CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Chrissie L. Alving-Trinh

Project Number
J1601

Project Title
Do Photosynthesis and Growth Rate Affect Stomatal Density?

Abstract

Objectives/Goals
My project was to determine if photosynthesis and growth rate affect stomatal density in a growing plant. I believed that photosynthesis drives stomatal density in the growing plant and that younger plants would have higher photosynthesis rates causing higher stomatal densities.

Methods/Materials
Plants were grown from beans in jars with damp paper towels and a heat/light source. Other plants were covered to block light. Samples were taken from the leaves and cotyledons of plants at different ages. Stomatal impressions were taken using super glue on microscope slides. Density was calculated using 100x magnification and a 0.5 mm by 0.5 mm mask. First, in 30 samples, height and age were compared to stomatal density; height and age were used as a way of measuring growth rate. Second, density of stomata of 4 cotyledons (which have their own food source) was compared to that of 6 leaves (which use photosynthesis). Finally, the stomatal density of 3 plants grown in the dark was compared to that of 10 grown in the light.

Results
Height and age did not correlate with stomatal density (correlation coefficients of -0.043 and -0.153, respectively). The average stomatal density in cotyledons was 5 while that of leaves was 69. Plants grown in the light had an average stomatal density of 72 vs. 29 for those grown in the dark.

Conclusions/Discussion
These experiments did not show that growth rate affects stomatal density. However, they did show that photosynthesis results in a higher stomatal density in the young plant.

Summary Statement
My project investigated how photosynthesis and growth rate affect stomata, which are microscopic structures on the under side of a leaf allowing exchange of carbon dioxide and water.

Help Received
Science fair coaches lent me equipment and helped answer questions; Parents helped purchase, critique, and glue board; Dr. Carpenter took picture of slide at Kaiser.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Della K. Atherton

Project Number
J1602

Project Title
Are We Ripe Yet?

Abstract

Objectives/Goals
The objective of this project was to study the ripening process of peaches in different container materials to determine which environment caused the sugar production rate to rise the most.

Methods/Materials
The materials that were used in this project were 70 unripe peaches, 2 27cm. x 28cm. ziploc bags, 2 paper bags, 2 bananas, 1 refrigerator, 1 refractometer, and 3 pieces of newspaper.
The experiment was conducted by placing 10 unripe peaches in each of the 7 environments. For each of 15 consecutive days, a peach from each of the 7 environments was removed and tested using the refractometer. All data was logged.

Results
The results of this project showed that the peaches inside the paper bag with a banana exhibited the highest rise in sugar production rate over the 15 day period.

Conclusions/Discussion
In conclusion, it was determined that the peaches in the paper bag with a banana ripened the most over the 15 day period because of the release of ethylene gas from the banana. This release of ethylene triggered the multiple genes responsible for the ripening process.

Summary Statement
This project is designed to determine under which circumstances a peach will ripen the most.

Help Received
I used a refractometer borrowed from California Specialty Citrus.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Chingiz R. Bigalimov

Project Number
J1603

Project Title
Plant Food: Does It Work?

Abstract

Objectives/Goals
In my experiment, I wanted to test how much of a difference plant fertilizers have on the growth and health of bulb plants.

Methods/Materials
Materials: Narcissus bulbs, soil, pots, distilled water # beakers, gravel, 30 cm ruler, meter stick, Schultz fertilizer, SuperThrive fertilizer, camera, scale or a balance.

Procedure:
A: Plant bulbs in soil; divide into 3 groups (12 bulbs per group). One group was watered with distilled water (DI) only, one with Schultz in DI third group with SuperThrive in DI and the fourth group with red food coloring. The height of stems were measured for 27 days
B: Suspend bulbs (3 groups- 12 bulbs per group) with only base in water or fertilizer solutions. Measure the length of both stems and roots for 21 days. Observe for any fungal growth.

Results
Results:
Experiment A-bulbs in soil: The bulbs grown with water or with Schultz plant food grew about the same. The bulbs with SuperThrive did not grow as well. The average growth of the stems with just water was 43 cm at day 27, with the additive Schultz it was 46 cm at day 27; the average growth of the stem with the additive SuperThrive was 38 cm at day 27; and the average growth of the stem with Red Food Coloring was 41 cm.
Experiment B-bulbs in water: The bulbs grown with distilled water had an average of 46 cm stem length and five plants# root length was 55 cm at 21 days. The bulbs with Schultz fertilizer had average of 8 cm stems length and only 4 plants had roots that were in the range of 12-35cm at 21 days and the bulbs in SuperThrive had an average of 20 cm stems length and only a few had roots with a range of 20-33 at 21 days. The bulbs grown in Schultz and SuperThrive showed fungal growth, 9 out of 12 plants from Schultz group had fungus and 11 out of 12 plants had fungus from the SuperThrive. Only 3 bulbs from the distilled water group showed fungal growth.

Conclusions/Discussion
Conclusion: My results did not support the hypothesis that plant fertilizers improve the growth of bulbs. Bulbs grown in soil and watered with just water or grown above just water showed the best overall growth. In fact the fertilizers increased fungus growth in bulbs grown above water. Bulbs with fungal

Summary Statement
In my project i wanted to see whether plant fertilizer really does improve the plant's health and growth rate.

Help Received
I used the lab equipment at the UCI university under the supervision of Dr. Debra Mauzy-Melitz; participant in the Orange County Science Engineering Fair

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Ryan W. Brothers

Project Number
J1604

Project Title
What Happens When Plants Smoke?

Abstract

Objectives/Goals

My objective is to find out if smoke from burning chamise, eucalyptus, willow, or paper causes the seeds of Phacelia grandiflora seeds to germinate faster. The smoke produced from the burning paper will act as a control since it contains mostly cellulose and lacks oils or proteins.

I plan to test this by exposing the Phacelia grandiflora seeds to smoke. The outside of the smoke chamber will be subjected to water, eliminating heat as a variable.

Methods/Materials

I collected the following plant species: chamise (Adenostoma fasciculatum), eucalyptus (Eucalyptus citriodora), and willow (Salix lasiolepis).

I then took 20 Petri dishes and placed 100 Phacelia grandiflora seeds into each dish. I then treated 5 of the Petri dishes and seeds with smoke from one of the above three plant species. I continued using five Petri dishes and seeds with smoke from each of the other plant species and paper. I then added 5 ml of water to each dish

I finally counted the number of seeds in each of the Petri dishes that germinated for 2-weeks, and recorded this information.

Results

The data shows that seed germination in Phacelia grandiflora treated with smoke from Eucalyptus was the highest with 99 seeds germinating. Chamise was a very close second with 98 seeds germinating. Treatment with smoke from willow leaves had 68 seeds germinating while only 33 seeds germinated with smoke from burning paper. The percent germination for each of the smoke treatment sources is as follows: Eucalyptus 19.8%, chamise 19.6%, willow 13.6%, and paper 6.6%.

Conclusions/Discussion

Smoke produced from dried chamise and eucalyptus produce a higher amount of germination in Phacelia grandiflora than smoke from willow or paper.

The high values of germination in both chamise and eucalyptus treated seeds could be caused by the high oil content in these plants compared to willow and paper. Paper has no oil content, which is most likely why paper had the least amount of germination.

My data both supports and rejects my hypothesis, which was that smoke produced from the chaparral shrub chamise increases seed germination in the Phacelia grandiflora. Because chamise smoke did have a higher germination on Phacelia grandiflora than willow or paper smoke, my hypothesis could be supported. However, eucalyptus smoke had the highest rate of germination on the Phacelia grandiflora,

Summary Statement

The influence of different types of plant smoke on seed germination in Phacelia Grandiflora.

Help Received

My Mom helped with the project board and my dad helped with treating the seeds with smoke in the smoke chamber.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Hillary R. Cleary, IV

Project Number
J1605

Project Title
A Study of the Santa Cruz Cypress (Cupressus ambramsiana) Tree

Abstract

Objectives/Goals
Project in plant ecology in which several physiographic factors including slope, aspect and soil types were analyzed to determine the effects on the growth and development of the Santa Cruz cypress tree.

