CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Katie L. Bakken

Project Number
J1601

Project Title
What Julian Apple Produces the Most Apple Cider?

Abstract

Objectives/Goals
Coming from a small town in the mountains of San Diego, I wanted to see what locally grown apple from Julian would produce the most juice for apple cider. In the fall our little town sells alot of cider, and apple pies from the local orchards who grow the fruit.

Methods/Materials
Apple press, clock, newspapers, pots and pans, clear measuring cup with mL markings, scale that measures in pounds, knife, and paper and pen to record your data.

Results
When I did my apple pressing for my testing,it came out to be that the most apple cider to the least apple cider. Since I did my experiment three times the conclusion was that the Red Delicious with 560.3mL produced the most juice for cider. The results for the other varieties are as listed. Wine Sap with 501.67mL, Granny Smith with 486mL, Jona Gold with 471mL, and Golden Delicious with 447.1mL.

Conclusions/Discussion
In my conclusion it came to see that the Red Delicious prodoce the most apple cider. So my hypothesis of the Granny Smith was wrong and came in 3rd place. But even though the Red Delicious won, it does not mean it is the best tasting apple alone to make the best apple cider. To have the best tasting cider you have to mix varities together.

Summary Statement
What apple from locally grown orchards in Julian produces the most juice for apple cider.

Help Received
My neighbor allowed me to use their apple press machine for pressing apples, with guidence from my sister Kristin.. My mom and dad provided me with the camara, an helping me get my pictures developed. My parents also gave me dirction in how to lay my backboard.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Ravi K. Bhatia

Project Number
J1602

Project Title
How Does the Germination Rate of a Plant Affect Its Ability to Outcompete Another Plant Species for Growing Space?

Abstract

Objectives/Goals
I asked how plant germination rates affect their ability to outcompete other plants for space. I hypothesized that faster germinating plants would outcompete slower germinating plants.

Methods/Materials
Tomato and broccoli were fast germinators, and garlic chive and creeping thyme were slow. I created an area for the pots, then transplanted seeds into pots. One pot carried tomato and garlic chive (A), and another carried broccoli and creeping thyme (B). The control pots carried each individual plant (C,D,E, and F). I watered and measured the plants for six weeks, doing five trials.

Results
By itself, the average tomato plant was 11.26 cm, and was 5.76 cm with the garlic chive. The garlic chive was 9.4 cm with the tomato, and 3.92 without. The thyme was .26 cm with broccoli, and .78 without. The broccoli was 9.98 cm with chives, and 11.96 without.

Conclusions/Discussion
These results proved my hypothesis false, proving that germination rates do not affect plant competition.

Summary Statement
My project asks if the germination rate of a plant affects its ability to outcompte another plant species for growing space.

Help Received
Mother helped glue everything onto the project display board

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

Korrin L. Bishop

Project Number

J1603

Project Title

Pitch Canker: Potential Infestations to Coastal Conifers in Humboldt County

Abstract

Objectives/Goals

The goal of my project is to investigate the pitch canker pathogen in California and its specific affects, if any, on Humboldt County conifers. When directly inoculated with the pitch canker pathogen, will selected coastal conifer (redwood, cedar, Douglas fir and Monterey pine) seedlings become infected with pitch canker? My objective is also to learn more about the geographic range in Humboldt County, the dynamics of the disease, the pitch canker lifecycle and any recommendations that would prevent the spread of pitch canker and from the damaging it could produce on the diversity of our redwood forest and its coastal conifer species.

Methods/Materials

I researched and learned about the pitch canker fungus from a variety of sources and enlisted the assistance of specialists in the field of pitch canker study. I obtained state permit applications, coastal seedlings and materials for planting and inoculating 55 seedlings. Basic materials used for this project were: coastal seedlings (total of 55 used and put in 3 groups, each with a control seedling), 48, 6 inch pots, "backyard" soil, tools for planting seedlings, State/Federal permit for the handling of the pitch canker pathogen, autoclave, beakers, pipetor tips, hemocytometer, pipetor, deionized water, 2 plates with grown spores, slides, ethanol.

Results

Results:
After being inoculated with the pitch canker pathogen within 15 days in Group I, II and III Monterey pines and Douglas fir seedlings showed severity of symptoms some seedlings died. While redwoods and cedars in Group I, II and III showed no symptoms. Seedlings were also crossed checked by its control seedling. Seedling data was determined by using a categorical system, categories were defined based on the severity of symptoms.

Conclusions/Discussion

If seedlings are directly inoculated with the pitch canker fungus they will succumb to the disease? My conclusion yielded some surprises. My hypothesis was 50 percent correct and 50 percent incorrect (see results above). I was most surprised at the results of the Douglas fir seedlings. Douglas fir is a major timber crop in Humboldt County. A pitch canker infestation would devastate the timber industry, the economy, and the beauty of our redwood forest, as well as inland forests areas.

Summary Statement

My project is about pitch canker and its potential infestations to coastal conifers in Humboldt County.

Help Received

Dr. Michael Camann, HSU, Dr. U Win, CSU, Monterey, Dr. David L. Wood, U.C. Berkeley, Dr. David Largent, HSU, Dr. Tom Gordon, U.C, Davis, Humboldt County Agriculture Dept., Simpson Timber, Sharon Kirkpatrick, U.C. Davis and my mother who proofread my project.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Nicole B. Chew

Project Number
J1604

Project Title
The Effect of Colored Light on Chlorophyll Production of Oxygen

Abstract

Objectives/Goals
The objective of my project was to discover which color wavelength of light: red, blue, green, yellow, or white, would best stimulate chlorophyll production of oxygen.

