CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Ashley M. Bianco

Project Number
S1901

Project Title
Screening for Genes Involved in Floral Determinacy

Abstract

Objectives/Goals
Angiosperms have obtained tightly regulated floral determinacy to ensure proper floral organ development. Within the floral meristem of Arabidopsis thaliana, two genes, AGAMOUS (AG) and WUSCHEL (WUS), have been shown to play a pivotal role in the determination of stem cells after the correct number of floral organs is produced . Additional unidentified genes are likely involved due to the complexity of floral determination. A weak allele of AG was used to screen for mutants that enhance the floral indeterminacy phenotype; two putative mutants were identified, R151 and R24. A genetic analysis of the phenotypes R151 and R24, characterizing their roles in floral determinacy. Both phenotypes exhibit an enhanced indeterminacy phenotype that is indicative of a mis-regulation of meristematic stem cells. Rough mapping and fine genetic mapping was completed and R151 was inconclusive due to phenotypic properties, and R24 encodes a MADS-domain containing protein known as SEPALLATA3 (SEP3).

Methods/Materials
DNA extraction, EMS Mutagenesis, PCR, Gel Electrophoresis, Gel Purification, 4Peaks and Arabidopsis.org. Overall materials used were test tubes, gloves, flats of soil, microwave, centrifuge, pipettes, and a PCR machine.

Results
R151 produced inconclusive results; R24 produced linkage to chromosome one and linked to SEP3. SEP3 is characterized in floral determinacy as it produces heterotetramic complexes with MADS-box genes (such as Agamous) and binds to CArG boxes.

Conclusions/Discussion
Plant screening and segregation analysis was obtained; however, when rough mapping began, R151 produced inconclusive results because it is a weak phenotype and could be background phenotype or mutation; due to variability when selecting the plants, an exact locus position could not be found.Rough mapping on R24 found that it was linked to chromosome one; Testing to the left and right of this primer was done. SEP3 was hypothesized to be the gene due to recombination frequency and genes in between primers 1-450 and 1-461. After complementation testing, SEP3 was proven to be the gene with R24. SEPALLATA (SEP) genes are fundamental factors in the ABCE gene model as they help with developmental processes of floral whorls; these genes are also a part of the MADS-box of floral homeotic genes

Summary Statement
In this project, I will study the relationship between R151/R24 and known genes involved in floral determinacy.

Help Received
Used lab equipment at University of California Riverside under the supervision of Theresa Dinh

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Amanda B. Cole

Project Number
S1902

Project Title
A Study of Growth Ring Size of Coastal Redwood Trees Compared to Their Height and Girth

Abstract

Objectives/Goals
The objective was to see if the height and girth of a coastal redwood tree would make a difference in its growth ring size.

Methods/Materials
Each core sample was taken, using an increment borer, 1.5m from the base of the tree and from the south side of nine different coastal redwood trees. The height and girth of each tree was also measured. The size of each tree ring for each core sample was measured to the nearest one-hundredth of a millimeter. The height and girth of each redwood tree was compared to the average ring size for that tree.

Results
The average size of the growth rings was larger in the bigger redwood trees. The relationship between the ring size and the tree girth was liner, while the relationship between the tree height and ring size was exponential. The largest tree did not fit the pattern. Its rings were smaller than expected.

Conclusions/Discussion
My experiment supported my hypothesis. After finishing this experiment I now know more about how tree rings are formed. I also learned how tree ring size is related to the tree's height and girth. I would like to continue these measurements with larger redwood trees to see if the large tree that did not fit expectations is normal.

Summary Statement
This experiment looked at the growth ring size of coastal redwood trees in comparison to the tree's height and girth, and a relationship was found between these factors.

Help Received
Mother helped in typing the report. Father helped in making the measurements and creating the graphs.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Nicole Foy; Mary Woodall

Project Number

S1903

Project Title

pHocus on the Basics

Abstract

Objectives/Goals

For our experiment, we tested the effects of pH on the growth of radishes. We wanted to know how the pH of the soil (acidic or basic) would affect the growth in height above ground of radishes, when using the 4 types of Sparkler, Cherry Belle, Champion, and Icicle Short Top. We hypothesized that the acidic (pH 6.0) soil would cause the radishes to sprout the quickest and grow the tallest, rather than the neutral (pH 7.0) soil and basic (8.0 soil). We hypothesized this because our research indicated that not only do radishes grow well at the pH range of 6.0 to 7.0, but that the soil of this pH has more readily available nutrients and bacteria that break down organic matter into food for the plants.