Methods/Materials
Established a belt transect over ten acres of land within sand hills habitat in Bonny Doon, California. Selected 12 mature Santa Cruz cypress trees. Recorded soil type, measured the height, DBH, health and vigor, slope, aspect, and age by core sampling each tree and counting annual growth rings. Correlated data of 6 trees growing in Zayante soils and 6 trees growing on outcrops of xerorthent bedrock.

Mattson core sampler
USGS aerial photograph
biltmore stick
digital camera
dissecting scope
stereo glasses
Soil Conservation Service publication for Soils of Santa Cruz county

Results
Santa Cruz cypress trees growing on Zayante soils on average are more than two times healthier than trees growing on xerorthent bedrock including overall greater height and size. However, Santa Cruz cypress trees growing on bedrock are up to 55 years older than Zayante soil trees.

Conclusions/Discussion
My hypothesis stated that Santa Cruz cypress trees growing on moist, less exposed sandy soils will be overall healthier, more vigorous, and grow at a faster rate compared to the trees growing on drier, more exposed bedrock. My hypothesis was correct. In addition, I believe that the smaller size and reduced vigor of trees growing on bedrock was due primarily to the reduced availability of water and that this is the ecological limiting factor.

Summary Statement
Analysis of phsiographic conditons affecting the growth and development of the Santa Cruz cypress tree.

Help Received
Father helped with field work and proofed report, mother helped assemble poster board

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Eva J. Cover

Project Number
J1606

Project Title
Fertilizer Withdrawal

Abstract

Objectives/Goals
The goal of my experiment is see what happens to plants given fertilizers (inorganic vs. organic) when they stop receiving the fertilizers. Using the results of this experiment, I hope to find which fertilizers are better for plants, over all. That way, farmers can have higher percent of marketable healthy plants, that haven#t died of unnatural causes.

Methods/Materials
Materials: 18 pots; Organic bat guano; Organic fish emulsion; Organic kelp meal; Organic plant food; Inorganic Alaska plant food; Inorganic Miracle Grow plant food; Inorganic Schultz plant food; Inorganic Peters plant food; Four level store bought greenhouse (2 ½#, 5#, 2#); 9 16 oz bottles to feed plants with; 18 plates; 4 bags of microwave soil; Lettuce seeds (Lactuca Sativa).
Methods: Buy a green house (2 1/2 x 5 x 2 feet); Microwave dirt; Put plates under pots with dirt on greenhouse shelf; Plant lettuce seeds; Give each plant 1/16 of a Tablespoon of fertilizer, do this every five days; Give plants fertilizer for three months then take them off the fertilizers.
Five days after the plants stop receiving fertilizer, tally up the amount of discolored leaves on the plant and the amount of leaves. Then find the height of each leaf, add all the heights together, and the divide them. In other words find the average. Record data for 9 days.

Results
I found that the plants given inorganic fertilizers had life threatening withdrawals or died. One plant given inorganic fertilizers wasn't affected in this way, it only had a decrease in its grouth rate. I believe this happened because it was given a fertilizer that was not all a chemical combination. On the other hand the plants given organic fertilizers only had minor withdrawals, for instance a decrease in grouth rate.

Conclusions/Discussion
The plant that did the best was the plant given Organic Kelp Meal. It was 19.4 cm tall and only had one discolored leaf. Before I started this experiment, I thought that the plant given Organic Fish Emulsion would do best. The plant given Organic Fish Emulsion didn#t die but the plant given Organic Kelp Meal did better. The plant given Inorganic Miracle Gro and the plant given Inorganic Schultz died.

In conclusion, plants given organic fertilizer and fertilizers not made out of chemicals experience only minor withdrawals from fertilizers and plants given inorganic chemical fertilizer experience life threatening withdrawals.

Summary Statement
The effects on plants conditioned to recieving organic vs. inorganc fertilizers when they stop recieving the fertilizer.

Help Received
Christie Rowe from the Dept. of Earth Sciences at UC Santa Cruz, for assisting my project via e-mail. Olivia Murphy and my teacher Lise Whitfield proof read my paper. I recieved interviews from Darren Pearson, Clara Vo, and Linda Cover.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Zoe E. Dubrow

Project Number
J1607

Project Title
Freaked Out Radishes!

Abstract

Objectives/Goals
The purpose of this project is to investigate whether the shape of radishes is determined entirely by genetics or if it can be influenced by factors in the environment.

Methods/Materials
Cherry Belle Radishes will be planted in a plant starter kit. The plants will be moved into one of the two aeroponics containers when they are five centimeters tall. There will be no medium supporting the radishes' roots. When a radish fully grown it will be taken out of the aeroponics system. The radish's diameter, length, root length, number of leaves, length of leaves, and width of leaves will be measured. Control radishes will be grown in soil. Above ground radishes will be grown so that their hypocotyls and leaves are above the soil while their lower fibrous roots are in the soil.

Results
The average aspect ratio of an aeroponically grown radish was 1.7. The aspect ratio of a typical cherry belle radish is 1.0. Only three of the ten radishes grown in aeroponics were round.

Conclusions/Discussion
My data supports the hypothesis that an unsupported radish will be elongated. Therefore it was found that radish shape can be dramatically affected by environmental changes.

Summary Statement
The purpose of this project is to investigate whether the shape of radishes is determined entirely by genetics or if it can be influenced by factors in the environment.

Help Received
Father consulted with father on experimental design

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Katherine (Katie) C. Elliott

Project Number
J1608

Project Title
How Do You Keep Your Cut Flowers Fresh?

Abstract

Objectives/Goals
What kind of ingredients can be used to keep cut flowers fresh? By experimenting with the use of 7up, bleach sugar and the combination of an aspirin tablet & a penny (all combined with water) -- all measured against plain water only, I can observe how well each solution does in preserving the cut flowers best over several days. Initially, my research suggests that bleach may be the best solution, as it may keep the water clean longer.

Methods/Materials
5 pairs of identical cut white roses we placed 5 identical vases, each vase containing a different solution of ingredients: 1) 1/3 cup 7up, plus 1 cup water; 2) 1/3 cup bleach plus 1 cup water; 3) an aspirin tablet and 1 penny in 1 cup water; 4) 2 tablespoons of sugar in 1 cup water; 5) 1 cup of water only. In all vases, the same tap water was used. A thermometer was used during the experiment to see what the room temperature would when checked twice a day, at the same time of morning and evening.

Results
The experiment was conducted over a 9 day period and the following vases of different solutions kept the flowers fresh for the following number of days: 1) bleach solution: 4 days; 2) aspirin/penny solution: 6 days; 3) sugar solution: 7 days; 4) tap water only: 7 days; AND THE WINNER WAS 5) the 7up solution: 9 days.

Conclusions/Discussion
The bleach solution, which my hypothesis said would keep the flowers fresh longer, only lasted 4 days, even though my research suggested bleach would clear the water of bacteria keep the water clean. A question remains: how much bleach is too much. Maybe less bleach, than was used in my experiment, might work as well as the winning solution using 7up.

The 7-up solution (1/3 cup 7up plus 1 cup water) kept the roses freshest for the longest time because of ingredients found in 7-up: sugar, citric acid and soda. I am assuming that the citric acid helped keep the water clean and was less harsh on the flower since citric acid comes from a plant. The soda may have helped keep the water balanced, so the acid was not too strong in the water -- something that might harm the flower.

Summary Statement
By trying tap water, and solutions of different ingredients with tap water, I wanted to find out how to keep cut flowers fresh for a longer time.

Help Received
Mom helped with report formatting and some typing.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Jennifer L. Haden

Project Number
J1609

Project Title
Sinister Sunflowers

Abstract

Objectives/Goals
My objective was to determine how far plants should be grown from sunflowers in order for them to be safe from the sunflowers' allelopathic toxins.

Methods/Materials
I planted two planter boxes, each with a small group of sunflowers at the end. Sunny Royal Viola flowers were planted in a line down the box. They were all given the same amount of water and sunlight. The plants were measured in small groups every few days.