Methods/Materials
Five test tubes were prepared by wrapping each with an equal amount of color plastic wrap. Equal amounts of the aquatic plant elodea were placed in each test tube under water admitting no air. After exposing all tubes to equal amounts of lighting under the plant table for several days, the amount of oxygen produced by the elodea was extracted from the test tube. I used a syringe connected to a tube to precisely measure the amount of oxygen produced by each sprig of elodea in a different colored test tube.

Results
The elodea in the green test tube produced the most oxygen for most tests while the blue test tube consistently produced the least. Green produced a total of 6.09 milliliters of oxygen, red produced 3.96 milliliters of oxygen, yellow produced 2.89 milliliters of oxygen, clear produced 2.17 milliliters of oxygen, and lastly blue produced 1.71 milliliters of oxygen.

Conclusions/Discussion
I conclude that the blue light stimulates chlorophyll the best. I conclude this because the green plastic wrapped test tube containing elodea produced the most oxygen. The green plastic wrap reflected green wavelengths of light. However it allowed blue and red wavelengths to light to pass through the test tube. Since blue and red wavelengths of light stimulate chlorophyll the best, the green-wrapped test tube should have produced the most oxygen. The blue and red plastic wrap however, blocked blue and red wavelengths of light; therefore less oxygen was produced. The blue plastic wrap produced the least amount of oxygen, thus concluding that it probably stimulated chlorophyll the best.

Summary Statement
By measuring the production of oxygen from the aquatic plant elodea, I attempted to discover which color wavelength of light best stimulates chlorophyll.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Spencer D. Christensen

Project Number
J1605

Project Title
The Use of Phytoremediation to Lower Selenium Levels in Soil

Abstract

Objectives/Goals
My objective was to learn how much selenium was abstracted from the ground by different plants. Another objective was to see what efect the selenium had on the different plants, and if these plants would take up more selenium if they were planted in more.

Methods/Materials
First I tested how much selenium would saturate the entire one gallon pot full of soil. I then planted the seeds in stater pots and waited until they grew and transplanted them into the selenium contaminated soil. I took growth and water charts until they were ready to be tested. I cleaned the plants of with water and put them in a freezer room where later they were tested for selenium uptake.

Results
the results were canola took up more selenium than broccoli in all the reps. Also when the selenium amount increased so did the uptake by both plants, and the plants with more selenium were bigger.

Conclusions/Discussion
Over all most of my hypothese were correct. My first hypothesis was correct both plants took up selenium so was my second (Canola took up more selenium than broccoli),but my third was off. The more selenium contaminated in the soil did change the amount taken up by both plants.

Summary Statement
My project is about the use of phtoremedeation to clean soil.

Help Received
Dr. Banuelevs help type and test report, mother helped type.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Elizabeth L. Clendenen

Project Number
J1606

Project Title
Growing Up?

Abstract

Objectives/Goals
My hypothesis is if I grow plants at different angles, then they will grow toward their source of energy (most often sunlight).

Methods/Materials
For my experiment, I grew nine Pothos sp. at three different angles. Every day for seven days, I measured three different ways with a centimeter ruler. I grew plants under a four-foot flourescent shop light with grow bulbs.

Results
I found that plants are not affected by gravity. Evidence that supports this is that none of the plants shrivled up or died, and that, when turned up in a regular position, plant groups B and C appeared to have grown sideways (to reach the light).

Conclusions/Discussion
My results supported my hypothesis. I learned that plants, like humans, grow up and are not affected by gravity.

Summary Statement
My project is about gravity and how it affects plant growth.

Help Received
Father helped type report and set up grow light, mother helped lay out backboard, and Mrs. Underwood, teacher, helped with writing, report, conclusion, etc.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Michelle A. Craig

Project Number
J1607

Project Title
Sow, How Fast Can You Grow? Seed Germination in Different Soils

Abstract

Objectives/Goals
My objecive is to find which soil will germinate corn and barley seeds the fastest: sand, native Kern County soil, clay, or potting soil. I believe that native Kern County soil will grow corn and barley seeds the fastest.

Methods/Materials
Four different soils: sand, native Kern County soil, clay, and potting soil, corn and barley seeds, one planter, and water. I planted each type of seed in the different soils, watered them daily, and measured how long it took for each seed to germinate.

Results
The sand took 197 average hours to germinate seeds, the native Kern County soil took 214.9 average hours to germinate seeds, clay took 213.5 average hours to germinate seeds, and potting soil took 210.7 average hours to germinate.

Conclusions/Discussion
My hypothesis was wrong, the native Kern County soil was the slowest soil in germinating seeds, sand was the fastest.

Summary Statement
My project is about how fast seeds can germinate in different soils.

Help Received
My parents helped me gather the supplies, my father showed me how to plant the seeds , and my father also showed me how to use the graphing program.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Constance Diaz; Kayla Kokkonen; Elin Kuzmack

Project Number
J1608

Project Title
They're Off to a Great Start!

