CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Mark A. Amash

Project Number
S2001

Project Title
The Effects of a Magnet on Plant Growth

Abstract

Objectives/Goals
To see if a magnetic field will have any kind of effect on a plants production and growth.

Methods/Materials
Radish seeds, Carrot seeds, Basil seeds, magnets, soil, and pots

Results
The magnetic field slows down the productivity and growth of the plants.

Conclusions/Discussion
Based on my data, the height of the plants were not as tall as the plants that I planted without magnets. Also, there were not as many plants that sprouted and not as many leaves sprouted from the plants as well. From further observations, I also discovered that the plants that were effected by the magnets were trying to avoid the magnetic field.

Summary Statement
How will a plants growth be effected by a magnetic field.

Help Received
Mother helped take pictures

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Sophia C. Becker

Project Number
S2002

Project Title
The Effect of Soil Salinity on Hard Red Winter Wheat and Barley Crops

Abstract

Objectives/Goals
The objective was to determine whether the health of hard red winter wheat and barley crops is impaired by higher concentrations of salinity in the soil.

Methods/Materials
Five different groups of wheat and barley plants (three plants in each group) were exposed to one of five different levels of diluted seawater at equal intervals over the course of nine days (#salt shock#), in order to simulate a condition in which crops are exposed to seawater. The growth of wheat and barley plants in the five salinity conditions was then compared.

Results
Wheat plants exposed to the two highest levels of salinity (25% and 50% seawater) suffered decreased health and reduced growth as a result. Wheat plants exposed to the three lower levels (0%, 6.25%, and 12.5%) did not suffer much stunting at all. In comparison with wheat, barley plants showed more resistance to salinity. The most surprising finding was how severe the effects were from only three instances of watering with salt water.

Conclusions/Discussion
When soil salinity is increased, the health and growth of wheat and barley plants are impaired. In an era when rising sea levels are predicted, these findings suggest the importance of carefully planning coastal crops.

Summary Statement
This project examines the effect of seawater on coastal crops and the difference between salinity tolerance in winter wheat and barley crops

Help Received
Mother helped edit report and enter data; Father helped develop research idea; C.M. Grieve, an expert in this area, corresponded with me.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Emily J. Carrera

Project Number
S2003

Project Title
Growing Vitamins: The Environmental Effects on Plant Nutrition

Abstract

Objectives/Goals
The goal of my project is to see how different environmental factors effect the nutrients in plants by growing tomato and egg plants with magnets and acid rain.

Methods/Materials
I created the 6 different greenhouse environments out of individual plastic containers. Then I created the acid rain by boiling water from a beaker, collecting the vapors through a plastic tube, to a cooling system (a box made out of foil mounted on a block of wood) and into the plastic greenhouse. I coated the inside of the cooling system with vinegar to create the "acid". I did this twice in 5 days. For the magnetic environment I added the magnets to 2 of the greenhouses for 10 days. To test the amount of nutrients extracted I cultured bacteria in Petri Dishes with agar gel. Then I extracted plant nutrients by drying out leaves under a heat lamp, pulverizing it with acetone and collecting the green solution. The solutions were added to the cultures to be observed. Plant nutrients were extracted once again after the testing period to be used for comparison and added to new bacterial cultures. I observed these cultures with a light microscope to monitor bacterial behavior.

Results
The bacterial cultures proved that the magnetic environment helps to concentrate nutrients in the leaves of the plant because this culture lasted the longest (meaning that there were more nutrients present to sustain its life). These leaves also came out to be very dark. The bacterial cultures that had the nutrients extracted from the acid rain plants proved to be nutrient deficient because this bacteria died the quickest. These leaves had turned light green.

Conclusions/Discussion
Growing plants with magnets helps to concentrate the nutrients in the leaves because some of the nutrients in plants such as magnesium, sulfur and iron are magnetic. They are attracted to the magnetic field and concentrate in the leaves which are in direct contact of that field.
Growing the plants with acid rain kills the plant because the acid kills the nutrients which are used by the plant to survive.
By doing this experiment, we can see that the way to gain the most nutrients in a plant is to place the magnets around the plant. We can also see how harsh chemicals effect plant nutrition. If plants are nutrient deficient, then we as humans (and consumers of the plants) are not receiving the nutrition we need for our bodies to properly function.

Summary Statement
The goal of my project is to show how different environments can effect the nutritional quality of plants.

Help Received
My teacher (Mrs, Flagan) provided most supplies and workspace.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Alex Chen; Samir Malhotra

Project Number

S2004

Project Title

Investigating the Morphological, Physiological, and Genetic Variability in Mustard Family

Abstract

Objectives/Goals

Our objective was to learn if different members of the brassica (mustard) family are different from each other in their morphology, physiology, growth, and genomics. This group of plants interested us due to their anti-cancer and anti-microbial properties.

Methods/Materials

Seeds from cabbage, broccoli, turnip, mustard, and cauliflower were obtained and germinated under sterile conditions. Our control group was germinated at room temperature and the treatment groups were germinated at 4°C, room temperature, 30°C, and 45°C. The germinated seeds were used for obtaining the rate of germination, DNA extraction, carbon dioxide production, microscopy, Polymerase Chain Reaction (PCR), and gel electrophoresis. We also studied the effect of cold treatment on the rate of seed germination.