Results
The plants farthest away from the sunflowers grew to be the tallest, while the plants closest to the sunflowers either died and turned brown, or just did not grow.

Conclusions/Discussion
My results allowed me to determine that plants should be grown at least thirty centimeters away from sunflowers to be safe. Plants closer than this will die quickly.

Summary Statement
My project is about the allelopathic powers of sunflowers, or the way that sunflowers poison plants through their roots.

Help Received
My mom and dad helped me with my board and experiment, and my mentor Robert Howry helped me form my experiment.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Collette K. Hamamah

Project Number
J1610

Project Title
How Does the Wavelength of Light Affect the Rate of Photosynthesis?

Abstract

Objectives/Goals
The purpose of this experiment is to determine how the wavelength of light affects photosynthesis. My independent variable is the wavelength of light in nanometers (nms). My dependant variable is the amount of Oxygen produced in milliliters (mLs). I hypothesized that the rate of photosynthesis would be higher in the red (600-700 nm) and blue (400-500 nm) lights and lower in the green (500-575 nm) light.

Methods/Materials
Halogen light and 3 filters were used to obtain the desired wavelengths. Elodea in 3% NaHCO3 solution was exposed to blue, green, and red lights for 12 hours and the produced Oxygen was measured.

Results
After adjusting for the intensity of different wavelengths in the Halogen light, Oxygen production using the 400-500 nms filter was 0.42 mLs; 500-575 nms filter was 0.24 mLs; 600-700 nms filter was 0.73 mLs.

Conclusions/Discussion
The rate of photosynthesis was higher in the red and blue lights and lower in the green light. The findings supported my hypothesis.

Summary Statement
I tested the affect of different wavelengths of light on the rate of photosynthesis by exposing the same weight of Elodea immersed in sodium bicarbonate solution to three wavelength ranges and measured oxygen production over twelve hours.

Help Received
My parents and science teacher helped me obtain material and setup for my experiment.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Victoria C. Juhasz

Project Number
J1611

Project Title
Going Bananas

Abstract

Objectives/Goals
To experimentally determine if the ripening of a banana is effected by the environment.

Methods/Materials
First I put the bananas in three different bags. Bag #1 had an unripe banana and a ripe banana, bag #2 had a unripe banana, and in bag #3 there was two unripe bananas. Next I measured each banana with a measuring chart every other day for five days. I when I was measuring I let them out for two minutes each exactly so that the time that I left out the bananas of the bag would not effect my experiment. My materials were three paper bags, four unripe bananas, one ripe banana, and one measuring chart.

Results
The environment does effect the ripening of the banana, bag #1 ripened the a complete ripening stage of 7 in five days, bag #2 ripened to a stage 5.5 in five days, and bag #3 ripened to a stage 5 in five days.

Conclusions/Discussion
The environment does effect the ripening of the banana. The reason why is ethylene. Ethylene is a gas that is produced by ripened fruit or ripened bananas. That is why bag #1 ripened the fastest, because of ethylene. When ethylene is produced and comes in contact with an unripe banana the unripe banana starts to ripen. So a unripe banana is ripened by a ripe banana.

Summary Statement
My project is about how the environment effects the ripening of the banana.

Help Received
My brother helped edit my report; my mother helped me take pictures

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Kathryn N. Keeley

Project Number
J1612

Project Title
Factors Affecting Germination of Native and Non-native Plants in the Sierra Nevada

Abstract

Objectives/Goals
I wanted to study what factors caused non-natives to come up earlier than natives in the Sierra Nevada grasslands. I also was interested in why the non-natives seem to grow in the open and natives sometimes grow under the trees and bushes. I proposed three hypothesis that concerned effects of 1: Cold - If I give non-native and native seeds cold and no cold, then non-natives will germinate regardless of the cold, while natives will germinate better with cold. 2: Day Length - If I give non-native and native seeds longer hours of light (12 hours) and shorter hours of light (6 hours) then non-natives will germinate regardless of day length, but natives will germinate better with short days. 3: Full Sun Light vs. Filtered Light - If I give non-native and native plants full light (like a flourescent light), and filtered light (a flourescent light covered in green cellophane) representing green leaves that filter out sun light, then I predict non-natives will germinate best with full light and natives will germinate best with filtered light.

Methods/Materials
I contacted a seed company and they gave me 6 native and 6 non-native species. In my experiment, there were 3 replicates for each species in each treatment in each experiment, and 30 seeds in each Petri dish.

Results
1: Cold- For the natives the 2 days cold treatment germinatinon is variable, but for 2 weeks of cold treatment, 2 species fit the hypothesis, when 1 was complete opposite.
2: Day Length- For the natives, my hypothesis is incorrect; the seeds did not germinate better in short days. However, with the non-natives, 4 out of 6 species was correct to my hypothesis.
3: Full Light vs. Filtered Light- For the natives, there is only 1 out of 6 species that proves my hypothesis is correct. For the non-natives, there is no difference between filtered light and full light.

Conclusions/Discussion
1: Cold- the non-natives followed my hypothesis, while the natives did not.
2: Day Length- The non-natives germinated reagardless of daylength, while natives did not germinatate better with short days.
3: Full Light vs. Filtered Light- Full Light vs. Filtereed Light has no affect on non-native species, and Full Light vs. Filtereed Light has barely any affect on native species.

Summary Statement
The central focus of my project was to figure out what factors cause germination of native and non-native plants in the Sierra Nevada grasslands.

Help Received
Father answered some questions related to my project.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Andrew J. Khasigian

Project Number
J1613

Project Title
To H(2)O(2) or Not to H(2)O(2) for Better Seed Germination?

Abstract

Objectives/Goals
Does the consentration and soaking period of hydrogen peroxide effect the germination time for a seed?

Methods/Materials
1.Household Hydrogen Peroxide (H2O2) 3-5% concentration
2.Water (H2O)
3.Measuring cups
4.Strong cups to soak seeds in
5.Enough seeds with roughly same germination time and pick flowers or vegetables.
Following seed types were used:
a.Sunflower large seed
b.Gypsophila small seed
c.Marigold large seed
d.Morning Glory large seed
e.Bachlor Button large seed
f.Snapdragon small seed
g.Aster small seed
6.Planter box

Results
My expectations were that the solution with 50% water and 50% hydrogen peroxide and soaking the seeds would be the most effective. From the data no clear pattern could be seen.
Snapdragons seeds seemed to germinate better with minimum soaking and with lower or no H202 in the soaking solution. Marigold seeds did better with longer soaking periods, and concentration of H202 did not seem to matter. Sunflower seeds needed longer soaking, and lower H202 concentrations. Morning glory much like Snapdragons preferred shorting soaking periods and lower concentrations of H202.
Gysophia seeds were very sensitive to both soaking time and H202 concentrations. They germinated best with no H202 in the solutions, and other seeds germinating did better with shorter germination times.
Aster seeds, did better at 12 hour soaking periods. They seemed to best with the lower concentrations of hydrogen peroxide. Bachelor Button, did better at a 12 hour soaking period, and in the presence of hydrogen peroxide.
Seed size did not seem to matter. Large seeds and small seeds all seemed to germinate at different rates, regardless of soaking time or % hydrogen peroxide.

Summary Statement
This project concerns the effects on seed germination, from being soaked in varying concentration of hydrogen peroxide.

Help Received
Father helped type and set up, mother helped set up

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Elizabeth M. Koes

Project Number
J1614

Project Title
Influence of Various Fertilizers on Onion Cell Mitosis

Abstract

Objectives/Goals
To determine what influence various fertilizers have on the growth rate of a green onion plant. This project focused on the study of mitosis and the study of different chemicals.

Methods/Materials
Phosphate (A), Ammonium Sulfate (B), and a Mix of Phosphate and Ammonium Sulfate Fertilizers (C) were dissolved in distilled water. Ten cups were filled with each fertilizer including an additional 10 cups of just Distilled Water (D). A bunch of green onion bulbs were suspended in each cup. Each plant was monitored for growth by taking photographs, counting new roots and observing cell mitosis.