Methods/Materials

To test this hypothesis, we divided the soil into three groups and changed the pH, using sodium hydroxide and hydrochloric acid, to soil pHs of 6.0, 7.0, and 8.0. Once the pH of the soils were set, we planted the 4 different radishes in each soil: 4 plots for each type divided into acidic, neutral, and basic. This added up to a total of 16 plots (32 seeds) for each pH group. We watered the plants every other 24 hours and recorded the heights every 24 hours, once they sprouted.

Results

After the plants had grown for 19 days, we recorded final measurements. The average height of the basic soil was 69mm, the average height of the neutral soil was 68mm, and the average height of the acidic soil was 64mm. Of the 32 seeds planted in each pH, 96.88% of neutral sprouted, 93.75% of basic sprouted, 87.50% of acidic sprouted. Neutral and acidic soil radishes sprouted the fastest (Day 7 of the experiment), while the basic soil radishes all sprouted by day 9. The tallest plant (106mm) was produced by the basic soil, while the shortest plant (35mm) was produced by the acidic soil.

Conclusions/Discussion

We concluded that our hypothesis was mostly incorrect. Basic, not acidic, grew the radish sprouts the tallest, while the neutral soil sprouted the highest percentage of seeds planted, followed by basic soil and then acidic soil. We also concluded that although our data pointed toward basic soil growing the radish sprouts the best, errors could have entered the experiment due to the pH of the water added to the soil as well as inaccurate readings of the soil pHs. However, if these errors do not adversely affect the experiment, then our experiment concludes that the basic soil is the best for growing radishes.

Summary Statement

Which type of soil - acidic (pH 6.0) soil, basic (pH 8.0) soil, or neutral (pH 7.0) soil - causes radishes to sprout quicker and grow fastest (when measuring height above ground)?

Help Received

Teacher provided hydrochloric acid and sodium chloride to change pH, Parents helped obtain materials

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Caroline A. Frost

Project Number
S1904

Project Title
Scrubbing the Air: Reducing CO(2) Levels with Fragaria, Galvezia, Heteromeles, and Salvia

Abstract

Objectives/Goals
The objective is to test how the photosynthetic rate of four plants, fragaria, galvezia, heteromeles and salvia respond to increases in atmospheric CO2 levels. My hypothesis is that there will be an initial increase in photosynthetic rate, but that the rate will then decrease due to the influence of CO2 on the stomata.

Methods/Materials
To test my hypothesis I used the LI-COR 6400XT generously donated by Dr. Drennan in her biology lab at LMU. The LI-COR uses gas exchange principles to measure photosynthetic and transpiration rate and reports other statistics like the indicator as to how the biochemical process in the leaf is utilizing the available CO2. Before each test, I calibrated the machine to eliminate the influence of atmospheric pressure from test to test. Before each reading, I waited for a steady state to be achieved in the leaf chamber. I conducted many tests at the CO2 concentrations 250, 400, 550, and 700ppm, and averaged the results.

Results
Salvia's photosynthetic rate increased over the tested concentration interval. The biochemical indicator showed that the leaf was using the available CO2 and conductance indicated that stomata remained open.
Galvezia and Fragaria's photosynthetic rate decreased and the indiction was that the biochemical machinery could not use the available CO2.
Heteromeles showed results that were anomalous, indicating that it could have been in a semi-dormant state at the time.

Conclusions/Discussion
Salvia results indicated that CO2 was the limiting factor in the photosynthetic rate (not rubisco or the diffusion of the CO2 in the leaf structures)
Galvezia and Fragaria results indicated that the stomata were acting as a regulator and closing since the leaf could not utilize the available CO2. The results also showed that these two plants biochemical machinery could not utilize the available CO2 and this condition worsened as the atmospheric CO2 increased.

Summary Statement
Reducing Atmospheric CO2 levels through increases in the photosynthetic rate of four native S. California plants

Help Received
Dr. P. Drennan of LMU graciously allowed me to use the LI-COR machine in her lab.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Dinara Gabdrakhmanova; Celine Qussiny

Project Number

S1905

Project Title

Plantricity: The Effect of a Direct Electric Current on the Germination of Seeds and Growth of Seedlings

Abstract

Objectives/Goals

The purpose was to determine how treatment of seeds in water with direct electric current (DC) before planting and duration of treatment would affect their germination rate and growth of seedlings (Part A), and how application of low values of DC to stems and roots of seedlings as well as placement and polarity of electrodes would affect their development (Part B).