Results

Our data shows that all seeds germinated much better (70-100%) at room temperature as compared to other temperatures (0-90%). At room temperature, the rate of germination was the highest (100%) in cabbage followed by mustard (90%). Seeds failed to germinate at extreme low (0%) or high temperatures (10%). Seeds for all plants germinated much better when given a cold treatment before transferring to room temperature for germination (10% higher). Rate of carbon dioxide production was significantly higher in cabbage seeds as compared to other types. When we ran the gels using genomic DNA, we obtained smears due to overlapping fragments and nuclease activity. In order to eliminate smears, we used RAPD primers and performed a PCR on the genomic DNA. The restriction digests on the PCR products of their genomic DNA showed many clear bands in DNA obtained from different plants.

Conclusions/Discussion

All seeds germinated much better at room temperature as compared to other temperatures. At room temperature, the rate of germination was the highest in cabbage followed by mustard. Seeds failed to germinate at extreme low or high temperatures. A cold treatment increased the rate of seed germination in all types. Rate of carbon dioxide production was much higher in cabbage seeds as compared to other types which correlated with the higher germination rate in this plant. The restriction digests on the PCR products of their genomic DNA showed that there were some differences in the banding patterns between these plants.

Summary Statement

In this project investigates the morphological, physiological, and genetic variability in the Brassica family.

Help Received

Used lab equipment at Thousand Oaks High School

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Lorene J. Chung

Project Number
S2005

Project Title
UV Radiation and Plant Pigmentation

Abstract

Objectives/Goals
To find out the effects that UV light has on plant growth, development, and pigementation.

Methods/Materials
Materials Used

-Spectrophotometer
-Spinach
-Cuvettes
-DPIP
-Phosphate buffer
-UV Bulb/Lamp
-Distilled water
-Blender
-Cheese Cloth
-Stop watch
-Tissues
-Ice
-Hot plate
-Large Beakers
-Foil

Results
The spinach that was exposed to UV light displayed a lower transmittance than the spinach that was exposed to regular sunlight.

Conclusions/Discussion
My hypothesis was correct because the spinach that was exposed to the UV lamp had a lower transmittance percent compared to the spinach that had been exposed to regular sunlight. This means that the chloroplast became inactive which halts photosynthesis. Therefore, UV light is more degenerative than regular light.

Summary Statement
My project tests the effects of UV raditions on plant pigmentation and development.

Help Received
My school let me borrow materials and a spectrophotometer.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Elma Frias; Shanta Hareesh

Project Number

S2006

Project Title

The Use of Chelated Iron in Growing Spinach as a Solution to Farming in Karst Soils

Abstract

Objectives/Goals

To test chelated iron as a solution to Karst Soils and analyze its overall effectiveness in improving iron absorption.

Methods/Materials

To conduct this experiment,we began germinating spinach seeds in towels,then harvested them when they sprouted to half an inch. They were put into cups containing a mixture of CaCO3 and compost,then separated into two categories containing five sections each.These sections were: 0g of CaCO3, 15g of CaCO3, 30g of CaCO3, 45g of CaCO3, and 60g of CaCO3.Both categories were watered daily,but one catergory receives a tablespoon chelated iron;the chelation process began once the spinach plants began to show signs of chlorosis.Months later,spinach plants were harvested and from each section,5g was weighted out and finely chopped for further experimentation and analysis on the effect of chelated iron. To test the iron concentrations in all sections from both categories,spinach plants were burned to ashes. To extract the iron concentrations from the spinach plants, ashes were put into a beaker with 2.0M HCl,then placed onto an electromagnetic machine.Each solution was then filtered and five ml of the solution was put into a cuvet.The cuvets were put into a spectrophotometer to collect the iron concentration.To find out how much iron concentration there was for every five grams of spinach plants, standards were made. When comparing the iron absorptions to the iron absorption in the standards graph,the following data was collected.

Results

Within the 0 g of CaCO3 with no chelated iron and chelated iron, the absorption of iron were .0447 mg/g Fe3+ and .0447 mg/g Fe3+ respectively. Within the 15 g of CaCO3 with no chelated iron and chelated iron, the absorption of iron were .0224 mg/g Fe3+ and .0224 mg/g Fe3+ respectively. The category of 30 g of CaCO3 with no chelated iron and chelated iron, the iron absorption were .00725 mg/g Fe3+ and .122 mg/g Fe3+ respectively. The section of 45 g of CaCO3 with no chelated iron and chelated iron, the iron absorption were .00647 mg/g Fe3+ and .0130014 mg/g Fe3+ respectively. The section of 60 g of CaCO3 with no chelated iron and chelated iron, the absorptions of iron were .00583668 mg/g Fe3+ and .00837 mg/g Fe3+ respectively.

Summary Statement

Testing Chelated Iron as a solution to Karst Soils and analyzing its overall effectiveness in improving iron absorption.

Help Received

Mrs. Hampton helped us in the planting process; Mom helped with the board.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Daniel M. Goodkin-Gold

Project Number
S2007

Project Title
Plant Breath: How It's Keeping You Alive and Helping to Stop Global Warming at the Same Time

Abstract

Objectives/Goals
My project was to determine if certain plants remove more carbon dioxide from the atmosphere than others. I believe that some plants have greater potential for reducing global warming than others.