Results
The phosphate fertilizer had the greatest effect on promoting the rate of green onion growth. Distilled water alone had the second greatest influence followed by ammonium sulfate and lastly, the mix of ammonium sulfate and phosphate fertilizers. Growth rate was determined by observing new root growth, maximum root length, and the number of cells undergoing mitosis.

Conclusions/Discussion
The hypothesis that the phosphate fertilizer would have the greatest influence on green onion growth was correct. Ammonium sulfate actually deterred growth - contrary to what was hypothesized. Unfertilized plants in distilled water grew more than originally anticipated.

Summary Statement
The goal of this project was to determine what influence various chemicals (fertilizers) had on the growth rate of green onion plants undergoing mitosis.

Help Received
My Mom helped with the layout and decoration of the exhibit. My Dad coached me on how to do the experiment, and also bought a microscope and a special camera to photograph specimens

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Elizabeth S. Koo

Project Number
J1615

Project Title
Humic Acid or Fulvic Acid: Which Organic Acid Accelerates the Germination of the Green Mung Beans?

Abstract

Objectives/Goals
I'm trying to see which organic acid: humic acid or fulvic acid, can speed up the growth of green mung beans. I think humic acid would be the best since it is composed of three organic acids: humic acid, fulvic acid, and ulmic acid.

Methods/Materials
1. Checked and recorded the pH balance for humic and fulvic acid.
2. I put cotton mats on four plates with 1/2 tablespoon of green mung beans.
3. I put 1/2 cup of distilled water on three of the plates and the last plate with 1/2 cup of tap water.
4. I put a 1/2 tablespoon of humic acid on the distilled water plate. Did the same thing with fulvic acid.
5. Observed each day and recorded the numbers of the beans sprouted and looked closely at the size of beans.
6. I calculated the percentage of the three experiments of the beans sprouted and averaged.
Materials: a dropper, distilled water, tap water, 12% concentration of humic acid (contains 2% of fulvic acid), 12% concentration of fulvic acid, 12 plates, 1/2 tablespoon measurement, 1/2 cup measurement, green mung beans, cotton mats, and an insta-chek surface pH pencil

Results
The results were based from the averages of three experiments on the fourth day:
Fulvic acid with distilled: 98% beans sprouted
Humic acid with distilled water: 93% beans sprouted
Tap water: 81% beans sprouted
Distilled water: 65% beans sprouted

Conclusions/Discussion
I concluded that my hypothesis was wrong. Fulvic acid had more beans sprouted. After doing this experiment, I figured out that fulvic acid is the key element for all plant growth. Today, our soil doesn't have enough fulvic acid or humic acid in it. If the soil lacks these elements, the plants will not be healthy. When our plants are not healthy, sick animals and people will be produced.

Summary Statement
Which organic acid, humic acid or fulvic acid, can speed up the germination of green mung beans.

Help Received
Mom helped me paste the layout on the board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Amanda D. Lee

Project Number
J1616

Project Title
Violets in Vitro

Abstract

Objectives/Goals
The objective is to determine if it is possible to grow all of the different parts of the African Violet in the tissue culture environment successfully.

Methods/Materials
To test my question I used the method of Tissue Culture to culture 6 portions of the leaves (the control group), blossoms, petioles, roots, crown, and seeds of the African Violet.

Results
After 6 weeks all of the leaves had plantlets on the edges of the leaves. Five blossoms had plantlets and one was contaminated. The petioles had no response at all to the tissue culture environment. All of the root portions became contaminated. Two of the crown portions gave no response to the tissue culture environment and the other four were contaminated. None of the seeds gave any response to the method of tissue culture.

Conclusions/Discussion
These results led me to conclude that it is possible to propagate the leaves (as proven before) and blossoms. All of the petioles and seeds had no response to the tissue culture environment. The crown had two results, 4 cultures were contaminated and 2 had no response. All of the roots were contaminated. The results of the petioles, seeds, crown and roots make it unclear as to whether it is possible to propagate them.

Other experiments might include trying different types of media or even different sterilization methods.

Summary Statement
To determine, it is possible to grow all the parts of the African Violet in tissue culture, successfully.

Help Received
Mother typed up Bibliography, and supervised internet research. Father looked up 3 terms in Glossary I could not find and corrected grammar mistakes. Dr. Carol M. Stiff answered questions about the Kitchen Culture Kit and procedure.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Kyle R. McCluney

Project Number
J1617

Project Title
Grow, Grow, Grow with Hydroponics

Abstract

Objectives/Goals
There are two main different ways to grow plants, but which is best for growth efficiency, soil-grown or hydroponics? It is hypothesized that hydroponics is the best method due to the facts that the roots will be more contained with the resources at their fingertips, and because their will be nothing bad (such as bugs) to interrupt the growing process. The Purpose of the experiment I am working on is to see how the growth efficiency of hydroponically grown plants differs to soil grown plants.

Methods/Materials
Pot of soil of Miricl-Gro all purpose plant food, hydroponics pot system, Nutrients (I used FloraMicro, which provides rapidly growing plants with Nitrogen, Potassium, and Calcium as well as a unique combination of chelated micronutrients and trace elements plus pH buffers and has a purple color. I also used FloraGro, which promotes vigorous foliar and structural growth and is green. Lastly, I used FloraBloom, which is pink and promotes vigorous flower and fruit development), and some plants such as Calla Lilies bulbs, flowering plants like snapdragons, and fruit plants like Sequoia strawberries. Procedure 1. Gather all materials 2. Plant the plants 3. Give the hydroponics nutrients every week and refill water 4. Water the soil pot twice every day 5. Take pictures every week and notes 6. In conclusion, note the differences in growth

Results
The hydroponic plants were not very strong because they went into a state of shock when the dirt was washed off. But they grew fruit and flowers unlike the soil grown. The soil grown ones look healthier and have more leaves. The bulbs are doing outstandingly for the hydroponics.

Conclusions/Discussion
1. The soil grown snapdragon was very leafy and healthy but had no flowers 2. The hydroponics snapdragon had lowers but had droopy leaves and didn#t look very healthy 3. The soil grown strawberries looked healthy and leafy but had no fruit growing 4. The hydroponics strawberries grew well but were not very healthy or leafy 5. The soil grown bulbs did not grow at all 6. The hydroponics bulbs grew very well and were healthy. The hydroponics plants were not very healthy but the bulbs did very well. The soil grown, were very healthy and leafy but they grew no flowers or fruit and the bulbs didn#t grow at all. Based off my hypothesis I would say that it would have been true if the plants hadn#t gone into shock. Other than that the bulbs show the diffrence in growth.

Summary Statement
My project is about the difference of hydroponics compared to soil-grown plants.

Help Received
My dad helped me with setting up the plants and etcetera and my teacher helped me with the understanding of all the work.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Laura N. Meert

Project Number
J1618

Project Title
Worming Around: The Effect of Earthworms on Plant Growth

Abstract

Objectives/Goals
My project was to determine if earthworms affect the growth of a wheat plant. I believe that the more earthworms in the soil, the higher the plant will grow.

Methods/Materials
In my project, I used 10 plastic cups, 36 earthworms, potting soil, water, measuring cups, 20 wheat seeds, and a ruler. In each cup, I put potting soil, 2 wheat seeds, and varying amounts of earthworms (0 worms, 1 worm, 2 worms, 5 worms, and 10 worms). I observed the plants for ten days and recorded their height each day.

Results
The results showed the wheat seeds with 5 worms averaged the highest growth, and the wheat seeds with no worms averaged the lowest growth. The no worms average was 7.333 cm., 1 worm average was 8.875 cm., 2 worms average was 7.833 cm., 5 worms average was 12.125 cm., and 10 worms average was 10.875 cm.

Conclusions/Discussion
My conclusion is that the more earthworms in the soil, the higher a wheat plant will grow. However, too many worms is not necessarily better.

Summary Statement
My project was about determining if earthworms affect the height of a wheat plant.