Abstract

Objectives/Goals
We have a dry, wind, and cold climate that#s not very good for growing plants. The purpose of this experiment was to see how we could make the plants grow the best early in the season. There is a product called Wall-o-Waters that are available at garden shops. These products are known to help tomato plants early in the season, but they are very expensive. Our hypothesis was that plastic jugs filled with water and placed around the plants would work just as well as Wall-o-Waters in keeping the plants safe and warm.

Methods/Materials
We planted 12 tomato plants, and left four with no treatment as our controls. We put Wall-o-Waters around four, and put water filled plastic jugs around four. We measured the plants height and width, and made observations about their health and vigor, for the next five weeks.

Results
We found that the jugs worked much better than the Wall-o-Waters and the controls. The plants grown in the jugs were by far the largest and most vigourous of the treatments.

Conclusions/Discussion
We found that the jugs worked better than the Wall-o-Waters because the Wall-o-Waters completely sheltered the plants, so that no wind came through to help the plants become stronger. The jugs let some wind through so that the plants had some resistance once we removed the treatments. The Wallo-water plants were so thin that they fell over. We had to put wire cages around them. The control plants did okay but not nearly as well as the Wall-o-Waters and the jugs.

Summary Statement
This experiment tested whether plastic jugs filled with water and placed around tomato seedlings would protect them from the elements as well as the commercially available Wall-O-Water product.

Help Received
One of the fathers helped prepare the planting bed for the tomatoes. One of the mothers helped with the experiment design and advised us on the report. Another mother advised us on the display.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Julissa Florido

Project Number
J1609

Project Title
Does Leaf Senescence Affect the Absorbance Spectrum of the California Sycamore (Platanaceae racemosa)?

Abstract

Objectives/Goals
The objective is to see if leaf aging(senescence) will affect the absorbance of light.

Methods/Materials
Procedures: Gather all your materials. Mass a gram sample from a sycamore leaf and blend with 40mL of distilled water for fifteen seconds. Strain the solution to remove large particles and pour it into a cuvette(2/3 full). Repeat steps 2-3 for all of the leaves (senescing and healthy). Turn on the spectrophotometer and let it warm up for fifteen minutes. Using a cotton ball, clean the fingerprints off the cuvette that contains distilled water. Place it in the spectrophotometer and zero it. Replace the standard, distilled-water cuvette with the first sample solution. Record the absorbances from 400-800nm (in 20nm increments). Take out the cuvette and repeat the above procedure for each sample solution.

Materials: 5 senescing leaves; 5 mature, healthy leaves; Spectrophotometer; 11 cuvettes; Distilled water; Cotton balls; Mesh strainer; Blender.

Results
The results showed that mature, healthy leaves had peak absorbances at wavelengths of 680nm and 400nm. These numbers correlate closely with the wavelengths of light needed for the light and dark reactions of photosynthesis. What I also noticed was that there was a small decrease in absorbance at 540nm(which would explain the leaf's reflection of green light). On the contrary, the senescing leaves did not show a large increase or decrease in the range of 500-700nm, but it did show a small peak absorbance at 400nm.

Conclusions/Discussion
My data supported my hypothesis. Any possible experimental error would have resulted from the limitations of the spectrophotometer that was used. Although there was less fluctuation in the absorbance spectrum of senescing leaves, it was interesting to see that there was still a small peak absorbance at 400nm. This might indicate that there is a delayed termination for some photosynthetic activity. An idea for a future project would be to compare the absorbance spectra from different species of leaves and look for similar trends.

Summary Statement
This project analyzes how the absorbance spectrum is influenced by leaf senescence.

Help Received
Equipment for this project was supplied by Raymond A. Villa Fundamental Intermediate School. My teacher and the UCI mentors helped me practice for the interview and gave suggestions on how to improve my research paper.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Corin H. Hamilton

Project Number
J1610

Project Title
Dangerous Dirt: Alleopathy of Eucalyptus Trees on Grass Seedlings

Abstract

Objectives/Goals
To measure how alleopathy in a eucalyptus tree effects grass seeds.

Methods/Materials
I collected 5 soil samples from 1,2,3,4, and 5 feet away from a eucalyptus tree. I had my dad randomize the samples in 72 plastic pots so I was blinded. I used commercial potting soil as a control.

Results
Seeds planted in soil nearest the trunk did not grow as well.

Summary Statement
I measured alleopathy of eucalyptus trees on grass seeds.

Help Received
My dad did the blinding.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Jory M. Harris

Project Number
J1611

Project Title
Ants: Farmer's Friend or Foe?

Abstract

Objectives/Goals
The objective of this experiment is to determine the effects of the western harvester ant, aphaenogaster cockerelli, on nearby plant growth such as radishes, greenbeans, kohlrabi and squash. I believe that harvester ants will improve height, germination speed and germination rate of plants.

Methods/Materials
I planted two seed sets of 40 radishes, 10 green beans, 10 cucumbers, 40 kohlrabi and 10 squash in two identical plastic planters measuring 8" by 16". I placed thirty western harvester ants in one of the planters. The planters were placed side by side in the attic, under 2 120-watt grow lights. I watered the planters at 7:30 AM and 6:00 PM, and measured the plants at 6:00 PM each day for 28 days.

