daily on how the beanstalks appear. Note the number of leaves, size of leaves and color.

Results
Although the chemically fertilized beanstalks sprouted first, the organically fertilized beanstalks grew taller by the end of my test period. Visually, the Organic beanstalks had larger and more leaves than the chemical and no fertilizer beanstalks. The chemically fertilized beanstalks took second place visually as well.
Organic: 9 of 9 seeds sprouted, average height on 2/28/08 was 5.16cm.
Chemical: 8 of 9 seeds sprouted, average height on 2/28/08 was 3.94cm.
No fertilizer: 5 of 9 seeds sprouted, average height on 2/28/08 was 2.22cm.

Conclusions/Discussion
Unlike the fairytale, using some sort of fertilizer will help beanstalks grow taller than no fertilizer. Using an organic fertilizer will grow beanstalks taller than a chemical fertilizer. This is good news, in case you want to eat the beans!

Summary Statement
What fertilizer will produce the tallest beanstalks; chemical, organic, or no fertilizer at all?

Help Received
The employee at Shore Gardens was very helpful by explaining some facts to me about fertilizers, including the NPK number. He also helped me choose which brands of fertilizers to use for my experiment. My mom helped me by driving me to Shore Gardens. She also helped me plant the seeds and

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Sanjay Siddhanti

Project Number
J1725

Project Title
Effect of Environmental Conditions on Plant Transpiration

Abstract

Objectives/Goals
The goal of my experiment was to assess the effect of environmental factors on the rate of transpiration in a tropical plant

Methods/Materials
I used a potometer to observe the rate of transpiration in the plant. First, I tested the rate of transpiration under normal conditions, which served as the control. I also checked the effect of wind (by using a fan kept close to the plant), heat (by using a 100w lamp), and humidity (by enclosing the plant in a water vapor saturated plastic bag). In addition, I sprayed the plant with carbonated water (pH 5.0) to simulate the effect of environmental acid rain on the transpiration process. Using the potometer, I compared the time required for the plant to lose 0.1 ml of water under different conditions.
The independent variable was the environmental conditions and the dependent variable was the rate of transpiration.

Results
I repeated the experiment three times and observed the following:
1)Transpiration was faster under windy conditions and under high temperature.
2)Transpiration was slower under humid conditions and in an acidic environment.

Conclusions/Discussion
After observing the effect of wind, high temperature, humidity, and simulated acid rain on the rate of transpiration in a tropical plant, and having repeated the experiments several times, I found that the data supports my hypotheses.
1. Humidity decreases the rate of transpiration
2. Higher temperatures increase the rate of transpiration
3. Wind increases the rate of transpiration
4. Simulated acid rain (carbonated water, pH 5) decreases the rate of transpiration
Since transpiration is vital to the proper functioning of the plant, it is important to understand the effect of environmental conditions such as global warming and acid rain on plant physiology.
If I were to repeat this experiment, I would test different types of plants. Also, I would test the effect of additional environmental conditions such as soil water, soil pH etc on transpiration and plant physiology.

Summary Statement
Different environmental conditions such as high temperature (global warming), acid rain (pollution), high winds and humid conditions affect the rate of transpiration in plants.

Help Received
School science teacher loaned glass pipette and tubing to make potometer. Used school microscope to observe stomata on the leaf surface.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Julia J. Slupska

Project Number
J1726

Project Title
Cactus Carbs

Abstract

Objectives/Goals
The question for this project was 'What are the effects of an area in which a cactus grows on the amount of carbohydrates in the cactus?'. I hypothesized that more carbohydrates would be detected in cacti growing at the locations with temperate conditions.

Methods/Materials
10 samples were collected from 5 locations differing in altitude and water abundance. Samples were dried and ground at a laboratory. The cacti powder was subjected to acid and high temperature treatment in order to hydrolyze the complex carbohydrates. The quantities of simple sugars released during the hydrolysis were determined by HPLC.
The materials used were: 10 cladodes of Prickly Pear cacti of Opuntia genus, 75% sulfuric acid, calcium carbonate, and de-ionized water.

Results
The relation of carbohydrates to the environment seemed to be opposite to my hypothesis. The harsher the environment was, the more carbohydrates were detected in the cacti. The lowest amounts of carbohydrates were discovered in the cacti from the farm and the seashore, while higher amounts were found in cacti growing in drier places. Comparing plants from the same altitude more carbohydrates were detected at the locations with lower precipitation. In the two locations with similar average yearly precipitation, more carbohydrates were detected at the higher altitude.