Methods/Materials
Four plants of different species were each put into a separate biochamber. Each biochamber contained a carbon dioxide sensor and an oxygen sensor. In another biochamber, I placed a light sensor and temperature sensor so that I could correlate carbon dioxide and oxygen readings with light and temperature data. All of the sensors were attached to hand-held units which would record the readings. I then placed each biochamber in the sun from 9 a.m. to 2 p.m. and brought them inside until the next day. I repeated this process for three days.

Results
Of the four plants tested, catnip consistently showed greater declines in carbon dioxide levels compared to the other three plants.

Conclusions/Discussion
My conclusion is that, based on the data, certain types of plants have greater potential for reducing the effects of global warming than others.

Summary Statement
My project was to determine if certain plants are more effective at removing carbon dioxide from the atmosphere than others, and therefore have greater potential for reducing the effects of global warming.

Help Received
Friend's mother helped lay out board; Used lab equipment at Ventura Community College under the supervision of instructor Whiteford

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Darrick L. Gowens

Project Number
S2008

Project Title
Determining the Effectiveness of Different Types Wood Ash as a Fertilizer on the Germination and Growth Rate of a Radish

Abstract

Objectives/Goals
The goal of the science project is to determine if different types of fire wood ash would help in the germination, growth and the production yield rate of a plant.

Methods/Materials
Have you ever planted a garden and wanted to produce fruits and vegetables at a faster rate? Many farmers spend countless dollars on fertilizers, hoping to accomplish this. I have found that wood ash produces a strong plant faster than the average store brought fertilizers. The 1/4-cup of citrus wood ash was mixed with 2 cups of soil to produce a quick germination rate, as well as a long thick taproot. I place the different types of woods through a wood chipper. Then the wood chips were burned, and the ash was then pace through a shifter to filter out any large debris. Two radish seeds were placed in each plant box and covered with a mixture of soil and ash. After the seeds were placed and covered, I watered each plant.

Results
Within 2.9 days covered by the citrus wood ash germinated. The plant was also thicker and taller then the control group.

Conclusions/Discussion
This project contributes to the agricultural industry because it is efficient in the way it produces results quicker, and is cost effective. My original objective was confirmed because the results did support my hypothesis.

Summary Statement
The effectiveness of different types of wood ash as a fertilizer on the germination and growth rate of a radish seed.

Help Received
I consulted Dr. John Constable at Fresno State University of Fresno Biology Department.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Christina C. Gunzenhauser

Project Number
S2009

Project Title
The Effects of Episodic Drought on the Rhus integrifolia Phenology

Abstract

Objectives/Goals

Rhus integrifolia is an extremely common coastal sage in Southern California. It is classified as a drought-resistant, evergreen scrub. These characteristics enable it to thrive on rocky coasts and cliffs. I observed in my previous work that this was not exactly the case. The variations in plant growth that I recorded were uncharacteristic of Rhus integrifolia. From this I originally concluded that there was an environmental condition that was affecting the growth. My initial work suggested that there was a correlation between precipitation and several growth characteristics. The purpose of this study, is to report on a full two years of study and analyze the relation between various growth characteristics and monthly precipitation levels. This data will prove crucial to identifying the environmental effects of severe droughts on seemingly #drought resistant# plant life.

As I analyzed the large amount of data, I found that precipitation levels were affecting various characteristics. After analyzing all of the parameters of data and comparing them to monthly precipitation, I found that the resulting trends confirmed my hypothesis. Several of the growth characteristics such as branch length, branch diameter, number of leaves, and number of new shoots all varied in relation to the precipitation levels. Branch length, branch diameter, and the number of leaves varied most directly. This study provides an estimate of the magnitude of this relationship and provides a baseline for measuring the effects of severe drought on plant-life of California. This, in turn, allows us to analyze any consequential risks involving the surrounding animal life or the higher chance of brush fire.

Summary Statement

My project is the two year study of the evergreen scrub, Rhus integrifolia, and its changing growth when effected by droughts.

Help Received

Dr. Sharifi helped with research; Father helped organize paper.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Vivien Macnguyen

Project Number

S2010

Project Title

The Effects of Soil-Contaminating Mercury on an Arbuscular mycorrhizal Symbiosis in Garden Bean Growth

Abstract

Objectives/Goals

Over time, mining, deforestation, and various industrial practices cause the toxic contamination of mercury compounds in soils worldwide. Mercury is a bio-accumulator that is known to inhibit or retard plant growth, preventing vegetation to be grown to its maximum potential. The objective of my project is to determine the tolerance of symbiotic garden bean plants, formed by inoculating its roots with arbuscular mycorrhizae (a fungi that occurs naturally in soil and may have adapted to natural-occurring mercury over millions of years), to mercury(II)chloride-contaminated soil, and its effect on resulting biomass, growth rate, and health of the plant.

Methods/Materials

I used mercury chloride in concentrations of 0 g/L (control group with no mercury), 0.10 g/L, 0.25 g/L, and 0.50 g/L to contaminate four groups of plants. Within each group, one plant will be inoculated with arbuscular mycorrhizae and the other will not. All plants were grown indoors under a grow light and observed for eight days for growth rate, height of plant, and other observations.