Help Received
My mom bought the potting soil and my friend gave me the wheat seeds.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Alyssa M. Mendoza

Project Number
J1619

Project Title
Do the Different Types of Soil Affect a Plant's Growth?

Abstract

Objectives/Goals
The purpose of my science project is to investigate do different soils affect a bean plants growth. After my investigation, I will learn which soil best affected a bean plants growth. I will have a better understanding of which soil is best suited for growing plants.

Methods/Materials
I will first rinse 25, 960 milliliter planting pots in 5 gallons of water mixed with 10 tablespoons of bleach to disinfect the planting pots. Disinfecting the pots will assure that no disease left in the pots will affect the growth of the plant. Next, I will label each pot with a number 1 and number 2 on opposite sides to verify rotation of plant daily to promote equal light exposure. After measuring 840 ml of organic soil for each of the 5 planting pots, I will label the planting pot #O# for organic soil. I will repeat this procedure for all the other 4 different soils and label each planting pot according to the type of soil. Once I have completed measuring each of the 5 planting pots I will plant one bean seed to the depth of my index finger in the middle of the pot. Next, I will water each planting pot with 250 milliliters of water on the first day and will water each plant when needed with the amount of 125 milliliters. Daily I will rotate the plants and observe them for dryness of soil and possible plant growth.
Materials: Organic Soil, Fir Bark, Rice Hulls, Redwood Bark, Backyard Soil, Metric ruler, Kentucky Blue Bean Plant, Water, Sun, 240 milliliter Pitcher, 960 ml plastic pot, Clorox

Results
Organic soil results #affected the plants growth the best by having all of the plants grown in the 12 day period. AVERAGE10.67
Backyard soil results#affected the plants growth the by having no plants grown. AVERAGE=0
Mix 1 results#affected the plants growth the 2nd worst by having 3 plants grown. AVERAGE=3.28
Mix 2 results#affected the plants growth the 3 best with 3 plants grown on the last day AVERAGE=6.4
Mix 3 results#affected the plants growth the 2nd best with 4 plants grown on the last day AVERAGE=8.32

Conclusions/Discussion
After completing my investigation on if different soil types affect a plants growth, I found out that my hypothesis was correct. My hypothesis for soil affecting plant growth stated that the organic soil would help a plant grow faster and bigger. Many people should use this organic soil made by many nutrients to help plants grow healthy and strong.

Summary Statement
The reason I am doing this investigation is to determine which soil is the best soil to use at home for the growth of a plant.

Help Received
Craig Peterson, Miller/Clark Nursery; Miss Carrie Given, Science teacher; Parents

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Jordan W. Muetterties

Project Number
J1620

Project Title
Germinating Seeds: In the Light vs. in the Dark

Abstract

Objectives/Goals
My goal was to observe which would grow better, seeds germinated in the light or in the dark.

Methods/Materials
I used four different seeds. Arugula, Sweet Pea, Cantaloupe and Squash. I placed one of each kind of seed in a ziploc bag with a wet paper towel. I prepared two ziploc bags, and placed one of the bags in a sunlit window. I placed the other prepared ziploc bag in a dark closet. I recorded the growth of the seeds for the next 20 days.

Results
Some of the seeds in the dark closet sprouted more quickly, and then died when they had no sunlight. These seeds used all of the endosperm or short-term energy provided and did not have sunlight to begin the process of photosynthesis. The seeds in the window, sprouted a slower rate. However, once the window seeds sprouted they grew faster and had stems and leaves, unlike the seeds in the closet.

Conclusions/Discussion
My hypothosis was proved wrong. I found that the types of seeds I tested need darkness to form a better root system, but that to continue to grow the plant needs sunlight to begin the process of photosynthesis.

Summary Statement
My project is about whether or not seeds would grow without sunlight.

Help Received
My mom helped with typing and my dad helped with the display.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Tessa A. Opalach

Project Number
J1621

Project Title
Native or Not?

Abstract

Objectives/Goals
The objective of the project is to study the occurrence of native and introduced species in various aged redwood forests in Humboldt County. The forests observed have been logged one or more times in the past. The hypothesis used was that there will be a higher occurrence of introduced species than native species in the younger stands. In background research it was learned that introduced species grow well in logging-disturbed soils. As time progresses the native plant population will dominate over the introduced species because they are well adapted to the stable redwood environment.

Methods/Materials
Eight redwood forests ranging in age from 0 to 90 years old were observed. At each location three plots were established, each of which was 10 feet by 25 feet. Using a plot card created for this study, the following data was recorded: species name, native or introduced, canopy position (tree, shrub, or herb), and percent cover (ocular estimate).

Results
The introduced species only occurred in two forests-the stands aged five and fifteen years. When they did occur they never dominated completely. However, the introduced species dominated the herb layer in both the five and the fifteen year old age stands. A total of 24 species were observed. Out of these, only three species were introduced. The introduced species were Pampas Grass, Himalaya Berry, and Dandelion. The most common native species were Sword Fern, Evergreen Huckleberry, and Redwood.

Conclusions/Discussion
The introduced species did not dominate in the early years, or at any time, as it was thought they would. Results did not support the hypothesis. This was surprising since background reading indicated that introduced species grow well in disturbed soils. From a forest management perspective, these redwood forests don#t appear to be overly influenced by introduced species. It is interesting to note that the older forests with thick conifer overstories had no introduced species. If this project were to be done again an old growth forest would be studied and compared to the younger forests, possibly in the spring when foliage is out and flowers are in bloom.

Summary Statement
The occurrence of native and introduced plant species were studied in various aged redwood forests in Humboldt County.

Help Received
Mother helped with backboard; Father helped with access to the forests and graphing; David LaBolle helped with development of idea and review of work; Annie Eicher helped with background information, species identification, and interview preparation; and Mike Alcorn helped with background information.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Bryan C. Pearn

Project Number
J1622

Project Title
Moonstruck: Are Plants Affected or Influenced by the Moon?

Abstract

Objectives/Goals
The project's objective was to determine if the light and gravitational changes found in each of the four moon's cycle would have an affect on seed germination and plant growth.

Methods/Materials
A mini greenhouse kit was planted with 6 radish and 6 bean seeds two days before each of the four moon cycles. The seed germination date and plant growth for both radish and beans were recorded and averaged. Plant failures were not factored in the averages.

Results
The New Moon Cycle had the fastest seed germination for both the radishes and beans. The radishes planted on the 1st Quarter Cycle grew 0.1 centimeters higher on average than any other cycle and the beans planted on the Full Moon Cycle grew 5.4 centimeters higher on average than any other cycle.

Conclusions/Discussion
There were several unseen variables I believe altered my experiment's results. There were weather and temperature changes which I believe could have altered my results. Another factor that may have altered my results were the number of seed germination failures. I feel that this data should be taken into consideration. Another variable, my plantings were based only on the four moon cycles- New Moon,1st Quarter,Full Moon,and 4th Quarter. I did not take into consideration the apogee and perigee moon's orbital cycle or the ascending or descending moon's orbital cycle. Further research indicated these three orbital cycles of the moon together appear to have a great affect on the germination of seeds and plant growth.

Summary Statement
My project was to substantiate claims that the light and gravitational changes found in each of the four moon's cyles affect seed germination and plant growth.

Help Received
My mother took the pictures that I was in. My step-father helped me to convert my data into graphs on his computer.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
William L. Perdue, IV

Project Number
J1623

Project Title
Saving the Olive Crop

Abstract

Objectives/Goals

The olive fruit fly, (Bactrocera oleae,) could wipe out the entire olive oil industry in California. Because its maggot feeds on the inner pulp of the olive, it allows bacteria to enter the fruit and rot the olives. This is serious because if 1% table olives, or 5% oil olives are stung, the entire batch can be rejected from processing. Conventional pesticides are not an option because consumers demand organic methods, but organic methods are not always effective.

I hypothesized that I could separate fly-damaged olives from good olives by density differences, since fly-damaged olives have a hole eaten in them, and may be less dense. My method needed to be safe and inexpensive, so it could be used by anyone farming olives.