Conclusions/Discussion
There are some possible explanations for my observation. It is probable that in severe conditions cacti need more storage material, which may influence the carbohydrate levels. It is also possible that the structure has to be stronger under such conditions; for example, at the more severe conditions more fiber (composed of insoluble sugars) is required. Another possible explanation is that cacti store extra sugar so that water will not evaporate due to the low osmotic pressure. In my project book, I discussed ways to verify these theories in future experiments.

Summary Statement
My project investigates the relation of a cactus's location and it's carbohydrate levels.

Help Received
Father drove me to different locations; Mr. Rogelio Oseguera performed HPLC testing; used Verium Corp. lab equipment under the supervision of my mother.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Abhijit Suprem

Project Number
J1727

Project Title
Effect of Organic Fertilizer and Traditional Farming Soil on Corn Plants

Abstract

Objectives/Goals
The objective of this experiment is to determine the effect of organic fertilizer (in amounts of 0%, 50%, and 100%) and natural farming soils (clay soil and sandy loam) on corn plants. There were four hypotheses made in this experiment:
1. Plants in clay soil may grow well due to the presence of natural nutrients.
2. Plants in sandy loam with medium fertilizer (50%) would grow the best due to the highest amount of nutrients.
3. Soils with 100% fertilizer may die due to excess fertilizer.
4. Soils with 0% fertilizer may not grow well due to inadequate nutrients.

Methods/Materials
Prior to the experiment, two types of soils, sandy loam and clay soil, were tested for pH levels, EC (Electrical Conductivity) content, and Nitric content. 18 corn plants were planted, 9 in clay soil and 9 in sandy loam. There were three different percentages of organic fertilizer in each soil, 0%, 50%, and 100%. The average heights of the plants were recorded on a time basis spanning 2 months. Each pot had the same amount of soil and the amounts of fertilizer were 0 gram, 2 grams, and 4 grams, respectively. A biomass study was done to observe the absorption of nutrients by the plants. The experiment was conducted in the greenhouse.

Results
It was found that most of the clay soil plants grew well and plants clay soil with 50% fertilizer grew the tallest, surpassing others. All the plants in soils with 100% fertilizer died due to excess fertilizer. Plants in sandy loam with 50% fertilizer died. The average height of the sandy loam was really low, considering its usage in the faring industry. On the other hand, the stats for the clay soil plants were really high.

Conclusions/Discussion
The interpretation of hypothesis was largely based on the growth rate. The differences in growths led to the following analysis. This experiment proved that clay soil is good for corn plants in the Central valley area. The clay soil had high amount of nutrients. Most of the sandy loam plants died due to excess fertilizer. The sandy loam also absorbed too much water and intoxicated the plants. Clay soil is known to be a bad water percolator, but it was able to absorb the right amount of water for the plants. The results might be different in other areas due to different weather, precipitation, and other eco-factors. The biomass test is currently underway and will be produced during the presentation.

Summary Statement
Quantitative and qualitative analysis of the effect of organic fertilizer and traditional farming soils on corn plants to provide the plants¡# growth information to Californian farmers and stakeholders.

Help Received
Used greenhouse and lab equipment at the Graduate Lab of California State University, Fresno under the supervision of Mr. Diganta Adhikari.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kimberly K. Tenbergen

Project Number
J1728

Project Title
Investigating the Growth of Duckweed using Nutrient Enriched Water

Abstract

Objectives/Goals
The purpose of my science project is to determine the different amount of nutrients in soil comparing potting soil and natural soil as determined by duckweed. The reason I have decided to do this project is because I wanted to determine the different amounts of nutrients in different soils to see how it can help out plant growth and our environment. I am using duckweed in my project only as a conductor to determine the nutrient effeteness' of the soils.

Methods/Materials
Duckweed; 400mls Water; 20g.Natural Soil; 20g.Potting Soil; 20g.Ash; 1200ml Containers; Metal Teaspoon; Metal Strainer; Cheese Cloth; Measuring Cup; Graph Paper; Balance; Ruler; Coffee Filters; Tooth picks.
Gather 10 different soils; Then set up containers, water, soil, and scale; Next label each of the containers with proper labels; After, add 20 grams of soil into each appropriate containers; Then repeat step 4 for each container; Then measure out 400 mls of water into each of the soil and additives filled containers. Afterwards let the soil sit for 2 nights so the nutrients can absorb occasionally stirring.
After the 2 day wait, gather the cheese cloth so you can drain out the debris out of each container. Then let the water sit for one more night so everything can settle at the bottom of the container. The following day, add one teaspoon of duckweed carefully into each water filled container. Now take one container and poke several small holes in the bottom so it will drain easily. After that put a coffee filter in the smaller container and pour all of the containers contents into the filter. Then with a toothpick very gently scrape the duckweed onto a piece of the graph paper. Now move the duckweed onto the graph paper units making sure that they spread out evenly into a square formation.