Results

By the eight day, all plants reached their seedling stage. The symbiotic plants had an average height of 17.75 cm and a growth rate of 2.2 cm/day, while non-symbiotic plants had an average height of 13 cm and a growth rate of 1.6 cm/day . While arbuscular mycorrhizae tolerated 0.50 g/L of mercury, the concentrations of mercury for each plant do not have an effect on its biomass. All three plants that are non-symbiotic and grown in mercury-contaminated soil displayed yellow cotyledons and pale stems, indicating a lack of chlorophyll.

Conclusions/Discussion

The arbuscular-mycorrhizal symbiotic plants had grown faster and developed a larger biomass than non-symbiotic plants, which indicates that the fungi had successfully protected the plant from the negative effects of mercury contamination. Due to the observation that non-symbiotic plants grown in mercury displayed yellow cotyledons and pale stems, it can be inferred that mercury inhibits the production of chlorophyll, responsible for photosynthesis in plants, which results in bean plants with smaller biomasses. The effect of various mercury concentrations on the growth of plants is indeterminable because some seeds may have been initially healthier than the others, which caused an inconsistency in my data.

Summary Statement

This project explores the tolerance of Arbuscular Mycorrhizae symbiotic plants to mercury, to determine its effectiveness for ecological restoration of mercury-contaminated areas.

Help Received

Set up my experiment under the supervision and assistance of Mrs. Navarro. Disposed of mercury chloride through professional toxic chemical disposal at Oak Grove High School.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Francesca McClintic; Janel Raab

Project Number
S2011

Project Title
Green Ethanol: Year 2

Abstract

Objectives/Goals
The theme of this exhibit is ethanol production using different materials. Ethanol is alcohol that is produced from sugars by the process of fermentation. This experiment is to explore more options in the materials used in this process other than corn. Using corn to produce ethanol is economically unrealistic; it takes more energy to produce the ethanol than the amount collected. This experiment will compare algae, bamboo, and cornstalk to the corn, sugar, water and sugar cane. The outcome can then be used find a better and more realistic alternative to replace the use of petroleum.

Methods/Materials
Collect the materials need to get 500mL of grinded malt. Grind each material down using various methods. Divide into to cups of 250mL and boil for 30 minutes. Then put it in a plastic container and add water so that it rises to 2Ls. Add ½ a teaspoon of yeast one gram of enzymes and set a side to ferment for more than five days. After fermentation is done, open the brew and measure alcohol level using a vinometer.

Results
Corn kernel produced an average of 90mLs of alcohol, and sugar cane produced an average of 240mLs of alcohol. Cornstalk had an average of 95mLs of alcohol, green bamboo had an average of 80mLs of alcohol, and dry bamboo had an average of 40mLs of alcohol. Water had 0mL of alcohol, while Sugar had 51mL average and Algae had 70mL average.

Conclusions/Discussion
Conclusion: In conclusion, though our hypothesis was close to correct, this experiment provided data that shows that there are other materials that produce more alcohol than corn kernel, such as cornstalk. Cornstalk is not a profitable material, so if used to make into ethanol it will not affect the economy. Also it shows that bamboo can also be used which is a realistic material because it is like grass, in that is grows fast and is a non-profitable. Algae are also an option.

Summary Statement
This experiment is designed to discover other green plants, which are non-cash crops, that can produce more ethanol than corn kernel.

Help Received
Parents supporting and supervising, Paul Jordan for advice in constructing our experiment design and providing tools.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Lauren E. McGuinness

Project Number
S2012

Project Title
How Differing Light Wavelengths Affect the Rate of Fruit Ripening

Abstract

Objectives/Goals

If fruit ripening can be altered in a natural way, such as exposure to only certain light wavelengths, then harmful ripening techniques, such as the use of chemicals, will become less useful. How certain wavelengths affect fruits and the rate at which they ripen was tested.

To test how specific wavelengths alter ripening rates, fruit was left to ripen under red light, blue light, purple light, and no light. A refractometer was used to more accurately determine the degree of ripeness for each fruit. A refractometer measure Brix or sugar weight # the reading help monitor the progress of ripening.

Methods/Materials

1.Test refractometer using a banana, mango, and grape bunch
2.Place the fruits in individual plastic bags
3.Set up # Place each light filter on a full spectrum light, the full spectrum lights should point towards the beakers of water, and the fruits placed besides the beakers (the light is not directly in contact with the fruits but reflected by the beaker of water)
4.1 banana, 1 mango, and 1 grape bunch should be placed under the red light, under the blue light, and under the purple light
5.1 banana, 1 mango, and 1 grape bunch should be placed in no light, away from the full spectrum lights
6.Each of the tested fruits will be placed in the same room to reduce variables such as temperature changes and access to outside light (because the fruits are all in a windowless room, the fruits will be exposed to little outside light.)
7.The fruits will be tested, using the refractometer, on day 1, followed by day 3, day 6, day 9, and day 12 at exactly 5:00pm each test day
8.Record observations on each test day

5 unripe bananas, 5 unripe mangos, 5 unripe grape bunches, 15 sealable plastic bags, large enough to contain fruit, Table, Knife for cutting fruit (for refractometer readings), Refractometer, Distilled Water (used for refractometer), 3 Large Beakers of Water, 3 Full Spectrum Lights, 3 Light Filters (1 red, 1 blue, 1 purple).