Methods/Materials

I used two scales, one a balance beam scale, the other a standard weight scale, a graduated cylinder, an Erlenmeyer flask, water, olives, and two thermometers.

I used the thermometers to measure the temperature of the olives and the water, and the other tools to find the density of the olives and the water.

Density is mass divided by volume. I found the density of the olives by measuring them on the balance beam scale, finding the mass. I used the graduated cylinder, added water, took note of the measurement, added the olives, took note of the new level, and subtracted the old measurement from the new. Then to find the density, divided mass by volume.

Results

I sampled olives from a small orchard and determined that 6.7% were fly-damaged. I put the sample in to 62.8˚F water; I noted that some olives floated, but most sank. Most of the floating olives were fly-damaged, most of the ones that sank were good. By removing the floating olives, I reduced the percent of fly-damaged olives from 6.7% to 1.7%; well below the 5% rejection level for oil.

Conclusions/Discussion

I conclude that fly-damage effects olive density, and because of that, density differences can be used to separate fly-damaged olives from good olives.

Summary Statement

Differentiating fly-damaged olives from good ones on the basis of their density.

Help Received

Father and Mother helped pick olives. Father asked questions that helped formulate some answers.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Dallas S. Peters

Project Number
J1624

Project Title
The Effects of Fructose Enhanced Ocean Water on Rice Plant Growth

Abstract

Objectives/Goals
My objective in this project is to try to find plants that can sustain alternative means of irrigation other than fresh water. My goal was to find an element that would counteract the salinity of ocean water as an irrigant for food bearing plants.

Methods/Materials
Collect water from Morro Bay. Soak one thousand rice seeds in water for 48 hours to start germination. Plant 250 seeds in potting soil of four separate planters. Use container of pure drinking water and fructose as control sample and repeat this process for the other planters containing the different levels of diluted ocean water and fructose. Test and record the three different salinity levels of samples with hydrometer and Aquachek pool and spa strips. Irrigate the control planter twice daily with pure drinking water and fructose and repeat this process for the other planters containing the different levels of diluted ocean water and fructose. Count and record the height growth of the control, 1/4, 1/2,and the 3/4 containers of rice plants irrigated with those diluted levels of ocean water.

Results
The results of my investigation on the effects of fructose enhanced ocean water on the growth of rice plants reveals that water samples containing 15.2 ppt (parts per thousand) the 1/4 diluted sample, had very little negative affect on the plants growth when compared to year 1 and the control sample.
The test sample irrigated with the water containing 28 ppt the 3/4 diluted sample had damaged the growth of the rice seeds.

Conclusions/Discussion
My investigation showed that the control sample had a height growth of 8 inches. This compared to the plants watered with diluted water with the highest salinity level of 28 ppt the three fourths, had a height growth of 4.5 inches compared to last years three fourths, of 3.25 inches. The plant being watered with the salinity levels of 15.2 ppt was not noticeably affected, in contrast to the three fourths sample.The height growth of 6 inches for the whole time period. The next sample of half ocean water, half pure water, and fructose was affected more than the 1/4 planter with a difference of 5.25 inches as a height growth. The last sample had the most negative affect while it still had a height growth of 4.25 inches during the eleven day time period of growing these hardy plants. Salinity has a negative affect on the rice plants, fructose can overcome some of the negative affect.

Summary Statement
The tolerance growth levels of rice plants, irrigated with fructose enhanced ocean water.

Help Received
Mother helped with transportation, Information from Mike Hillhouse at Koda Farms, Rice seeds from James E. Hill, an extension Agronomist from UC Davis.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Ben J. Pfenninger

Project Number
J1625

Project Title
The Natives Strike Back

Abstract

Objectives/Goals
The objective of tis experiment was to find out the effect of acid rain on native and non-native plants.

Methods/Materials
36 native, and 36 non native seeds were planted in separate containers. Then they were equally divided, one for control and one for experimentation. The experimentation group received distilled water the first day and an acid substitute (pH was 4) the control group received just distilled water. The acid solution was made by mixing 4 parts vinegar and 6 parts water. The plants were watered with an atomizer bottle. Plants were right next to each other and received same amount of sunlight, moisture, and soil. Everyday the pH of the soil and the temperature of the room where the plants grew was measured. At the end of the experiment success was measured based on blade length and survival rate.

Results
The data suggested that the acid mixture did not effect the plant growth but did effect how many sprouts grew. Grass on both sides sprouted better with just water but Native grass seemed less affected by the acid mixture. The acid solution did nothing to effect the native grass's growth. The non-native's growth did change but not drastically. One should note that since there was only one sprout that a solid conclusion could not be made.

Conclusions/Discussion
The Data did not support my hypothosis which was that Non-Natives would do better under acid rain then Native.

Summary Statement
Native plants are less damaged by acid rain then Non-Native plants in Tulare County.

Help Received
Father helped with graphic design

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Natalee N. Pughe

Project Number
J1626

Project Title
What's the Dirt on Compost?

Abstract

Objectives/Goals
My objective is to find out which works better with plants, potting soil or compost.

Methods/Materials
Method: Put soil in three of the six pots; Put compost in three of the six pots; Divide four packs of Blanket Flower seeds between the six pots; Bury the seeds until unseen; Saturate soil and compost pots with a cup of water; Move plant inside near light (natural or lamp); Water each plant every day; Measure all six sprouts and record on data table each day.

Materials: 4 packages of blanket flower seeds; 6 terra cotta pots; Potting soil; Compost; 1 tray large enough to hold all 6 pots; Water (1cup daily).

Results
The compost pots all spouted first
The soil pots began slowly, but began to catch up
The compost pots grew faster at first, but began to slow in growth
Over time, the compost and soil pots had almost the same results in plant growth

Conclusions/Discussion
Given enough time, all the plants reached about the same height
Compost and soil compliment each other
Compost and soil work better together rather than separately
Compost is a nutrient for soil

I had a few difficulties with this project. First, it was winter and the temperature outside was cold with shorter days. This winter was also a very heavy rainy season. I wanted to do my experiment outside, but was forced to bring the plants in because of the cold and rain. This caused my plants to sprout late and therefore the experiment was delayed. The seeds selected were supposed to sprout within 5 to 10 days after planting. They spouted eleven days after being planted.

One way I would improve my investigation is to specify how many seeds I put in the pot and how deep I bury them. Another way I would improve is to have one set of soil pots, one set of compost pots and one set of a combination of soil and compost pots to make the experiment more accurate

Summary Statement
My project is about how well compost and potting soil work separately from each other.

Help Received
Mother and sister helped type report and set up board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Christina A. Quisno

Project Number
J1627

Project Title
Plant Growth: Type of Liquid vs. Plant Height

Abstract

Objectives/Goals
The objective of my project was to determine how the variables of salt water, vegetable oil, vinegar, and detergent soap affect the height of the Japanese Boxwood plants. Regular water was used as the control group. The hypothesis stated that the detergent soap would increase the plants' heights more than the other variables.

Methods/Materials
The Japanese Boxwood plants were measured weekly and "watered" every few days with their specific solution (salt water, vinegar, vegetable oil, and detergent soap). The group of plants "watered" with regular tap water was used as the control group in this experiment. The heights of plants were recorded into a table. The plant growths were then averaged and the hypothesis was answered.

Results
The group of plants watered with the detergent soap had the worst growing peroid with an average height loss of 1.00 cm. The group of plants watered with the salt water had the best growing period with an average height growth of 0.10 cm.

Conclusions/Discussion
After averaging all of my numbers I figured out that the hypothesis I stated at the beginning of this project was wrong. The detergent soap, which I thought would have the greatest effect on the plants' heights, resulted in having the worst effect on the plants' heights. I was surprised that the plants "watered" with the salt water actually grew the most among the non-control solutions.

Summary Statement
I tested different liquids and how they affected the heights of a group of Japanese Boxwood plants.