Results
The seeds planted in the planter infested with harvester ants had higher germination rates, germinated more quickly, and grew taller. The greatest improvements occured in radishes, green beans and kohlrabi, where germination speed and germination rate increased dramatically with the help of harvester ants. Kohlrabi and green beans also grew taller with ant influence. Harvester ants had the least impact on cucumbers and squash, where there was no difference in germination speed or germination rate. The cucumbers grew taller near harvester ants, but squash heights were not affected.

Conclusions/Discussion
From the data collected in this experiment, I can conclude that harvester ants improve plant growth, and could increase agricultural fertility. Further study, using a complete harvester ant colony with a laying queen and a full agricultural cycle in a larger growth area, might determine if this data holds commercial value.

Summary Statement
The purpose of this experiment is to determine the effect of harvester ants on plant growth.

Help Received
Mother drove me to buy the supplies and taught me how to best cut backings for the presentation board.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Justin G. Hill

Project Number
J1612

Project Title
Not on My Turf: A Study of Allelopathic Trees

Abstract

Objectives/Goals
The objective was to determine which trees in the neighborhood are allelopathic.

Methods/Materials
Picked 3 different kinds of trees, chose at least one or two with little undergrowth. Collected 3 or more leaves from each tree and then ground them in a mortar along with a small amount of water to make a liquid. Cut out 3 small circles of paper towels and placed them in a petri dish. Using a medicine dropper, saturated the petri dish paper towels with the leaf/water mixture. Placed cabbage seeds on the moist paper towels and put the covers on the petri dishes. Thoroughly washed the mortar and pestle and medicine dropper with water and repeated the procedure for the other trees and the control. Placed the petri dishes in a warm place with sunlight and examined them for seven days. Looked for signs of cabbage seed germination with the hand lens, and counted and recorded the total number of seeds germinated every day in each petri dish.

Results
The California Redwood had the least growth of the three trees and the control in all 3 experiments. The redwood needle/water solution clearly slowed or stopped the growing process. The needles from the Redwood must have released allelopathic chemicals into the water that was used to soak the paper towels. The Magnolia and Japanese Elm leaf/water solutions had little to no effect on the growing process. The control showed the most growth. The Japanese Elm, the Magnolia, and the control solution cabbage seeds would likely germinate into cabbage plants if they continued to grow. The seeds in the Magnolia solution in Test #1 did not germinate, therefore the data was left out of the calculation of the average. The most likely cause was that there wasn't enough of the solution on the paper towel (and so the seeds didn#t have enough water to germinate). Another possible cause might be that the eyedropper was not completely clean after using it for the California Redwood solution, and some of the allelopathic chemicals from the Redwood were mixed with the Magnolia solution used for the first Magnolia petri dish.

Conclusions/Discussion
The hypothesis was correct. The California Redwood solution caused little cabbage seed growth, while the solution from the other trees and control had little effect on cabbage seed growth. Therefore, the research shows that the California Redwood is allelopathic and the Magnolia and Japanese Elm are not.

Summary Statement
My project demonstrates how certain chemicals released by allelopathic trees inhibit the growth of other plants.

Help Received
Father helped type report.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Alex C. Hoover

Project Number
J1613

Project Title
Searching for Light

Abstract

Objectives/Goals
My objective was to study plant growth and determine if plant stems can move around obstacles toward a light source. My hypothesis was, " If plant stems can move toward a light source, then plant stems can move around obstacles that they may encounter."

Methods/Materials
I planted one lima bean seed in each of eighteen pots and waited for them to sprout. Once they sprouted, I moved six pots each into three boxes with holes cut in the top for a light source. One box had no dividers in it, one had two, and the last one had three. Then, I began taking daily pictures and records of the plants' growth.

Results
In Box 1 the plants grew straight up toward the hole in the top of the box. In Box 2 the plants grew up and around the one obstacle. The plants in Box 3 bent twice to curve around the two obstacles.

Conclusions/Discussion
My hypothesis is correct, "If plant stems move toward a light source, then plant stems can move around obstacles that they may encounter." The plants curved their way around the foam core shelves toward the light source at the top of the boxes.

Summary Statement
My project trys to find out if plants can grow around obstacles toward a light source

Help Received
Mom helped with some of the typing and board matting. Dad helped me set up one graph so I could do the rest of them.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Catherine E. Jedlicka

Project Number
J1614

Project Title
How Does the Amount of Plant Food Affect the Germination Rate of Black Turtle Beans?

Abstract

Objectives/Goals
The objective of my project was to find how the amount of plant food affects the root and stem germination rate of black turtle beans. I believed that the beans being watered by 1/2 teaspoon of plant food in 1 pint of water would have the fastes average root and stem germination rate.

Methods/Materials
I performed this project by running three trials for each variable level. The variable levels are as follows: 0 teaspoons of plant food, 1/8 teaspoon of plant food, 1/4 teaspoon of plant food, 1/2 teaspoon of plant food, and 1 teaspoon of plant food. each of these amounts of plant food were mixed with 1 pint of water. There were three cups per variable level and in each cup there were four beans. Every night at 6:00 p.m. I would measure the results of both the root and stem growth per bean and water the beans with two teaspoons of water from the corresonding cup. I performed this experiment for threes weeks or twenty-one days.