Conclusions/Discussion

The differing wavelengths tested each had a specific affect on the fruit. The red light sped up the ripening process the most. When under the red light, the percent brix of the fruits increased the fastest compared to

Summary Statement

Exposure to certain light wavelengths should alter the rate at which fruit ripens.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
James I. Miller, III

Project Number
S2013

Project Title
Plantorade

Abstract

Objectives/Goals
This project was done to see if plants grow better with regular tap water or if they like sugar and electrolytes and grow more when fed Gatorade. And also determine if the different formulas/flavors of Gatorade will effect the rate of growth.

Methods/Materials
First I needed to go to Green Thumb and get the organic soil, the six plastic pots,and the butter bean seeds. Then I went home that day and planted all six pots and watered them that night. Also I labeled each pot with a plant number and what they were being fed. Everyday I go in my mom's room and open the curtains and put 1/3 cup of Gatorade or water in it and let it sit for the day and soak up the sunshine. Then at night I go in the room and measure the plant in centimeters and record the data in my notebook. That's how I am doing my project and that's exactly the procedure that I have followed.

Results
Plants do not like Gatorade. The low calorie G2 Gatorade barely sprouted. The X-Factor and the Tiger Gatorade grew 6 inches. The watered plants grew 14 inches.

Conclusions/Discussion
Some parts of my hypothesis was right but some were wrong. In my hypothesis I guessed that the G2 plant would have the most growth but instead the G2 plant barely grew at all. I was right when I said that the X-Factor plant was going to be one of the tallest Gatorade plants. As with any experiment there are sources of error that were not accounted for before the experiment. One error that I have found was the different depths that I planted the seeds. I tried to plant them all the same amount of inches under the surface of the soil but after the first watering soil was displaced and seeds were probably moved around a little bit and pushed to different depths. I have learned that although water is a much better way to feed a plant, Gatorade will work but it won't grow as fast. I also learned that plants can grow even when strong acids are present. If in a few weeks there is a harvest of butterbeans then I will be able to see which plants came out with better beans and better quality of bean. If the Gatorade grows a better bean than it could possibly be used to grow produce in the future. I could take this experiment further by waiting for the beans to sprouts and seeing which bean looks and tasted the best.

Summary Statement
Will Butter beans grow when fed different types of Gatorade with electrolytes in it?

Help Received
Mom fed plants a few times

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Allison Park; Lucas Salzman

Project Number
S2014

Project Title
The Correlation between the Part of a Banana and the Amount of Potassium It Contains

Abstract

Objectives/Goals
The goal is to determine if there is a correlation between the location of a banana, and the potassium concentration within the location.

Methods/Materials
The materials used were five bananas of the same hand, a Cardy Potassium meter, distilled water, garlic press, standard solution, sampling sheets, cheese cloth, plastic pipette, and scissors.
To test to see if the location had an effect, cross-sections from the tops, middles and bottoms of five bananas were obtained. The interior meat, the exterior meat, and the skin/peel were tested from each of these cross-sections. Using a garlic press to extract the juice, the juice from each of these pieces was soaked onto a sampling strip. The sampling strip was then placed on the meter itself and a reading was taken. The Cardy Potassium meter indicated the potassium concentration in parts per million. The location of the banana where the potassium concentration was tested was altered. Five bananas were tested. Each banana had three cross sections tested. Within each cross-section three areas were also tested. There were total of 45 measurements taken from these different areas of the banana. Each location tested was from a piece of a banana about 1 cm by 1 cm.The measurements were taken of potassium concentrations in portions of the banana from the interior, exterior, and skin of cross-sections that came from the top, middle, and bottom of five bananas.

Results
There was an overall mean of 3300 ppm in the interior meat, in comparison to the 2900 ppm in the exterior meat, and 2400 ppm in the skin. The average deviation of the interiors was 200 ppm, the exteriors contained an average deviation of 240 ppm, and the skin contianed an average deviation of 180 ppm. In the top portions of the bananas, there was an average of 2900 ppm, compared to 2700 ppm in the middle and 2800 ppm on the bottom.

Conclusions/Discussion
It was found that location did have an effect on the potassium concentration. It was found that the highest potassium concentration lied in the interior meat of the bananas. This study indicated that the outside of the banana compared with the inside, had an effect on potassium concentration, rather than the distance from the tip of the banana.

Summary Statement
This project determines which specific part of the banana has the highest concentration of potassium.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Diane L. Polyakov

Project Number
S2015

Project Title
The Effect of Ultraviolet Light on Plant Development and Fruit Production

Abstract

Objectives/Goals
Does reducing the amount of ultraviolet light on pea plants affect the plantsâ## development, fruit production, and chlorophyll levels?