Results
Potting soil has more nutrients than natural soil does because they are specifically designed to do so. For the natural soils, clay based soils work better compared to sandy soil because they hold in the water nutrients obtaining growth.

Conclusions/Discussion
After completing my project on, investigating the effect of different soils using nutrient enriched water determined by duckweed, I came to realize that potting soil has more given nutrients than natural soil. When people want strong and healthy plants they should use potting soil to increase the rapid production and stunning color of the vegetation.

Summary Statement
Determining whether natural soil or potting has more nutrients to grow plants, determined by duckweed.

Help Received
Dr. Balaji Sethuramasamyraja helped supervise the procedure; Sharon Joyner helped pick out the 5 potting soils from nursery; Mr. Carl Gong helped revise work

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Emily N. Thielen

Project Number
J1729

Project Title
One of These Is Not Like the Others: Discovering the Impact of Non-Native Grasses on the High Desert Ecosystem

Abstract

Objectives/Goals
The objective of my project was to determine if plants native to the High Desert will consume less water than non-native plants.

Methods/Materials
In the experiment two types of plants were purchased, one native and the other non-native, and then planted in the same soil and location. Both sets of plants weighed 7 pounds at the time of purchase. Also, at the test site, I placed small tubs to catch any excess water not consumed by the plants. Over the period of many weeks I carefully watered both plants with 7000 ml of water at each application. When the watering was completed, I took the excess water found in the tubs and measured the amount of water not consumed by the plants. I recorded this information in my logbook. This same procedure would be repeated many times in order to gain the average water consumption level for each plant.

Results
After completing my science project, I discovered that native plants consumed considerably less water than non-native plants. In fact, proof from my data shows that over the course of the project, the native plants consumed nearly 20% less water than the non-native plants.

Conclusions/Discussion
Wildfires have become quite common here in California and their devastating effect is undeniable. Though there are many reasons behind our increasing amount of wildfires, one key issue which is often overlooked is the impact of non-native plants. Many wildfires grow in size and intensity due to the fact that the open spaces that used to exist between the native grasses are being filled by non-native grasses. So instead of fires dying out as they travel over ground with just a small amount of native grass, the non-native grass provides the fuel to keep the fires burning. Another interesting impact of non-native grasses is that they may require more water to maintain and thus deplete water supplies especially vital to the desert communities. The data from my project suggests that greater oversight might be needed to monitor the amount of non-native plants which are added to the High Desert landscape.

Summary Statement
Do plants native to the High Desert consume less water than non-native plants?

Help Received
My dad helped make two drip lines in our backyard to water the plants.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Andrew L. Thompson

Project Number
J1730

Project Title
Growing Lettuce without Soil?

Abstract

Objectives/Goals
Which method of hydroponics best supports plant growth?

Methods/Materials
Styrofoam cooler, x-acto knife, 4 Tupperware, perlite,1 aerating tube, plastic tubing, aquarium pump, nutrient solution, outlet, extension cord, 72 lettuce seeds, 2 metal tins, 1 metal frame, 1 plastic tub, 4 plastic cups, Wicking felt, scissor
Procedure:
Bubbler (Method 1)
Use an inexpensive Styrofoam cooler. 1.Cut 4 holes to fit the Ziploc plastic Tupperware containers into the lid. 2.Cut holes into the bottom of the containers and fill the containers with perlite. 3.Put the aerating tube in the bottom of the cooler. Attach the clear plastic tube to the aerating tube and the aquarium pump. 4.Place the cups in the lid and fill the cooler with nutrient solution so that only the bottom couple centimeters of cup are submerged. 6.Put the lid on the cooler.
Ebb and Flow (Method 2)
1.Plants are grown in a metal tin. 2.Poke holes. 3.Use a metal frame that will hold up the top tray, but allow the nutrient solution to drain into a bottom tray.
Wicking (Method 3)
1.Use a large plastic tub with a lid. 2.Use 4 red plastic cups. 3.Cut 4 holes in the lid (using a sharp utility knife). Each hole should be the size of the cup. Cut a hole in the bottom of each cup. 4.Put a piece of felt the size of the hole and long enough to touch the bottom of the box inside each of the 4 red cups. 5. Fill the tub with nutrient solution. 6.Put the lid on the tub and put one cup in each of the 4 holes.
*All of the methods use nutrient solution and 24 seeds are planted in the perlite.