Results
Through this experiment, I found that the beans with one teaspoon of plant food had a total average root growth rate of 98.0 inches, and a total average stem growth rate of 24.4 inches, while the beans with zero teaspoon of plant food had a total average root growth rate of 22.4 inches and a total average stem growth rate of 5.1 inches. These results have refuted my hypothesis, but they pertain to my objective because they have answered the question that I have asked.

Conclusions/Discussion
My conclusion is that as the amount of plant food increased both the root and the stem growth rate increased. This information expands our knowledge of plant biology because it allows us to know that when plants gain more nutrients they will have a greater root and stem growth rate.

Summary Statement
My project tests how the amount of plant food affects the root and stem germination rate of black turtle beans.

Help Received
Teacher helped get books for project ideas and help purchase the color back board, Mother helped type results into the chart, Mother and Father helped purchase various materials.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Amanda C. Lane

Project Number
J1615

Project Title
The Effects of Transpiration on Transpiration

Abstract

Objectives/Goals
The goal of my project was to investigate how wind current affects transpiration in plants. I predicted that wind will increase transpiration in geranium and cactus plants, and that the rate of transpiration in geranium plants will be greater than cactus plants.

Methods/Materials
In this experiment, 20 plants were covered with plastic bags and twist ties to make sure the water in the soil didn't evaporate. Ten of the plants, 5 cacti and 5 geraniums, were exposed to wind the fist day, while the other plants, 5 cacti and 5 geraniums, had no wind. I weighed them every hour, for 7 hours, to measure how much water they would transpire. The next day I switched the plants so that the 10 with wind had no wind and the 10 without wind had wind. I recorded the results in my science log.

Results
I found that the mean decrease in mass for the geranium control group (X=2.33g, or 2.33 ml of water lost during transpiration) was significantly less than the geranium experimental (wind) group (X=3.84g). The mean decrease for the cactus experimental group (X=.49g) was significantly less than the cactus experimental group (X=2.10g). The transpiration rate was greater for the geranium control compared to the cactus control group, and greater for the geranium experimental compared to the cactus experimental group.

Conclusions/Discussion
Wind increased the transpiration rate in geranium and cactus plants. Knowing about transpiration is important because it could affect weather patterns on a larger scale and could impact the growth of other plants.

Summary Statement
My project shows the affects of wind on transpiration (the loss of water through the roots) in geranium an cactus plants.

Help Received
Mom and uncle helped with graphs and Father helped with statistic analysis and board design.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Audrey A. Lee

Project Number
J1616

Project Title
Effect of Light versus Gravity on Plant Growth

Abstract

Objectives/Goals
My objective was to determine if light was a stronger factor than gravity to plants in growing upright.

Methods/Materials
I planted 3 radish seeds in each of 8 bottles, 2 of which contained control plants cloaked in total darkness, mounted on a horizontally spinning bicycle wheel. Lights were placed 90 degrees from the direction of gravity. The seeds were allowed to germinate and grow until the stem was tall enough to measure the growth angle.

Results
I completed three tests. The average angle for the light exposed plants was 78.5 degrees. The average angle for the control plants was 72.5 degrees. My fourth test showed that the light exposed plant angle was 80 degrees and the average of the control plants was 58 degrees.

Conclusions/Discussion
I observed that many of the plants were growing at the inner edge of the bottles. That forced the plants to grow alongside the bottle. I discovered that I made a mathematical mistake in calculating the magnitude of gravity the plants received. This made the angle of gravity 6 degrees instead of 66 degrees that I thought it was. This explained why the plants were growing at the inner edge of the bottles. I redid my experiment to find a better answer to my question. This time the angle of gravity was 47 degrees. I placed lights at a right angle to gravity. Between these two experiments light was a stronger factor in the direction of plant growth.

Summary Statement
My project was to discover if phototropism was a stronger factor than geotropism to plants in growing upright by using directional lighting and centrifugal force from a horizontally spinning bicycle wheel.

Help Received
Dad helped construct the experimental apparatus, Mr. Merilatt gave me guidance

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Allison A. Lopez

Project Number
J1617

Project Title
The Effects of Colored Light on Plants

Abstract

Objectives/Goals
The objective of my project was to find out which color of light plants grow best in.

Methods/Materials
Seven pots with bean plants were grown with six cellophane structures to go over six of them. The seventh pot received natural light. I measured each plant in each pot about every other day. All the pots were put by the window and rotated everyday so they would get the same amount of light.

Results
The plants with yellow cellophane over them grew the best followed closely by the green cellophane-covered pot. The orange and blue cellophane-covered plants were also successful. The purple cellophane-covered plants grew well, but not as fast, as did the natural lighted plants. The plants with red cellophane covering them did not grow well, and at one point even shrank!

Conclusions/Discussion
These results happened as they did most likely because of the greenhouse effect. The cellophane structures trapped in heat and moisture, therefore allowing the plants that were covered by them to grow faster. The plants under the natural light did not have a cover over them. The red cellophane-covered plants grew as they did probably because of the color.

Summary Statement
My project is about how different colors of light affect plant growth and which color of light plants grow best in.

Help Received
Mother helped in making cellophane structures and Father helped by correcting graphs.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Andrew S. Luksik

Project Number
J1618

Project Title
Worms in Your Future?

Abstract

Objectives/Goals
I will see if vermicompost helps the growth of plants.