Help Received
Dad helped format results table in Excel; Mom helped with board layout

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Andrea Patricia T. Santos

Project Number
J1628

Project Title
Do Roses Get Heartburn?

Abstract

Objectives/Goals
I thought up this experiment when I noticed that there were always different experiments dealing with plants being watered with a typical type of liquid (like soda or vinegar) but I personally have never heard of plants being watered with some type of medicine for unusual sicknesses. I was just curious. I believe that it was pretty interesting to water plants with heartburn and an Arthritis pain killer.

Methods/Materials
Materials: 3 mini indoor roses with many buds, all the same color; Water; A bottle of 500mg chewable Antacid tablets; A bottle of 325mg Aspirin; A measuring cup; Thermometer.
Procedures:
1.) Buy three mini indoor roses of the same color. Cut some buds off so that each plant has approximately the same number of buds. Then decide which plant will be watered with; water, water and aspirin, or water and antacid.
2.) place your plants indoor and place a thermometer nearby.
3.) Make 3 different mixtures to water the roses with. ¼ cup of water, ¼ cup of water and one dissolved 500mg Antacid tablet, and ¼ cup of water and 2 dissolved 325 Aspirin. Use the spoon to crush the tablets to make it easier to dissolve.
4.) Water your roses every other day and write down your observations [changes, growth, difficulties encountered, etc] into your daily journal.
5.) Take a picture of each plant individually after every time you water the plants.
6.) Make a data table to record how many buds start to bloom, with observations on how the plants feel, smell, or look like.
7.) Repeat steps 2-5 for a total of one week, only watering the plants every other day

Results
At the end of one week, the results surprised me. It was clear that the Aspirin killed the plant. It was the most dried up and withered one, with the most buds that had fallen off. But both the water and the water and antacid plants looked similarly grown. Both only looked a little bit withered but just not as much as the Aspirin. Although it looks like both were equal, the Antacid didn#t shed as much buds as the water.

Conclusions/Discussion
I was wondering why antacid did so well on my mini roses. On the bottle itself, it said that it is also a calcium supplement. On another article I found on the internet, it said, "Plants absorb inorganic calcium from the soil and convert it to ionized calcium." It also said that plants make calcium themselves, so I

Summary Statement
My project is about seeing which of three mini roses, would grow the best with either ;water, a mixture of water and antacid, or a mixture of water and aspirin.

Help Received
Dad bought meds and miniroses.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Linnea M. Shorey

Project Number
J1629

Project Title
Can a Disease Cross Species?

Abstract

Objectives/Goals
Last year I tried to spread diseases from one plant to another, but it did not work. I thought that maybe my experiment from last year did not work because plant diseases can not cross species. The goal of my experiment was to see if I could transfer Cucumber Mosaic Virus (CMV) disease to other plant species. When I did my research I found out that 800 different kinds of plants get CMV. This made me think that the disease I was using would make all my plants sick.

Methods/Materials
Healthy bean, tomato, melon, tobacco, bell pepper and squash plants were put in two groups. My disease source was squash with Cucumber mosaic virus. The test group of plants was rubbed with CMV positive leaves ground up in phosphate buffer. The healthy control group was rubbed with phosphate buffer only. Plants were measured over time to see changes.

Results
For each kind of plant tested, I checked three things to tell if the plant had any signs of being sick. First I counted the leaves, I found that the sick plants did not produce as many leaves as the healthy plants. The second thing I measured was the height of the plants. Sick plants maybe grew one or two inches then the disease started to kill them. One of the symptoms of CMV is stunting. The third thing I did was to look at the leaves for changes. I saw leaves that were stringy and wrinkled instead of broad and flat. I also saw some leaves that were cupping up and others were curling under. Many leaves got a starry night pattern or other kinds of spots on them. This is called a mosaic pattern. All the different kinds of plants tested got sick with CMV.

Conclusions/Discussion
All of the plant species I tried to get sick, got sick. My results show that all my sick plants were shorter, usually had fewer leaves, and the leaves had disease symptoms on them. The leaf symptoms were like what was described in my references. So I proved my hypothesis was correct. At least in plants a disease can pretty easily be spread across species.

Summary Statement
I took Cucumber Mosaic Virus and tried to spread it to different plant species.

Help Received
I used greenhouses and CMV control plants at Seminis Vegetable Seeds in San Juan Bautista, CA. My mom helped with research.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Rebecca S. Snyder

Project Number
J1630

Project Title
Salty Radishes: Does Salinity Affect the Germination of Radish Seeds?

Abstract

Objectives/Goals
My project was to see how the salinity of water affects the germination of radish seeds. I think that the higher the salinity, the harder it will be for the plants to extract water from the soil, causing them eventually to die.

Methods/Materials
Materials included twelve, 16.9 ounce bottles of pure water (each reduced to 16 ounces to make room for varying amounts of salt), salt, radish seeds, seed starting mix, and seedling trays for 72 plants in 12 groups of 6. Using a measuring cup, measuring spoon, and funnel I prepared 12 bottles of water with increasing degrees of salinity. I setup the soil and seeds into 72 seed cups split into 12 groups of 6, each group with its own water bottle. I watered the plants for 10 days using only the water bottle assigned to each group to water each of the 6 plants in each group. Then I counted the number of sprouts and measured the average sprout height and tallest sprout in each group.

Results
In group 1 I counted 72 sprouts. In group 2 there were 42 sprouts and there were 32 in group 3. I got 28 in group 4. In group 5 there were 39 sprouts and 28 in group 6. In group 7 there were 6 sprouts and there were 0 sprouts in all the rest of the trays. The plants could not grow using a solution of more than 2 tsp salt per pint of water. The plants were generally larger and healthier looking with less salt in the water used.

Conclusions/Discussion
The hypothesis was correct. The more salt in the water, the fewer and less healthy the plants were, to the point where the seeds would not germinate at all.

Summary Statement
This project is about how germination and early growth of radish seeds are affected by the salinity of the water used.

Help Received
My mother and father helped type and my father helped make the charts and graphs in the report.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Taylor N. Swantek

Project Number
J1631

Project Title
Tea: It Does a Plant Good. The Effect of Watering and Misting with Tea Solutions on Plant Growth

Abstract

Objectives/Goals
My objective was to find out if tea is beneficial to plant growth and health. Would the type of tea used for watering the plant effect plant growth? Additionally, would using tea to mist the leaves of the plants further enhance plant growth? I believe that plants hydrated with white tea will grow better than plants watered and/or misted with the other two types of tea because white tea has the highest levels of polyphenols (antioxidants).

Methods/Materials
Three tea types (non-oxidized, semi-oxidized, and fully oxidized) were tested against each other, along with a control group of water, to measure their effect on plant growth. I had four plants to test each tea type on (two would be watered with the solution, two watered and misted with the solution). My test consisted of watering and misting the designated plants regularly, and recording plant growth (height and number of leaves) for each plant every three days for 36 days.

Results
Each category of measurement (height, number of leaves, health) differed in the final results. Water had the most consistent results of all the plants, with each of its four examples having a final height within two inches of each other. Oolong tea had very differing final heights and the lowest overall heights of all the plants. The White tea plants that were not misted were shorter than the average for regular water plants, but those that were misted were the second tallest pair of plants, gaining 8-12 inches over the non-misted two. Black tea had one plant that did not sprout, and one that looked unhealthy from the beginning, but the other two achieved the tallest heights out of all the plants.

Conclusions/Discussion
While the results were mixed, they seemed to indicate that some teas had a positive impact on both plant size and leaf production. The data is strong enough that I believe that some combination of teas used for watering and misting will definitely improve plant growth.

Summary Statement
This project compares the effects of water and tea solutions on plant growth.

Help Received
Father and Mother helped buy materials for project and board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Stephen Show Tran

Project Number
J1632

Project Title
An Investigation of the Bioelectric Response of Mimosa pudica to Physical Stimuli

Abstract

Objectives/Goals
The Mimosa Pudica is a member of the Pea family which also includes the Venus fly trap. The Mimosa folds its leaves and droops its petioles rapidly when the leaves are stimulated by brushing, and by exposure to cold water droplets. The purpose of my experiment is to test the hypothesis that an electrical potential is generated when the Mimosa responds to these stimuli.