Results
The bubbler system had the best results out of the three hydroponic methods.

Conclusions/Discussion
the bubbler system produced the greatest results. I believe the bubbler system had the best growth because air was always circulating through the system.

Summary Statement
Which form of hydroponics supports the best lettuce growth

Help Received
Mother helped type edit report; father helped assemble the project; Jack at SC hydroponics provided the materials

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Alex L. Vasconcellos

Project Number

J1731

Project Title

What Smokey the Bear Didn't Say: A Flammability Study of 30 San Diego Plants

Abstract

Objectives/Goals

If 30 shrub, flower, parasite, and tree samples are collected from the San Diego County area, then a rating system for the flammability of these plants can be established based on combustibility, moisture percentage, consumability, and maximum temperature while burning.

Methods/Materials

30 Samples were collected from canyons around San Diego, then labeled pictures of them were sent to botanist Carrie Schneider and she identified them as the correct species. Then the plants were taken to the USDA Burn Building in Riverside CA where testing was conducted using a moisture meter, thermocouple, and a scale feeding data to a computer. Then the samples were placed on the scale tared to zero after a paper towel with a fixed amount of alcohol was placed on it. Then the paper towel was ignited. The computer measured mass loss, and temperature from the scale and thermocouples, while at the same time the samples were put into a moisture meter and measured for moisture content. The entire procedure was filmed, and the film was reviewed to look at the flame height, as the tests were conducted in front of a large board with points in height marked on it. The data was analyzed based on combustibility measured by maximum flame height, consumability by mass loss during burning, maximum temperature while burning, and moisture percentage.

Results

A rating system was established for all of the plants, in each of the categories, giving them a 1, 2, or 3 rating, 1 being low, and 3 being high flammability. The plant with the lowest ratings, and least flammable was California Dodder with an overall 1. The plant with the highest ratings, and most flammable was the Cocklebur with an average rating of 3.

Conclusions/Discussion

The data and results did support the hypothesis. The results show that it is possible to establish a rating system by determining each plant#s combustibility, moisture percentage, consumability, and maximum temperature while burning. Some other variables could be used, but the system used is substantial for determining the rating of 30 San Diego plants.

Summary Statement

30 different species from San Diego were collected, and tested for combustibility, moisture percentage, consumability, and maximum temperature, a rating system was created based on these factors.

Help Received

Parents helped gather specimen and transportation; Carrrie Schneider identified the plants via email; Used lab equipment at U.S.D.A. burn building in Riverside under the supervision of Dr. David Weise.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Rebecca C. Vincent

Project Number
J1732

Project Title
The Effect of Growing Medium on the Height of Paperwhite Narcissus Flowers

Abstract

Objectives/Goals
When Paperwhite Narcissus bulbs are flowering the stem is often so tall that it can't support the flower and it falls over. My goal is to find a growing medium that makes the stems shorter so that the plant will stay upright when flowering. Based on a Cornell University experiment, my hypothesis is that watering the plant with some alcohol will make the stem shorter, but too much alcohol will harm the plants. Cornell researchers thought that this effect was caused by water stress, so I also hypothesize that giving a plant less water will make it shorter. I also hypothesis that the stem of the plant will grow even taller if grown in a nitrogen rich growing medium.

Methods/Materials
To test my first hypothesis, in experiment 1, I grew Narcissus bulbs in rocks and liquid. I used 5 different liquid solutions: plain water (control), 5% alcohol (from wine and from gin), 10% alcohol, and 15% alcohol. To test my second hypothesis, in experiment 2, I grew Narcissus bulbs in potting soil. Once set of bulbs was watered normally (control) and a second set was watered with half as much water. To test my third hypothesis, in experiment 3, I planted one set of bulbs in 50% organic coffee grounds and 50% soil. The control was the same as in experiment 2. I measured the height of the plants regularly.