Methods/Materials
This project will look at different amounts of vermicompost in a poor soil mix (soil)to see what benefit, if any, vermicompost as a soil additive can be. I used sand as a base and then 10%, 25%, 50%, 75%, and 100% vermicompost. For plants , I chose to use radishes, beans, and primroses and I will follow their growth and make observations to see which combinations of vermicompost and sand are best.

Results
I found out that beans grew best in 100% vermicompost, radishes did best in 100% vermicompost, and primroses did best in 0% and 100% vermicompost.

Conclusions/Discussion
My hypothesis, plants will grow best in vermicompost, was proven to be correct. All the plants are doing well in 100% vermicompost.
Vermicompost contains nutrients which benefit plant growth. Therefore, the plants growing in the higher concentrations of vermicompost have more nutrients available for growth. This was evident in all the plants. In the future it would be interesting to perform this experiment with different kinds of plants and in different growing seasons.

Summary Statement
My project will test different ratios of vermicompost to discover what benefit vermicompost is to plant growth.

Help Received
I used a commercial greenhouse to grow my plants and protect them from freezing temperatures.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Anthony L. Merz

Project Number
J1619

Project Title
The Effects of CO(2) on Coleus Plant Growth

Abstract

Objectives/Goals
My project was to determine if Carbon dioxide affects the growth of Coleus plant growth.

Methods/Materials
Materials: 12 plant packs, 6 plants per pack, a total of 96 Coleus; Duct tape; Sealing Caulk; Caulk gun; 22 cups of water; 4 large, clear, plastic storage boxes; Dry ice; Three Pie Tin Pans; A pen; 1 scale that measures mass in grams.

Procedure: First collect all the needed materials. Then place one pie pan with 3 cups of water in it onto three of the four the storage box lids. Take 4 packs of Coleus plants and place them around the pan on each of the four box lids. Caulk the ridges of all four box lids. Then put a 1400mg block if dry ice into the first lid with pan of water and put the lock the box into the lid and label 350ppm. After that put a 1800mg block if dry ice into the second pan of water on the second lid and put the lock the box into the lid and label 450ppm. Then place a 2200mg block if dry ice into the third pan of water and put the lock the box into the lid and label 550ppm. Place the lid of the last box and lock the box into the lid and label Room Air. Place all the boxes in a sunny place and observe daily then record in science log.

Results
The plants grown in 550ppm of CO2 died. The plants grown in the environment with 450ppm also died. The plants grown in 350ppm grew some leaves until the end of testing when some leaves started dieing. The plants grown in Room Air grew the best. The leaves did not die.

Conclusions/Discussion
CO2 does affect the way Coleus plants grow. Based on the results of this experiment, it appears that the higher the CO2 level the worse the Coleus grew. In the 350ppm of CO2 the plants were healthy and grew some, however at the end of the testing they started to wilt and die. The 450ppm of CO2 started to wilt on the tenth day of testing, and the plants died. The 550ppm of CO2 was the worst of all four tests. On the ninth day of testing the leaves started to wilt, and the plants died during testing. The Room Air environment grew and looked healthy. Ten days before the testing was over same leaves wilted. Therefore the hypothesis was not supported.

Summary Statement
The experiment #The effect of CO2 on Coleus growth# attempted to determine if Coleus grew better with more carbon dioxide than normal.

Help Received
Father helped designed test box.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Natasha L. Meyers-Cherry

Project Number
J1620

Project Title
The Effects of Fertilizer Variations on Plant Growth

Abstract

Objectives/Goals
The objective of my project is to determine whether different types of fertilizers promote varying growth patterns in plants. The three types of fertilizers that I used were:organic vegetarian wastes(rabbit),organic carnivorous wastes(dog),and inorganic, commercially prepared. I propose that the rabbit manure group will have the largest overall growth patterns. I further planned to research the field of fertilizers for further implications for plant growth in the future.

Methods/Materials
The following materials were used in my experiment: nine pansies, nine flower pots, 100g commercial fertilizer with 100g soil, 100g rabbit manure with 100g soil, 100g dog manure with 100g soil, one hand-sized shovel, 60ml water per plant per week, and one south-facing window to promote optimal growth. Plant three pansies in each fertilizer type. Label the groups so that the growth can be measured individually as well as averaged within the group. I chose VR1,VR2,VR3 (vegetarian/rabbit), CD1,CD2,CD3 (carnivorous/dog), and CP1,CP2,CP3 (commercially prepared). Measure and record your initial data. I recorded: plant height, # of flowers, # of bulbs, # of stems, and stem height. Measure and water the plants twice a week. Record your data weekly in your journal.

Results
After seeing the outcome of the data, it is clear that the rabbit manure group has, by far, grown the largest. According to my data tables, the rabbit manure group has far exceded the average growth of the other two groups in the areas of:plant height,# of flowers,# of bulbs, and width of flowers. Individually all of the rabbit manure plants exhibited the same patterns throughout the data. The commercially prepared fertilizer was the second most effective, promoting the greatest stem height with the dog manure trailing far behind.

Conclusions/Discussion
After reviewing the results of my data, I found that my hypothesis was validated by my results. My research in the field of fertilizers concurred with the results of my experiment. Research suggests that a certain percentage of nutrients:nitrogen(N),phosphate(P),and potash(K) is essential to promote optimal plant growth. One of the best nutrient N:P:K ratios exists in rabbit manure, second only to bat manure! The research further supported my hypothesis and the results of my experiment. The implications of this project could be tremendous in the fields of farming, flower production, and even backyard gardening.