Methods/Materials
Stainless steel electrodes were inserted into the petioles and adjacent stems of the Mimosa plant. A differential preamplifier, an analog-to-digital converter, and a computer were used to monitor and record the electrical responses in real time. The leaves were stimulated either by varying degrees of brushing or different number of ice cold water droplets. The experiments were conducted on four healthy petioles and adjacent stems chosen from three Mimosa plants.

Results
Voltage waveforms were recorded from the implanted electrode. The amplitudes of the responses were graded. When the leaf was brushed more forcefully, a higher voltage was recorded for the response. Therefore, there was a qualitative correlation between the forcefulness of brushing and magnitude of the electrical response. The recorded voltages averaged between 10mV to 35mV. Similar results were obtained when the leaves were stimulated by a droplets of ice-cold water.

Conclusions/Discussion
The results of my experiments show that the Mimosa Pudica generates a graded electrical potential in response to different strength of stimuli. Recently, a broad class of chemical molecules, called the Turgorins, has been isolated and identified from the Mimosa. Turgorins can effect a seismonastic reaction in the Mimosa Pudica.

Further studies are suggested by the results of my experiments:

1.What is the biological significance of the electrical potential generated by the Mimosa Pudica upon physical stimulation?

2.Does the electrical potential precede the seismonastic reaction, or is it a product of the seismonastic reaction?

3.Does electrical potential cause the release of chemical molecules such as Turgorins which subsequently cause a seismonastic response?

Summary Statement
Experiments were conducted to verify that an electrical potential was generated within the petioles when the Mimosa Pudica leaves were physically stimulated.

Help Received
My father helped me with the design of the experiments and acquuired the necessary equipments. My mother edited my report.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Elena Vergara

Project Number
J1633

Project Title
Succulent Plants: Leaf Material vs. Water

Abstract

Objectives/Goals
To find the percent variation of water storage among different succulent species.

Methods/Materials
Forty-five grams of eight succulent species which are: Red Apple Ice Plant, Purple Ice Plant, Begonia Wax Leaf, Pink Caccneau Begonia, Aloe Vera, Aloe Ibitiensis, Consolea Rubescens Cactus, and Cotyledon Macrantha; electrical centrifuge, and electrical balance and two centrifuge test tubes with a capacity of fourteen milliliters. First I weighed fifteen grams of one of the species and then crushed it and poured into a centrifuge test tube. Then, I placed the centrifuge test tube on the electrical centrifuge. I was able to place two different samples in the centrifuge at a time. Next, I turned on the centrifuge for twenty minutes. After twenty minutes, I took them out. I figured out how much water and how much was leaf material and how much was water by looking at the readings on the centrifuge test tube. Next, I figured out the percentage of leaf material and water to comparison of the fifteen grams of leaves. I repeated the procedure three times for each species. Lastly, I figured the average percentage of leaf material and water for each of the eight species.

Results
On a average, the Purple Ice Plant had the greatest percentage of water, second the Begonia Wax leaf, third the Aloe Vera, fourth the Aloe Ibitiensis, fifth the Consolea Rubescens Cactus, sixth the Cotyledon Macrantha, seventh the Red Apple Ice Plant and eighth the Pink Caccneau Begonia. The following are my average results. On average, the Purple Ice Plant had 72.64% water and 27.36% leaf material, the Begonia Wax Leaf had 71.43% water and 28.57% leaf material, the Aloe Vera had 67.29% water and 32.71% leaf material, the Aloe Ibitiensis had 63.07% water and 36.93% leaf material, the Consolea Rubescens Cactus had 61.29% water and 38.71% leaf material, the Cotyledon Macrantha had 59.50% water and 40.50% leaf material, the Red Apple Ice Plant had 55.93% water and 44.07% leaf material, and the Pink Caccneau Begonia had 46.43% water and 53.57% leaf material.

Conclusions/Discussion
My hypothesis was incorrect. I learned that there is a variation of how much water succulent plants contain among different species. So from the plants that I tested, I now know that the Purple Ice Plant will survive better in hot climate environments including my garden.

Summary Statement
The purpose of my doing my project was to know the percent variation of water storage among succulent species and find one plant that had to most water storage, which would survive better hot climate environments including my garden.

Help Received
Mr. McMahon, my science teacher, helped me learn how to use the electrical centrifuge. My mother helped me make helped me paste my papers on my display board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Samuel M. Woodman

Project Number
J1634

Project Title
Extra Carbon Dioxide and Locoweed Growth: Is It Global Warming in a Soda Bottle?

Abstract

Objectives/Goals
The main goal of this experiment was to find out how extra carbon dioxide affects growing locoweed (Astragalus laynae). This experiment was designed to see how plants might be affected as global warming continues.

Methods/Materials
The main materials for this experiment were six locoweeds, vinegar, baking soda, baby food jars, saran wrap, and soda bottles with the tops cut off. Each locoweed was placed under a soda bottle and closed off by a piece of taped saran wrap. Three of the plants had 10g of baking soda mixed with 20ml of vinegar in a baby food jar to create extra carbon dioxide. The other three plants had normal air. The plants were left under the soda bottles for six days. To test the hypothesis two measurements were taken on day one and on day six; the volume of each plant was calculated by finding the height, width, and length and the leaves on each plant were counted.

Results
Every plant increased in volume, but the plants with the extra CO(2) grew an average of 175% while the plant in the normal air grew 88%. Also the plants with the extra CO(2) grew a total of 15 new leaves while the plants with normal air only grew a total of 6 new leaves. Note: two control plants were unexpectedly excluded due to growth problems.

Conclusions/Discussion
Based on the results, the plants with the extra CO(2) grew more compared to the plants with the normal air. This experiment mimics what might happen to plants on Earth if global warming continues. As more and more CO(2) is put into the air, plants will be affected, probably in this way, by the CO(2) alone.

Summary Statement
This experiment tests how extra carbon dioxide affects the growth of a desert perennial plant called locoweed (Astragalus laynae).

Help Received
Mother helped write & proof report, take photos, and helped set up the display board; Science teacher helped proof.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Bryce K. Woods

Project Number
J1635

Project Title
Oak Leaf Chromatography

Abstract

Objectives/Goals
Can the geographic location of local live oak trees be found by the varying degree of travel of chlorphyll in paper chromatography strips, from sample trees from those areas. I hypothesized that I would be able to distinguish between chlorophyll values, from trees grown at different locations.

Methods/Materials
Oak leaves from the native live oak tree Quercus agrifolia were collected from 5 different locations in rural Mendocino County. Chlorophyll was extracted using a rub out method for 30 seconds onto chromatography paper. The strip was attached to a sample bottle with the tip of the strip placed in acetone. The strips were left for 30 minutes at room temperature. The travel of the chlorophyll up the strip was measured and the "RF" (retention factor)value calculated by dividing the travel of the chlorophyll by the total travel of the solvent (the acetone). The average value for each location were calculated each location was compared to the other locations. Materials used were: oak leaves, plastic baggies, paper clips, five sampling bottles, chromatography paper, 50 mL graduated cylinder, various labels.

Results
I was only able to detect chlorphyll "a" in my tests. All of the locations had RF factors that were very close to each other. Most had a RF value between 0.90 and 0.92.

Conclusions/Discussion
The chlorophyll values were too close to draw any conclusions regarding geographical area. The range was only .02 RF. I did not prove my hypothesis. Chlorophyll is very close in live oak trees. I am continuing this project at different times of the year when it is possible that more and different types of chlorophyll will be present when doing chromatography. Any information that scientific studies gather pertaining to oak trees can be valuble to science, our native oaks have been having trouble with different fungus and bacterial diseases, "Sudden Oak Death".

Summary Statement
Paper chromatography was done on Live Oak leaves from various parts of Mendocino County to test for varying amounts of chlorophyll.

Help Received
My dad drove me around to collect leaves and he also taught me the computer program excel.