Results
In experiment 1, my hypothesis was correct. The plants with 5% alcohol were shorter and flowered normally. Higher concentrations lead to small or no flowers. Wine, which also had sugars in addition to alcohol, caused mold, and small or no flowers. In experiment 2, my hypothesis was also correct. Plants watered less had shorter stems but still flowered normally. In Experiment 3, my hypothesis was wrong. There was no significant difference in height between Paperwhites grown in soil and those grown in soil and coffee grounds.

Conclusions/Discussion
My experiment successfully confirmed the Cornell result that small amounts of alcohol in the growing medium produces shorter plants. Cornell had not yet conducted an experiment to prove their hypothesis that this effect was caused by water stress. My experiments confirmed that simply watering the plants less also produced shorter stems and normal flowers. My experiments also showed that there wasn't much difference between growing the plant in soil, soil with extra nitrogen, or just water. This may be because the plant gets all the nutrients it needs from the bulb.

Summary Statement
In my project I wanted to find a way to make the stems of Narcissis flowers shorter; I compared adding alcohol to their water and watering the flowers less.

Help Received
Parents helped get supplies and mother supervised mixing the alcohol solutions and taught me how to make the graphs in excel.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
John P. Waggoner, IV

Project Number
J1733

Project Title
Got Water? Testing for Hydrotropism in Certain Garden Plants

Abstract

Objectives/Goals
The objective is to determine if hydrotropism of roots differs depending on whether plants have a fibrous or taproot system and how much water the pant uses. I predicted that species with taproots would show less hydrotropism because they are more gravitropic and that the more water a species uses the more hydrotropic it would be.

Methods/Materials
I used six species of garden plant, three with fibrous root systems and three with taproot systems. I germinated the seeds and studied the roots when they were several days old. I measured hydrotropism by the angle of the roots curve towards a hydrostimulant (wet floral oasis) from downward growth. I put the floral oasis with the germinating seeds attached to its edge over a saturated salt solution to give a gradient of water towards the hydrostimulant (experimental) or over water so there was no gradient of water (control). To measure the water lost through the leaves of the plants, I took seedlings of each species and wrapped the pots in plastic to prevent water loss. I weighed the pot and left it outside for a day and then weighed it again.

Results
All the species showed deviation of the root towards the hydrostimulant. The average angle of deviation was greater in fibrous root systems than taproot systems. There was a negative relationship between the amount of water a plant used and its hydrotropism. Plants with fibrous roots used less water than taproot plants.

Conclusions/Discussion
Based on the species I looked at, it seems that all plants are hydrotropic. I suggest this because the angle of deviation was greater for experimental than control roots. My hypothesis that fibrous root systems would show more deviation than taproots was also correct; the fibrous root species showed a greater angle of deviation. I did not expect the negative relationship between hydrotropism and water use because I thought if a plant used a lot of water it would need to search for water. A plant that uses a lot of water might occur in an environment where there is a lot of water, and not need to search for water.

Summary Statement
I showed that hydrotropism is greater in species with fibrous root systems by comparison to taproot systems and also in plants that use less water.

Help Received
I discussed the techniques and experimental setup with Philippa Drennan of Loyola Marymount University.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Mikaila R. Ward

Project Number
J1734

Project Title
The King's River: Will Applying Compost from Native Trees Improve the Growth of Vegetation?

Abstract

Objectives/Goals
The objective is to determine if adding compost from native trees will improve the growth of vegetation along the banks of the King's River.

Methods/Materials
Compost from three types of native trees were tested: Oak, Sycamore, and Ash. Twelve trials of each test variable were performed. The compost was planted in the soil. Radish seeds were used. In addition, a control with no leaves added was also tested. The plants were watered daily with 6ml. of water. Plant growth rate was measured over a fourteen day period.

Results
Oak compost when added to the soil had the greatest growth rate average of 4.27 inches. Ash compost was second with an average of 3.15 inches. Sycamore compost averaged a growth rate of 2.66 inches followed by the control with no leaves added at 2.62 inches.

Conclusions/Discussion
When comparing the growth rate of vegetation from applying compost from native trees that grow along the King's River, the Oak compost did the best out of all composts. Ash did second best. Sycamore barely passed the control. After my investigation, I learned that Oak and Ash composts are very good for vegetation. In conclusion, the people who live along the banks of the King's River, or any river, should not throw away their leaves. Instead, they should put them along the banks of the river in which they live. This will help preserve fish habitats and the insect population that they thrive on.

Summary Statement
Improving the vegetation along the banks of the King's River by applying the compost from native trees.

Help Received
Mother helped type report; used teacher's back yard to conduct experiment