Methods/Materials

In part A, seeds of radish, beans and cucumber were treated in water with 20mA DC at 0, 0.1, 1, 10, 100 min and planted into a soil mixture for 5-9 days before measuring. An additional experiment for larger groups of cucumber seeds for 1min treatment was done to calculate the germination rate. In part B, seedlings of sweet pepper were treated for 40 days with DC by applying 1.5V with the cathode or the anode attached to the apical part and the reference electrode to the soil, and with both electrodes applied to the soil. A relative increase in length of stems and number of leaves and buds was measured and calculated.

Results

In part A, 1 min treatment of cucumber seeds demonstrated a strong increase in the germination rate of treated seeds (99.2±1.3%) compared with the non-treated ones (90.4±4.5%) and the increase of root/shoot lengths of seedlings. A positive effect of DC on germination viability of beans in unfavorable conditions was observed. In part B, plants with electrodes applied to the roots/soil demonstrated a significant increase in stem lengths measured in % to original (35.4±1.8%). The insertion of anodes to the stems also showed an increase (26.3±1.0%), while no effect was observed for insertion of cathodes to the stems. The significant increase of the number of leaves and buds was noticed in the same two groups.

Conclusions/Discussion

The results indicate: 1) DC treatment of cucumber seeds increases their germination rate and induces growth of seedlings; 2) DC treatment can increase germination viability of beans; 3) the sweet pepper seedlings develop faster under exposure to DC with negative electrodes connected to the stems and with both electrodes applied to the roots. These results can be explained by the activating effect of DC on plant hormones that stimulate a metabolism of seedlings and by the intensified nutritional cations uptake while roots of plants are exposed to DC or negative electrodes are applied to stems. The found results can be used in agriculture.

Summary Statement

We researched the stimulating effect of direct electric current on the germination of seeds and growth of seedlings.

Help Received

Father helped with experimental design setup, mother assisted with drawings. Science teacher, Mr. Tim Smay, corrected our project paper.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Christina Kong; Priyanka Mehta; Nicole Midani

Project Number

S1906

Project Title

Year 3: An Analysis of 6 Plant Species through Theoretical Capacities for Oxygen Production and Ability to Block Out UV

Abstract

Objectives/Goals

The purpose of this investigation was to analyze the leaves of six distinct species of plant, Plumeria, Jasminum, Hibiscus, S. romanzoffiana, C. limon, and, S. oleracea, through their differing theoretical capacities for oxygen production and compare it to the species ability to effectively block ultraviolet (UV) radiation, further comparing those results to time exposure analyses of day length from year 1700B.C.E. -2100 B.C.E. In this way, information was gathered to analyze the capabilities of these plants through changing environmental conditions. This was then used to provide evidence towards the strength, efficiency and reliability of the species in order to determine the most efficient specimen(s) in oxygenating the atmosphere, blocking out harmful UV radiation from the sun, and having strength to do so through the variable circumstances of the passage of time.

Methods/Materials

The method of a three year analysis is too long to be placed here.
Please refer to the project notebook. Thank you.

Results

By cellular sampling,unit area sampling, and distinct cell sampling, it was determined that S. oleracea, had the most chloroplasts. When counted for the number of chloroplasts, per distinct cell, S. oleracea had an average of 17.2 chloroplasts per cell. When tested, for their ability to block out UV radiation in 2008, all of the specimens, Plumeria, Jasminum, Hibiscus, S. romanzoffiana, and C. limon, blocked 100% of the UV radiation they encountered in the test area. Every specimen tested was equally effective in blocking out UV radiation. The percent deviation of UV strength in mW/m^2 under the leaves for all six species was 000%. The tests in 2010 however gave contradictory results. Though tested at different times over a period of two days, there was a distinct pattern in that live leaves blocked out more UV radiation than dead leaves and that C. limon blocked out the most UV radiation, live or dead, yielding only a 5% penetration rate either way.

Conclusions/Discussion

A genetically enginered combination of characteristics of plants would have the optimal strength, efficiency and reliability of the species and have the efficiency in oxygenating the atmosphere, blocking out harmful UV radiation from the sun, and having strength to do so through the variable circumstances of the passage of time.