Methods/Materials
To start my project I built a new habitat for the pea plants. I created three different environments for the pea plants: Control, Receiving UV Light, and UV Light Blocked. A total of five pots grew in each environment. I routinely measured the height of the plants using a centimeter ruler and photographed the plantsâ## growth. The plants eventually produced flowers and then pea pods. I harvested the peas, measured and weighed each pea pod, and then separated them into individually labeled Ziploc bags : one for each pot. After the first harvest, I arranged to take my plants to UCI and Marko Spasojevic, a graduate student, allowed me to use his Departmentâ##s SPAD meter, or chlorophyll meter. The SPAD meter measurements enabled me to calculate the levels of chlorophyll in the leaves of the pea plants.

Results
The pea plants growing in the Control environment produced 16 pea pods, those growing in the UV Light environment produced 22 pea pods, and those growing the the UV Light Blocked environment produced 34 pea pods. The average length of the pea pods growing the Control environment was 7.44 cm, in the UV Light environment was 6.18cm , and in the UV Light Blocked environment was 6.69. The average weight of the peas pods in the Control environment was 3.62 grams, in the UV Light environment was 3.84 grams, and in the UV Light Blocked environment was 4.00 grams. Lastly, the average number of peas per pod in the Control environment was 5, in the UV Light environment was 6, and in the UV Light Blocked environment was 6.

Conclusions/Discussion
The pea pods from the UV Blocked environment were also the heaviest and had the highest number of peas per pod. A surprising result was that some of the pots in the Control Group environment produced no peas. Also, a mold developed on the plants in the UV Light Blocked environment. This is probably because ultraviolet light is necessary for the production of vitamins which inhibits the mold growth. The plants in the UV Light Blocked environment were likely unable to produce the vitamins to stop the growth of the mold.

Summary Statement
The focus of my project was to see how Ultraviolet Light emmited from the sun affects plant growth, fruit production, and chlorophyll levels in pea plants.

Help Received
Professor Katharine Suding and Graduate Student Marko Spasojevic allowed me to use the SPAD meter at the University of California Irvine Lab.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Matthew "Dustin" D. Rodgers

Project Number

S2016

Project Title

The Effect of Fumigants on Fusarium oxysporum forma specialis vasinfectum

Abstract

Objectives/Goals

The purpose of this ongoing experiment is to determine if certain fumigants can effectively neutralize or lessen the harmful effects of Fusarium oxysporum f. sp. vasinfectum (FOV) on cotton crops. Lack of knowledge and inadvertent dispersal of this fungal disease has caused it to become a major threat to cotton.

Methods/Materials

The fumigants used in this experiment were Methyl Bromide with Chloropicrin, Telone Chloropicrin, Metam-Sodium (Vapam), and the non fumigants, AM120 mycorrhizae, solarization, and a control. At the test site, these six treatments and four varieties of cotton plants were randomly allocated throughout the approximately 300# x 100# of the sample infected field. Once the treatments were confirmed to have taken effect, the cotton varieties were planted. The crops were then monitored for the effect of FOV.

Results

The fumigants Methyl Bromide with Chloropicrin and Telone Chloropicrin proved successful but expensive treatments that were expected to lessen the effects of FOV on the cotton crops, and they did. Metam-Sodium (Vapam), AM120 mycorrhizae, and solarization are less expensive treatments that were not predicted to lessen the effects of FOV. Metam-Sodium (Vapam) and AM120 mycorrhizae, as predicted, did little to lower the effects of FOV. However, solarization did lessen the fungi strand to the degree of the expensive treatments, leading to a possibly less expensive, alternative method.

Conclusions/Discussion

The finding of these results is critical to cotton farmers in the San Joaquin Valley and around the world. Methyl Bromide with Chloropicrin and Telone Chloropicrin are very powerful in dealing with just about any soil-borne disease, but they have two fatal flaws that make them inconvenient to use. First, they are very expensive. To a cotton farmer, they cannot afford to douse their field with the spray. It is possible that they could use them in the #hot spots# where a population is concentrated, but it is still a financial burden that they could barely uphold with the loss of their previous yields. In addition, these two fumigants add to the breakdown of our ozone layer, and must be used in extreme moderation to stop this from continuing. The solarization treatment is an alternative to the use of these two fumigants, and comes at a much more economical cost. Although more labor intensive and tedious, it still lowers the fungi population at an affordable cost to the farmers.

Summary Statement

The purpose of the project is to determining methods in which to lessen the destructive power of the fungal disease, Fusarium oxysporum forma specialis vasinfectum, on cotton.

Help Received

Dustin Rodgers of Highland High School under the direction of Ag Futures Internship mentor Dr. Rebecca Bennett of the USDA pathology lab at the Shafter Extension and Research Center

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Patricia Bruce; MaryAnne Russell

Project Number

S2017

Project Title

In the Spotlight: The Effects of Light Intensity on Photosynthesis

Abstract

Objectives/Goals

In this project, the goal is to find out what effect light intensity (luminous intensity), of an artificial light source, has on the rate of photosynthesis in an aquatic plant, Bacopa Australis. In order to test the effects of light intensity in terms of luminosity on the rate of photosynthesis, the Bacopa Australis will be tested under four light sources, each with a different measurement of lumens. Since oxygen gas is a byproduct of the photosynthetic process, the rate of oxygen being emitted by a plant can be used to measure the rate of the entire process.