Summary Statement
My project is designed to demonstrate the effects of three different fertilizers on the growth of plants.

Help Received
My mother helped me cut out the background for my board layout.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Jessica S. Ng

Project Number
J1621

Project Title
Three Is a Crowd

Abstract

Objectives/Goals
The objective of my ecperiment was to determine the effect of density, if any, on the growth and development of Chinese broccoli.

Methods/Materials
I used 15 pots, soil and broccoli seeds. I filled all the pots with 2000ml of soil. In five pots I placed 3 seeds in each, in another five pots I placed 10 seeds each, and in the last five pots I placed 20 seeds each. I repeated the experiment using the same materials, but instead of 10 seeds I put 15 and instead of 20 I put 50.

Results
I discovered in both parts of my experiment that pots with more seeds produced taller but thinner broccoli, and pots with less seeds produced shorter but thicker broccoli.

Summary Statement
I wanted to determine the effect of density on the growth and development of Chinese broccoli.

Help Received
Teacher helped take pictures; Teacher helped get some materials

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Michael Q. Nguyen

Project Number
J1622

Project Title
Sinking pH

Abstract

Objectives/Goals
The objective of this project was to evaluate whether the growth of a pinto bean would be affected by different pH levels. I predict that different pH's will affect the growth of pinto beans, and that chemicals that are alkaline will cause better growth than the acid chemicals.

Methods/Materials
Seven Petri dishes were set-up with labels; and each label was clarifying a different level of pH. Inside each petri dish included: three pinto beans, one cotton ball, and exactly 10 mL of the precise pH level solution listed on the label. Litmus Paper was used to determine the pH level of the solution. Here are the chemicals listed: Sulfuric Acid (pH 0), Lab Water (pH 5), Distilled Water (pH 6), Tap/Municipal Water (pH 7), Baking Soda (pH 8), Borax (pH 9), and Pure Ammonia (pH 14.)

Results
Some pinto beans did not grow or even germinate. The only pinto beans that did grow were the ones that were grown in the solutions of pH 5, pH 6, pH 7, and pH 8. The pH level that the pinto bean grew the best was pH 6.

Conclusions/Discussion
Therefore, concurring, I found out that different pH levels of a solution does affect the growth of plants, and that my hypothesis was incorrect. I stated that alkalinic solutions would make the plant grow faster. It seems that this bean type, the pinto bean, grew the best at the pH level of six. However, the pinto beans in the pH levels of 0, 9, and 14 all died. Therefore, these results must mean that plants grow best under the pH levels close to pH 7, (which is neutral.)

Summary Statement
To grow a pinto bean plant by using several, different, pH level solutions.

Help Received
Used Laboratory Equipment From MacArthur Fundamental Intermediate School Under Permission Of Ms. Kateryna Matwijewsky (Science Teacher); Dad Helped Store Materials.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Allie E. Pittenger

Project Number
J1623

Project Title
Juicing It Up!

Abstract

Objectives/Goals
it was concluded in research that pectin was a commonly used substance in jams, jellies,and marmalades. An experiment was completed to determine which of the common eaten fruits and vegetables contained the most amount of pectin. The hypothesis stated that grapefruit will contain the most amount of pectin.

Methods/Materials
Ten commonly eaten fruits and vegetables were selected at random. They were prepared by cutting each up, placing them into a saucepan with a suitable amount of water, and cooking it for approximately 45 minutes. After cooking, the juice was strained from the pulp and core material, mixed with 70% isopropyl alcohol, and then strained through a coffee filter to collect pectin. The volumes of juice and alcohol and the weight of pectin produced were recorded. The data was analyzed to determine the weight of pectin per volume of juice.

Results
The concentration of pectin was highest in lemons at 0.42 g/ml and lowest in tomatoes at 0.01 g/ml. Olallie berries and grapefruit were intermediate at 1.8 g/ml. In general, citrus fruits usually contain more pectin but the results from my experiment showed that oranges had little pectin, even though they are in the citrus family.

Conclusions/Discussion
Pectin is a substance commonly used in making jams, jellies, and marmalades to ensure they jell properly. Although my hypothesis is wrong, I believe jams, jellies, and marmalades prepared from citrus fruits will need less added pectin to ensure the jelled state. But, when making a jam, jelly, or marmalade it would possibly be beneficial to add the juices from the fruits with a high pectin content to ensure achieving a well jelled state.

Summary Statement
My project compared the amount of pectin in 10 commonly eaten fruits and vegetables.

Help Received
mother helped type report and organize project board; father helped gather needed materials

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Deanna R. Schultz

Project Number
J1624

Project Title
The Effects of Radiation on Plants

Abstract

Objectives/Goals
Radiation therapy is effective in treating cancer because the actively growing cancer cells are more sensitive to radiation than the normal tissues. Therefore, it is my hypothesis that large doses of radiation will have a greater negative effect on the germinated plants than on dormant beans.

Methods/Materials
One hundred twenty bean sprouts and one hundred twenty dormant beans were used in the study. The sprouts and the dormant beans were divided into four groups of thirty. Each group received either no radiation, radiation from diagnostic imaging, five Gray, or ten Gray. The height of the plants was measured at seven, fourteen, twenty-one, and twenty-eight days.