Summary Statement

Exploring usefull characteristics of various plant species, through their ability to block out UV radiation, and through their theoretical capacities for oxygen production.

Help Received

This investigation would like to thank Aileen Anderson, Ph.D. and Brian Cummings, Ph.D. for their generous time and effort, in providing a lab environment necessary for the accuracy of this experiment. Their generous giving of time, energy, supplies, and stereoscope, is greatly appreciated.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Marc J. Matossian

Project Number
S1907

Project Title
The Effects of Plasma Treatment on the Growth Behavior of Plant Seeds

Abstract

Objectives/Goals
The objective of my science project was to compare the growth characteristics of plasma-treated plant seeds. A plasma is an ionized gas that consists of ions (positive or negative), radicals (excited neutral species), electrons, and radiation (UV/VIS/IR). My hypothesis was that the reactive ion and atom species of a plasma could affect the outer shell of plant seeds, causing enhanced plant-growth characteristics, but this effect would probably depend on seed type and plasma type.

Methods/Materials
Two types of plant seeds (Bush Bean seeds and Soy Bean seeds) were exposed to three types of atmospheric-pressure plasmas (air, nitrogen/N2, and carbon dioxide/CO2). Each atmospheric-pressure plasma was created by filling a glass-TEE with gas and a high voltage was applied across two sharp metal electrodes to ionize the gas and create an arc discharge. Three plasma exposure times were studied; (1 minute, 5 minutes, and 50 minutes), and seed temperature was kept below 60 C to prevent seed deterioration. Plant height was used to compare growth characteristics of plasma-treated seeds and un-exposed control seeds.

Results
1. Bush Bean seeds showed increased growth for all plasma treatments
a. 1 minute Air plasma treatment: 90% increased plant height
b. 5 minute N2 plasma treatment: 80% increased plant height
c. 5 minute CO2 plasma treatment: 40% increased plant height

2. Soy Bean seeds showed reduced growth for all plasma treatments
a. 50 minute Air plasma treatment: 35% reduced plant height
b. 50 minute N2 plasma treatment: 65% reduced plant height
c. 50 minute CO2 plasma treatment: 50% reduced plant height

Conclusions/Discussion
Plasma treated plant seeds can have increased plant growth vs. un-treated control seeds, but the results depend on seed type, plasma type, and treatment time. The results could have important implications to improve plant growth for farmers.

Summary Statement
Plant seeds exposed to an atmospheric-pressure plasma can result in enhanced growth behavior

Help Received
Mr. Alan Kramme, VP of Products at Ace Glass Inc. (NJ) for donating the glass Tee, Teflon plugs, and Teflon insulating support rod. Mr. Andrew Del Gatto, owner of DELGA PROTOTYPE, Engineering and Precision Machining for drilling holes in the Teflon plugs for the gas inlet and outlet lines. Father helped

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Merna H. Mikhail

Project Number
S1908

Project Title
The Effect of Different UV Light Machines on Radish Seed Germination

Abstract

Objectives/Goals
Objectives:This experiment investigates the effect of different UV light machines on radish seed germination.
Hypothesis:#If we expose radish seeds to the three UV light machines, less germination may happen in the powerful group, but the low and medium groups are not going to get affected as much.#

Methods/Materials
Materials:
#Divide the seeds into four groups of equal number so as to make one control group and three experimental groups.
#Expose each group of the radish seeds in the experimental groups to varying strengths of UV light over a period of one hour.
#Germinate the seeds of the four groups, the control and the experimental, in zip-lock baggies.
#Compare and contrast the observations collected from both the control group and the three experimental groups.
Materials:
Three UV machines, Paper towels, Marker, Radish Seeds, Zip-lock baggies.

Results
The powerful UV machine decreases the germination rate for a while but does not stop it. On the other hand, the medium machine fastens the rate of germination. The low group does not get affected as much because it shows very close results to the control group.

Conclusions/Discussion
-The hypothesis is proved to be incorrect. The medium UV light machine has the strongest effect on the seeds' germination. Although the medium and the powerful machines make the seeds germinate faster with longer sprouts, the sprouts grow crooked and unhealthy. This shows the dangerous effects of radiation on the germination of seeds and, accordingly, the development of plants. This may foresee the hazards of the ongoing exposure of plants to radiation which, eventually, may affect our own lives.
-For further investigations and scientific experiments, radish seed germination is also being tested after exposing it to three different lasers. This will expand our knowledge of the effect of radiations on the germination of radish seeds.

