CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Daniela C. Abrams

Project Number
J1601

Project Title
The Growth Rate of Poa pratensis in Pure Humus and Pure Humus Mixed with Sand

Abstract

Objectives/Goals
The experiment was done by comparing Kentucky bluegrass, or Poa pratensis and measuring how it grew in pure humus, or potting soil and a mixture of pure humus and sand.

Methods/Materials
I used six plastic pots and filled half of them with pure humus. With the other three pots I added pure humus mixed with sand. I watered the grass every day. I observed the six pots in a period of seven weeks, and looked at the root size, the width, and the length of the grass.

Results
The grass did not sprout until the third week of the experiment. Until about the sixth week the pots with grass in pure humus was mucher taller and fuller than the other pots of grass. During the last week all of the grass in the pots with pure humus died, so by the end of the experiment the grass in the pots with the mixture of pure humus and sand had outgrown the other pots.

Conclusions/Discussion
The first six weeks of the experiment, the pots in the pure humus grew taller in size than the pots with the pure humus mixed with sand because the pure humus contained more certain types of important nutrients and moisture. The moisture in the soil helps the pure humus keep all of its water inside it, so the roots could absorb all of the water in the pots. Unlike pure humus, the water that goes into the pots with a mixture of pure humus and sand drains out of the pot much faster because of sands such large pores. Since the speed of the water is so quick, the soil and roots do not have enough time to absorb all of the water. Water that goes into the pots with pure humus travel very slowly because of the small pores, so since the water#s speed is so slow the roots and soil have more time to absorb all of the water in the pot. Therefore, the grass planted in pure humus get more water than the grass planted in the mixture of sand and soil, but because it rained during the sixth week too much water entered the pots causing them to flood. Then, because of its large pores the excess water was able to drain out of the pots with the mixture of soil and sand. With the pots with pure humus the pores were to small so all of the water stayed in the pots killing all of the grass.

Summary Statement
The experiment is about the difference in growth of grass planted in two different types of soil, potting soil and potting soil mixed with sand.

Help Received
Mrs. Weitkamp helped design charts; Mom helped design display board

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Nikole M. Ankrom

Project Number
J1602

Project Title
Does Beta Carotene Prevent Tumor Growth in Plants?

Abstract

Objectives/Goals
The objective of this experiment is to determine if beta carotene is effective in preventing tumors (galls) in plants. Agrobacterium tumefaciens is a bacterium known to cause tumors in plants. I hypothesized that plants watered with water and added beta carotene would develop fewer tumors than plants watered with water, after being inoculated with A. tumefaciens.

Methods/Materials
Four groups of sunflowers (A, B, C, and D) with five plants in each group were planted using the same size pots and the same type of soil. Group A was watered with water and not inoculated with Agrobacterium tumefaciens (A. tumefaciens), group B was watered with a beta carotene solution and not inoculated with A. tumefaciens, group C was watered with water and inoculated with A. tumefaciens, and group D was watered with the beta carotene solution and inoculated with A. tumefaciens. I watered and measured the plants every second day and recorded their growth and tumor accumulation over a period of sixty-seven days.

Results
The plants watered with beta carotene solution and inoculated with A. tumefaciens accumulated a total of seven tumors while the plants watered with water and inoculated with A. tumefaciens accumulated a total of seventeen tumors. The plants not inoculated with A. tumefaciens developed no tumors. The plant groups watered with beta carotene grew taller in height than the plant groups watered with water.

Conclusions/Discussion
My conclusion is that beta carotene is effective in preventing tumor growth in plants. My results suggest that the antioxidant beta carotene made the plants less susceptible to tumor growth caused by A. tumefaciens.

Summary Statement
I showed that beta carotene reduces the incidence of tumor growth (galls) by Agrobacterium tumefaciens in plants.

Help Received
Elizabeth Pflenging helped me with her expertise in plant pathology and plant inoculation. My dad purchased the A. tumefaciens, and my mom purchased the other supplies & materials.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Priyanka V. Athavale

Project Number
J1603

Project Title
Making of a Potpourri Fertilizer

Abstract

Objectives/Goals
For those people who have lots of plants, buying fertilizers can be expensive. The purpose of my experiment was to make homemade fertilizers and compare them with commercial fertilizers. If homemade fertilizers are as good as commercial fertilizers, then there will be no significant difference in the growth and development of plants being treated.