Methods/Materials

The tip of a single stock of Bacopa Australis is placed inside the 70mL test tube, which is filled completely with a .25% sodium bicarbonate and water solution. The opening of the test tube is then covered with Parafilm to prevent extra amounts of Carbon Dioxide from entering. The test tube is then placed under a small desk lamp in a closet. The 455 lumen bulb is placed into the small desk lamp. After five minutes of being exposed to the 455 lumen intensity, the plant is checked. The bubbles released by the plant are counted and recorded. This is repeated five times. The same procedure is used with the 770, 1060, and 1610 Lumen bulbs.

Results

Though the data was not entirely conclusive, it did help support the hypothesis in the sense that when the plant was exposed to the highest light (luminous) intensity, the average rate of photosynthesis was the highest. When the overall average number of bubbles for each trial was taken, the average increased as the light (luminous) intensity increased. Through the data it can be concluded that light intensity does have an impact on the rate of photosynthesis.

Conclusions/Discussion

From the data obtained, it can be concluded that light intensity may have a significant impact on the rate of photosynthesis. A general trend in the averages suggests that a higher intensity may in fact increase the rate of photosynthesis. However, the results of this experiment were not as accurate as possible. Bubbles vary in size and therefore vary in the amount of gases they contain. In addition, oxygen may not have been the only gas that was being emitted, as the plant also releases some carbon dioxide in cell respiration. For these reasons, the results obtained by counting bubbles were not entirely conclusive.

Summary Statement

The experiment tested the effects of light on the rate of photosynthesis.

Help Received

Parents contributed knowledge of aquatic plants; Sister helped put board together

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Sheena W. Song

Project Number
S2018

Project Title
The Effects of Recycled Water on the Growth and Germination of Leymus triticoides, Nassella cernua, and Poa secunda

Abstract

Objectives/Goals
With the growing demand on a limited water supply, the use of recycled water for irrigation offers both a possible long term sustainable approach as well as a cost effective plan. However, the effects of recycled water on the growth and germination of native plant species are virtually unknown and may therefore pose a risk to the well being of plants. It was hypothesized that those plants treated with recycled water would exhibit the most detrimental effects and low germination, while those treated with tap water would exhibit optimal growth and high germination.

Methods/Materials
In this experiment, three water treatments were used to evaluate the responses of the three native grass plant species, Leymus triticoides, Nassella cernua, and Poa secunda. These treatments included recycled water, tap water, and a 50/50 mixture of both. The plants were irrigated regularly and stem counts and height measurements were taken. At the end of an approximately 90 day period, wet and dry masses were obtained. Several analyses were then taken, which included net water absorption and stem: root ratio. In addition, separate germination seed tests were conducted in Petri dishes, and seed germination percentages were determined.

Results
It was concluded that though recycled water may have given all of the plants an initial boost in height and stem abundance, the gradual accumulation of heavy metals and salts may have ultimately proved detrimental to the plants# health. Recycled water caused the plants# shoot system to outgrow the root systems, hindering the plants# ability to absorb the necessary nutrients and to support itself. Seed germination tests provided that seeds treated with tap water showed optimal growth.

Conclusions/Discussion
The experiment provided useful information regarding the usage of recycled water on grass growth. Though recycled water may be a sustainable solution to the world#s growing water crisis, it was determined that its usage on plants was harmful.

Summary Statement
My project aims to determine the effects of recycled water on the germination and growth of native grass species.

Help Received
Mentor proofread report; Parents drove me to several locations

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Maria E. Valenzuela

Project Number
S2019

Project Title
Does the Percentage of Water Content Vary with the Variety of Orange?

Abstract

Objectives/Goals
The purpose of this project was to determine if the percentage of water in different varietes of oranges varied.

Methods/Materials
Materials: 1. Navel and Valencia oranges- Minnelo and Clementine Tangerines; 2. A kitchen knife; 3. Aluminum foil; 4. Weight scale (electronic for exact weight); 5. A clock or timer; 6. An oven; 7. Cookie tray; 8. Oven mittens; 9. pen and notepad.

Procedure: 1. Weigh the selected orange. 2. Cut the orange in very thin slices. 3. Place the slices on the aluminum foil and place in the oven to dry. 4. Weigh the dried orange slices once. 5. Calculate the total percent of water weight. 6. Repeat with all orange samples.

Results
In conducting the experiment a record was kept of the total weight of each orange before and after each test. Each orange was weighted individualy as well as the aluminum foil before and after drying. The dryed weight was subtracted from the intial orange weight. The initial weight of each orange was different. However, the final results showed that at the end of the experiment each variety of orange had about the same water content percentage. The average water weight for all oranges fell in the range of 75.5 % to 80.4%. Examination by variety showed that the average Navel orange percentage is 77.8%, the average Valencia orange is 78.6%, the average Minneola Tangerine is 75.5%, and the Clementine Tangerine is 80.4%.

Conclusions/Discussion
The purpose of the experiment was to determine and compare the percentage of water contained in different varieties of oranges. It was hypothesized that an orange would have about 60% water and that 40% of the orange would be none liquide material including the orange peel, pip, and pith. At the end of the experiment it was calculated that the total average amount of water in all orange varieties tested orange is about 78%. Although different from the value hypothesized, the calculated value is indeed close. Water is therefore more than half of the total weight of the orange. The percentage values did vary for the different varieties of oranges, although only slightly. In conducting the experiment on four different types of oranges and taking the average percentage of weight, it can be concluded that about 78% of any orange's mass is water.