Summary Statement
This experiment investigates the effect of different UV light machines on radish seed germination.

Help Received
My classmate, Paula, provided me with one of the UV machines. The other materials were provided by the school.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jessica M. Ramos

Project Number
S1909

Project Title
Do Plants Have a Sweet Tooth?

Abstract

Objectives/Goals
The purpose of my science fair experiment is to conduct an experiment that will determine whether or not sugar helps plants stay fresh for a longer period of time. An answer will be found at the end of the procedure. Though it is unsure as of right now to know if sugar is in fact a preservative, the end of the procedure will dictate one way or the other. Also, by the end of my project, I expect to garner the answers and explanations as to why I got the results. If sugar is proved to be a preservative, I hope to figure out the exact reasons for this, the ingredients or the chemistry behind this scientific happening.

Methods/Materials
3 plants
2-3 quarts of distilled water
1 pound of sugar
Measuring cup
Spoon
Digital Camera

Results
DAY 1 DAY 3 DAY 6 DAY 9
NO Change Obvious change.
Plant #2 is somewhat wilted
Plant #3 is brown.
Changes on Day 3 are continuous.
Plant #1 looks healthy. Pant #1 still looks healthy.
Plant #2 is still alive but in grave condition.
Plant #3 has dead flowers and is dried a little.

Conclusions/Discussion
By the third day of conducting my experiment, I was able to determine whether or not my hypothesis was proving to be true. The results were surprising. As stated in my hypothesis, I was expecting the plants with the sugar water solution to grow faster and stay fresh longer. However, on the third day I noticed that the plants that I had put sugar in the water were beginning to wilt and die. In other words, Plants #2 and #3 were looking worse than Plant #1 that I had watered with normal tap water. Another observation I made was that the leaves on Plant #3 were sticky while the others were not. Though these observations did not prove my hypothesis completely right, it does not prove it totally wrong either. Plant #2 showed

Summary Statement
Sugar can have either a positive or negative effect on a plant's growth depending on the amounts given.

Help Received
None

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Xiang (Bobby) Ren

Project Number
S1910

Project Title
The Use of Different Soil

Abstract

Objectives/Goals
My projec is about useing different soil to plant the flower.I have 12 plant, they are in 3 groups: normal soil, baked soil, and half half. They are in 4 different envierment: without anything, with 20 earthworm, fertilizer, and both 20 earthworm and fertilizer.

Methods/Materials
Moutain soil
oven
12 Chinese rose
water
Fertilizer
earthworm

Results
The group of baked soil have the most flower.
The plant #12 grows the best.

Conclusions/Discussion
The results are a little different with my hypothesis. My hypothesis was the half half will be the best group, but the results is the baked group is the best.

Summary Statement
Test different form of soil.

Help Received
Mother helped me buy, and dad helps me water them after the project.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Hayley S. Schlobohm

Project Number
S1911

Project Title
Grow!

Abstract

Objectives/Goals
The goal of my project was to determine weather or not plants grew better in a loud environment, a semi-loud environment, or a quite environment.

Methods/Materials
The materials I used for my project were three poinsetta plants, a ruler, water, and my working journal. I placed the three plants in a silent room for two weeks and watered them with equal amounts of water on the same day. After the two weeks was up I measured them with the ruler and kept the results in my journal.I did this again in a semi-loud environment, and a loud environment.

Results
The results of my project were that the plants grew in the semi-loud room. They did not grow at all in any other environmentoud.

Conclusions/Discussion
The conclusion of my project is that plants grow the best in a semi-loud room. The research that I had done before my experiment had shown that plants would grow more in a louder environment because there are more energy waves being "thrown" at them. This made me wonder why the plants didn't grow more in the loudest environment. This project has helped me to better understand the anatomy of plants and I am glad i did this experiment.

Summary Statement
My project was to determine if plants grew better in a quite, semi-loud, or loud environment.

Help Received
Parents bought plants

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Aradhana Sinha

Project Number
S1912

Project Title
Triforine Sensitivity in Lettuce

Abstract

Objectives/Goals
The objective of this experiment is to determine if the mutation controlling triforine sensitivity in primitive romaine lettuce (PI491224) is in the same or similar location as the mutation that causes triforine sensitivity in modern romaine lettuce (cv. Valmaine).