Methods/Materials
Homemade solid and liquid fertilizers were made using various ingredients. They were compared with commercial solid and liquid fertilizers on radish and mung bean plants. The plants were kept in small pots and were grown in vermiculite. The experiment was conducted in a controlled environment in my school lab.

Results
Using the analysis of variance, I found out there was no significant difference between the solid and liquid commercial and homemade fertilizers tested on radish plants. However, there was a significant difference between the homemade and commercial fertilizers on mung bean plants, the former being better.

Conclusions/Discussion
Since homemade fertilizers are equivalent to commercial ones, why go out and buy expensive commercial fertlizers. Instead, household items can be used to make a fertilizer that is as good as the store bought ones.

Summary Statement
Homemade solid and liquid fertilizers were compared with commercial solid and liquid fertilizers on mung bean and radish plants.

Help Received
My advisor helped me correct errors during the experiment.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Kayla Billiou

Project Number
J1604

Project Title
Suck It Up!

Abstract

Objectives/Goals
I wanted to find out how temperature affects a plant's ability to transport nutrients. From my research, I learned that transpiration and respiration increase as temperature increases. I thought the plants in room temperature would transport the most nutrients because the plants in the other temperatures were too hot or too cold.

Methods/Materials
Ten white carnations were placed in each of three mugs with 200 ml of water. Then 1/4 teaspoon of food coloring was added into each mug. Each mug was placed in a box in a different temperature zone with a thermometer in each mug. A plant light was placed over each box and observations and measurements were made every few hours recording the results.

Results
The results showed that flowers which were in 110 degrees Fahrenheit soaked up the most water. However, the petals of the flowers dried out. The flowers in the 68 degrees Fahrenheit transported a little more water than the flowers at room temperature (78 degrees Fahrenheit).

Conclusions/Discussion
The hypothesis was incorrect because it was thought that the flowers in room temperature would transport the most nutrients, but actually, the flowers in the heated temperature soaked up the most water. This information is important for growing plants at the right temperature so they will be healthy. If this project was repeated, the flowers would be placed in solutions 10 degrees apart to find out how much the slightest temperature change would affect the plant's ability to transport nutrients.

Summary Statement
The purpose of this project was to determine if different temperatures would affect a plant's ability to transport nutrients; the data showed that plants exposed to warmer temperatures soaked up the most water.

Help Received
Mother helped type report

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Jaron E. Brandon

Project Number
J1605

Project Title
Hydroponics vs. Aeroponics

Abstract

Objectives/Goals
My objective was to determine how Hydroponic and Aeroponic growing systems compare to traditional soil based technology in terms of water consumption, root vigor, and growth rates.

Methods/Materials
Three experiments were developed using the same water, nutrients and seeds, but each had a different way of delivering the nutrients to the plants. The traditional soil system was used as a control; the Hydroponic system used Oasis Foam as an inert medium and oxygen-enriched water; the Aeroponic system also used the foam and was setup like a rainforest, allowing roots to absorb water from the air, maximizing oxygen intake. At the conclusion of this eight week term, the plants were evaluated for growth, root vigor and water consumption.

Results
The Aeroponic system had the highest growth rate and used the least amount of water while the Hydroponic system had the most pronounced root system.

Conclusions/Discussion
Although all three experiments produced viable seedlings, the Aeroponic system was clearly the best option considering the small amount of water used implies applications in nonarable parts of the world and outer space.

Summary Statement
I wanted to determine if an Aeroponic growing system can compete with more traditional methods.

Help Received
Ron Brandon provided funding, Mrs. Parker and Pat Brandon provided help with project development.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Aubryn R. Butterfield

Project Number
J1606

Project Title
The Effect of Color on Cherry Trees

Abstract

Objectives/Goals
I want to determine if there is one color that can be used to paint our cherry trees that will protect them from sunburn without causing harvest delays.