Summary Statement
This project determined the average percentage of water in different varieties of oranges.

Help Received
Mom supplied the oranges; Mr.Usher supplied me with the electronic weight scale; teachers supported me and revised my project.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Suh Young Woo

Project Number
S2020

Project Title
The Effects of Drought Conditions on the Photosynthetic CO(2) Uptake and Water Potential of an Invasive and Native Speci

Abstract

Objectives/Goals
Plant invasions are widely recognized as significant threats to biodiversity conservation worldwide. In addition, the drought in California is an environmental concern. Therefore, water is the first limiting factor in plant growth for the California Coastal Sage Community.The objectives of this research were to compare the photosynthetic CO(2) uptake, water potential, and water-use efficiency of an invasive and a native species during well-watered and drought conditions and to determine which species, invasive or the native, would be more favorable during drought conditions.

Methods/Materials
Five pots of Ageratina adenophora and Encelia california was obtained. The plants were maintained under well-watered conditions and fertilized twice weekly. Then at the start of the experiment, top of the pots were sealed with plastic to avoid evapotranspiration from the soil surface. Water use and transpiration was measured by weighing the pots every two hours and using a LI-1600 Steady State Porometer. Then Net photosynthetic rate (A), instantaneous water-use efficiency (A/E), intrinsic water-use efficiency (A/g), and internal CO2 measured using a gas exchange system. Water potential was measured using a pressure chamber and the specific leaf area was found.

Results
It was found that a California native plant, that is known to thrive in dry conditions, has lower water-use efficiency than an invasive plant. Therefore, the reason for invasive plants to drive out the native plant is because of the wise use of water. Even though the native plant has a greater rate of assimilation and transpiration, they grow faster and they show late senescence. Their higher water potential also indicates that that they have more water available in their leaves.

Conclusions/Discussion
Water-use efficiency in invasive plants may be identified as an important factor contributing to the success of the invasive species. Furthermore, Invasive plants tend save water and use water more wisely than native plant which can be a reason for invasive plants to drive out native plants. When invasive plants and native plants live side by side each other, water would not be a limiting factor for the invasive species. In conclusion, Invasive species can possibly decrease our need for water because they do not take up as much water as a native plant, but the risks beyond keeping an exotic plant may be far too great.

Summary Statement
My project is about the water-use efficiency of an invasive and native plant during drought conditions.

Help Received
Used lab equipment at University of California, Los Angeles under the supervision of Dr. Rasoul Sharifi.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Daniel D. Wright

Project Number

S2021

Project Title

Suppressing Harmful Algal Blooms through the Use of Calcium Chloride

Abstract

Objectives/Goals

My project investigates whether calcium chloride (CaCl(2)) works as an effective agent for suppressing harmful algal blooms (HABs).

Methods/Materials

In Phase I, I practiced growing Chlorella vulgaris in beakers and measuring chlorophyll concentration with a spectrophotometer. In Phase II, I added different amounts of fertilizer to the beakers to see if it promoted algal growth. In Phase III, I added different amounts of CaCl(2) to algae that had already bloomed with fertilizer to see if this addition suppressed algal growth. In all three phases I measured temperature, pH, phosphate concentration (when applicable), and chlorophyll concentration. I took daily digital photographs of the beakers to record the color and gross appearance of the algal suspensions.

Results

Phase I was a test phase conducted to refine my procedure. Phase II showed that fertilizer does increase algal growth. By the seventh day, the control beaker had not produced readable concentration data, but the beakers with added fertilizer had chlorophyll concentrations of 5.6 and 7.3 mg/L^-1. Phase III spectrophotometer readings seemed to indicate algal growth increased with the addition of CaCl(2). Four days after adding the treatment, the readings were 9.4 (control), 8 (fertilizer only), 6.5 (fertilizer + 0.5 g CaCl(2)), 19.0 (fertilizer + 1 g CaCl(2)), 28.1 (fertilizer + 2 g CaCl(2)), and 39.7 (fertilizer + 3 g CaCl(2)) mg/L^-1. Digital photographs, however, show that there was actually less algal growth in the treated beakers than in the control.

Conclusions/Discussion

Fertilizer can be to blame for provoking HABs: the addition of fertilizer to the algal batches significantly increased algal growth versus the controls (Phases II and III). However, data from the algal suppression phase (Phase III) were problematic. Precipitate, clearly visible in both the beakers and centrifuged samples, interfered with the chlorophyll measuring process. The spectrophotometer could not distinguish concentration of algae from concentration of precipitate, resulting in high absorbance readings that seemed to indicate significant algal growth. This contradicted the evidence of the digital photographs. Measuring algal growth with a coulter counter or a hemocytometer might have avoided the precipitate problem.

Summary Statement

I investigated whether calcium chloride works as an effective means of suppressing harmful algal blooms.

Help Received

Dr. Thomas Schuerlein consulted on chemistry of CaCl(2); Dr. Douglas Wright consulted on procedure. Mr. Jim Olwell helped run chi square on data; Dr. Julianne Wright proofread paper.