Methods/Materials
In the first phase of the experiment I determined sensitivity to triforine in the inbred F4 filial that originated from a cross between insensitive cv. Iceberg and sensitive lettuce PI491224. I tested this by spraying the two-week-old plants with a diluted triforine solution, which killed the sensitive plants. In the second phase of the experiment I wanted to locate the gene for triforine sensitivity. I accomplished this by checking the parent plants (cv. Iceberg and PI491224) of tested population for polymorphism in four molecular markers located next to the triforine sensitivity gene previously mapped in cv. Valmaine. Using the markers that show polymorphism between cv. Iceberg and PI491224, I tested their offspring (population from phase 1) to see if these alleles are linked to triforine sensitivity. In Phase 3, sequencing was done on DNA amplified with Marker 4.

Results
Phase 1: 104 plants died, and 80 remained alive. According to the Chi test, P= .9407
Phase 2: I was unable to differentiate alleles using gel electrophoresis, as all amplified lengths were the same size. The LightScanner showed two parent plants displayed polymorphism for Primers 4 (BAIS) and 6 (BOLP). All 8 plants showed that the BAIS (Primer 4) gene was linked to the Triforine sensitivity gene.
Phase 3: There are Single Nucleotide Variations at bp38 and bp76, and anInsertion/Deletion (InDel) from bp121 to bp150.

Conclusions/Discussion
In Phase 1 of the experiment, I found that the F4 filial matched the phenotypes predicted by Mendelian distribution. In phase 2, I determined that the Triforine sensitivity gene was located in a similar location in Valmaine and Romaine. In the future, I can differentiate alleles using Gel Electrophoresis with a smaller Primer that brackets the InDel.

Summary Statement
I will determine if the mutations that caused triforine (a fungicide) sensitivity in primitive romaine lettuce (PI491224) is at the same or similar location as the mutation that causes sensitivity in modern romaine lettuce (cv. Valmaine).

Help Received
My mom drove me to and from the USDA. Dr. Ivan Simko, Ms. Amy Folck, and Ms. Amy Atallah at the USDA guided me through my project.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jacob M. Stelman

Project Number
S1913

Project Title
Controlling Flowering by Modifying Light Exposure and Root Proximity

Abstract

Objectives/Goals
The objective of my project was to determine if it is possible to flower a single branch of a plant, while leaving the rest of the plant in a vegetative (non-flowering) state. My hypothesis is if different parts of the plant are exposed to different hours of light, and different proximity to roots and the hormones they create, one branch will flower and another will not.

Methods/Materials
Two chambers were constructed one on top of the other in a cardboard box and thoroughly light proofed from each other. The lights in each chamber were controlled by timers. The top chamber received 12 hours of light a day (representing the flowering spring season) and the bottom chamber received 18 hours of light a day (representing the vegetative summer season.) Four tomato plants were used as test subjects. A control plant was placed in each chamber. Two study plants were placed so that their bottom branches were in the bottom chamber and their top branches were in the top chamber. One of the study plants grew through a second pot of soil placed around the stem as it entered the top chamber and formed a second root system.

Results
The control plant in the top chamber flowered completely, and the control plant in the bottom chamber did not flower at all. The study plant with a root system in each chamber flowered in the top chamber, but not in the bottom chamber. An interesting thing occurred in the study plant with only one root system in the bottom chamber. It flowered completely in the top chamber, but a branch on the bottom also had one small flower bud on it.

Conclusions/Discussion
My results confirmed my hypothesis. This is because leaves detect the season by the hours of light they receive and send a signal to the apical meristem (very top of the plant) to produce auxins (a type of flowering hormone.) Perhaps the auxins produced in the plant with only one root system descended into the lower part of the plant causing it to flower in both chambers. Perhaps this did not happen in the plant with two root systems because cytokinins (a hormone produced in roots of plants) in the second set of roots in the top chamber stopped the auxins from descending into the branches of the plant in the bottom chamber. Farmers using this method they might be able to harvest the flowering top of the plant each year and let the bottom survive in a vegetative state. This may save their annual plants from dying every year.

Summary Statement
I researched the ability to flower a single branch of a plant while leaving the rest of the plant in a non-flowering vegetative state.

Help Received
My father helped me wire the electricity to the light bulbs on the board in a safe manner.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Yurika K. Yoneda

Project Number

S1914

Project Title

Determining the Biomass of Eriogonum fasciculatum in a Coastal Sage Community

Abstract

Objectives/Goals

This project was designed to establish a correlation between the dry weight measurements and the canopy area and volume and develop an equation to formulate biomass estimates of Eriogonum fasciculatum in the coastal sage community.