Results
No dose related negative or positive effects were observed during the four weeks of the study. The groups that were sprouted prior to planting grew better than the dormant beans.

Conclusions/Discussion
I was unable to confirm my hypothesis at the radiation levels that I selected. My hypothesis may be correct with higher doses of radiation. Plants are relatively radiation resistant, since some groups received radiation that is lethal to humans.

Summary Statement
I tested the effects of radiation on plants and found no dose related effects at the levels selected.

Help Received
San Antonio Community Hospital assisted in the irradiaton of the plants.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Jaclynn A. Soares

Project Number
J1625

Project Title
H20 or H2moo? Will a Feed Crop Grow Better Irrigated with Ground Water, Dairy Lagoon Water, or a Combination of Both?

Abstract

Objectives/Goals
My objective was to determine if a feed crop would grow better if it was irrigated with ground water, dairy lagoon water, or a combination of both. I believe that the dairy lagoon irrigated crop will grow best because it has natural nutrients and fertilizers.

Methods/Materials
Two different sets of testing were performed on rye crop using ground water, dairy lagoon water, and a 50/50 combination of both. To determine which one grew better, I measured the blade height and visually rated the thickness daily for nine days.

Results
Although the difference wasn't significant, the dairy lagoon irrigated rye crop had more thickness and blade height than the ground water or the 50/50 combination.

Conclusions/Discussion
My conclusion is that dairy lagoon water is a possible alternative for irrigating crops on a dairy. This would recycle and conserve precious water resources.

Summary Statement
My project tests whether feed crop grows better irrigated with ground water, dairy lagoon water, or a combination of both.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Steven M. Tugas

Project Number
J1626

Project Title
How Effective Are Polymers in Keeping Pre-Emergent Active in Soil?

Abstract

Objectives/Goals
The goal was to see if the polymers would help make the Pre-Emergent become more active and last longer.

Methods/Materials
I put potting soil into nine flats. Then I mixed polymer with water. The polymer was then put into Group C potting soil. I mixed one teaspoon of pre-emergent into 1 gallon of water. That was put into a 16 once spray bottle. 8 onces was sprayed into both Group B and C. After two months, I planted ryegrass seeds into Group A,B,and C. I sprayed water once a day until germination occured.

Results
Results showed that it took 3 days for Group A (potting soil only) to germinate. It took 7 days for Group B (potting soil and pre-emergent) to germinate. It took 13 days for Group C (potting soil,polymer,and pre-emergent) to germinate. The grass of Group A would make a perfect lawn because it was really green and tall. The grass of Group B was very scarce. Group C barely had any grass at all. The grass was very sick looking and it had a yellow and brownish color.

Conclusions/Discussion
The pre-emergent and polymer had the greatest effect on Group C. My hypothesis was corrrect. My hypothesis stated that Group A would have the most growth and Group C would have the least amount of growth. This project would help get a healthier environment and less manual labor.

Summary Statement
My project is to investigate if polymers would help pre-emergent last longer and become more active in soil.

Help Received
Mother helped organize the board and father advised me with the chemicals.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Katherine J. Wallace

Project Number
J1627

Project Title
Which Pest Resistant Plant Can Best Protect Adjacent Pansies from Garden Snails?

Abstract

Objectives/Goals
The objective of my project was to determine which plant that produces pesticidal compounds would best protect adjacent pansies from garden snails. I believe that the pyrethrum plant (part of the chrysanthemum family) will best protect adjacent pansies from garden snails.

Methods/Materials
Five Plants were identified to produce pesticidal compounds and resist garden snails.
 Pyrethrum
 Chives
 Lavender
 Rosemary
 Peppermint

We purchased 35 pansies - one pansy for each pest resistant plant in the EXPERIMENTAL group (25) plus ten pansies for the CONTROL group (group was without any pest resistant plants to protect them). To attract snails we poured beer into a pie tin and let it sit over night in the morning we collect the snails and placed there in the them in the center of each flat (there was a total of 6 flats) 2 snails for each flat. Only 12 snails were needed in this process left over snails were placed in aquarium for the next trial. In total there were 6 trial and 72 snails.

Results
After twelve weeks, the 25 pansies in the EXPERIMENTAL group were observed and the results were recorded. In the pyrethrum/pansy flat, 4 of the 5 pansies (80%) had no snail damage. In the chive/pansy flat, 3 of the 5 pansy plants (60%) showed no snail damage. Of the 5 pansies adjacent to lavender plants, only one (20%) had no snail damages. In the rosemary/pansy flat, only 1 of the 5 pansy plants was undamaged (20%). None of pansies (0%) adjacent to peppermint plants were left undamaged (all 5 had notable snail damage).

Conclusions/Discussion
The hypothesis was correct. Of the five plants that produce pesticidal compounds, all of the pansy plants planted with pyrethrum plants were expected to survive the 12-week period without damage from garden snails. Overall, the pansies in the pyrethrum flat did very well; 4 of the 5 plants lived. One of the pansies was slightly damaged by snails.

Summary Statement
Which plant that produces pesticidal compounds can best protect adjacent pansies from garden snails ?

Help Received
UCSD Master gardeners for plant advice. My parents proofing my report and helping me get the information I needed.