Methods/Materials

Fifteen samples of Eriogonum fasciculatum shrubs in various sizes and aspects were collected from Forrestal Palos Verdes Land Conservancy. Canopy height, diameter, and circumference in meters were recorded to calculate the area and the volume. These samples were then separated into branches, leaves, and flowers and were placed into the air-forced drying oven for 48 hours at 75 degrees Celsius to measure the dry weight mass in grams. The samples were analyzed for the biomass-size relationships of coastal sage buckwheat using dimensional analysis to develop regression equations.

Results

The results showed that total biomass correlated with the canopy area and volume. The equations relating biomass to canopy area and volume for the fifteen shrubs can be represented with the linear regression best fit equation y=170.08x+87.346 for the canopy area vs. biomass and y=102.953x+72.207 for the canopy volume vs. biomass. The r^2, or the coefficient value of the biomass vs. the canopy area is .9737, which is very high and therefore is a very accurate data. The r^2 coefficient value of the biomass vs. canopy volume is .9492 which is strong and therefore is a very accurate data to predict the relationship between the volume and the dry weight mass.

Conclusions/Discussion

In this study, there appeared to be a surprisingly strong positive correlation between the biomass and the size of Eriogonum fasciculatum. All graphs were positive indicating the canopy area and volume increases when there is a proportionally increase in biomass. This equation could now be used to predict the biomass measurements for other scientists# use and applicability. It would be interesting to repeat this experiment in a different community and compare the results while determining the carbon intake of these plants. This is an initial step in determining if this could be applied to other plants as well.

Summary Statement

This project is a biomass analysis of Eriogonum fasciculatum in a coastal sage community, developing an equation to formulate biomass estimates of the California buckwheat.

Help Received

Mother helped me drive to the field, Forrestal PV Land Conservancy; Mr. Starodub let me use his drying oven; Mrs. Dalkey from the PV Land Conservancy and Dr.Sharifi helped answer questions about the native plants.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Christina E. Gerges

Project Number
S1999

Project Title
A Comparative Study of Nuclear Differences Between Similar Brodiaeas

Abstract

Objectives/Goals
My interest is to determine the paternity of the Brodiaea santarosae in comparison to other related species. In analyzing already published chloroplast sequences I saw that they are very similar. Based off of this information, I deduced that there is not enough knowledge to determine the procession of paternity between the questioned species. In order to attain more knowledge, I decided to take an alternate route in sequencing. I am interested in amplifying a nuclear gene segment, cloning it, sequencing this fragment and comparing the sequences of the other Brodiaea species in order to come to a conclusion concerning the paternity of said species.

Methods/Materials
-Extraction of DNA for the collected plant specimen using a Qiagen kit.
-Setting up PCR using the taq polymerase enzyme from TAKARA as a test to see if extracted DNA will amplify a product from B. filifolia.
-Gel Electrophoresis (ran after every PCR)
-Test PCRs using the TAKARA enzyme on Brodiaea and Citrus Samples. Test for the appropriate annealing temperature required for the amplification of products of the expected size.
-Run final PCR
-Cloning of PCR amplified products in E. coli cells
-Plasmid Miniprep using a Qiagen kit
-Sequencing and Analysis

Results
The results returned were close to what was anticipated but there were a few discontinuities with what was expected. It was predicted that the returned nuclear sequence would be of MDH, but it clearly was not, so further testing will be required to properly identify the type of nuclear gene that was sequenced. The results returned from B. filofolia diverged from the other tested species considerably, so it was eliminated from the sequencing chart and chromatograph in order to try to view the results without such a protruding outlier. While excluding B. filofolia it is apparent based off of the chromatograph that the specimen are a part of a closely related family.

Conclusions/Discussion
The chromatograph shows specific peaks nearly every time, but the broadness off the rest of the data is shown in the additional noise which show a discontinuity with the sequences. While this was expected, the returned results were not sufficient to form a cluster that would adequately and conclusively inform of

Summary Statement
The purpose of this project is to inform of the paternity of the Brodiaea santarosae in comparison to other similar Brodiaea species in order to determine santarosae's ability to evade extinction.

Help Received
Used lab equipment at the USDA center at UCR under the supervision of Dr. Ramadugu and Dr. Keramane