Methods/Materials
My experimental method utilizes a Random Block Design comprised of 12 cherry trees in our orchard. I used a power sprayer to paint 4 trees white, 4 trees black, 4 trees silver, and 4 trees were left unpainted as my control. I took numerous measurements over a one year period to evaluate tree growth, pre harvest data, and post harvest data.

Results
Based on all the field tests and resulting data, the color white had the most favorable overall response on the trees followed by silver and then black.

Conclusions/Discussion
I conclude that my hypothesis was incorrect. Silver was not the color that would provide the best overall qualities for sunburn protection and elimination of harvest delays.

Summary Statement
How different colors painted on a tree surface can effect tree health and fruit maturity.

Help Received
Parents purchased supplies; Dad helped me paint the trees; Mom kept me focused; I used my sisters old board.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Michael M. Case

Project Number
J1607

Project Title
Determining the Effects of Water Temperature and Exposure Terms on Seed Germination

Abstract

Objectives/Goals
I wanted to find out if long term exposure to water of different temperatures would affect different types of seed's germination. This year has proven that the world's weather patterns, and water distribution volumes are everchanging. I wanted to see if sweet corn, watermelon, cantaloupe, and green bean seed germination is altered by long term exposure to water of different temperatures.

Methods/Materials
I seperated the seeds into groups of five. I placed five seeds into a clear 10 ounce labeled cup, with 8 ounces of purified water. I put the cups in three different temperatures; hot(85 degrees F), room(60 degrees F), and cold(35 degrees F). The hot was created with a light bulb, the room was done in a windowsill in my house, and the cold was done in my refrigerator. I repeated my tests five times to gain conclusive results.

Results
In the room temperature tests, the sweet corn germinated the most seeds. In the hot temperature tests, the watermelon seeds germinated the most. In the cold temperature tests, the sweet corn again germinated the most seeds. The cantaloupe and green bean seeds did not germinate well in the hot and cold temperatures. All four seed types germinated well at room temperature.

Conclusions/Discussion
The different water temperatures did affect the number of seeds that germinated. The cold water had the most adverse effect on each seed type. The hot water almost halted all germination in the cantaloupe seeds. The long-term exposure to water in general had an adverse effect on every seed type in comparison to the results that were listed on the back of each seed packet. I guess water, and it's temperature can alter seed germination rates.

Summary Statement
Long-term water exposure, and it's temperature's effect on four different seed types

Help Received
Mom and Dad helped with typing, and project board/data book assembly

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Kayla E. Casillas

Project Number
J1608

Project Title
"Lettuce" Feed the Seed

Abstract

Objectives/Goals
My objective was to determine which of four pre-planting treatments to lettuce seed would cause the seed to germinate the fastest. The four pre-treatments I used were: pre-watered seed, fertilized seed, refrigerated seed, and non-treated seed.

Methods/Materials
I placed 1/4 cup of "Helena" Iceberg lettuce seed into four Ziploc baggies.
Baggie #1 was labeled REFRIGERATION, and placed in a 45 degree area. Baggie #2 was labeled WATER, and 1 cup of purified water was added to the seed inside, and place in a 75 degree area. Baggie #3 was labeled FERTILIZER, and 2Tbs of Liquinox fertilizer and 1 cup of purified water were added to the seed inside, and placed in a 75 degree area. Baggie #4 was placed in a 75 degree area.
After 24 hours I filled 4 egg cartons with potting soil to use as my planting trays. I planted 18 seeds from each pre-planting treatment into separately marked cartons. I gave each carton 1 cup of purified water and put them side-by-side in a 75 degree area. They had the same amount of sunlight during the day, and all cartons were in the dark at night.
Every 24 hours I looked at the cartons and counted any sprouts that were above the soil. I marked the counts down on paper. Then I watered each carton with 1 cup of purified water.
I repeated this procedure for 5 days. On my final count, I looked at each carton, and and judged which sprouts were the strongest.

Results
My conclusion was that the seed treated with water germiniated the fastest, and the plants were the tallest and sturdiest. Below are the # of sprouts counted for each pre-treatment:

HOURS	WATER	FERT.	REFRIG.	NONE
48	2	0	0	1
72	13	0	6	9
96	17	0	17	17
120	18	4	18	17

Conclusions/Discussion
I originally thought the seed pre-treated with fertilizer would germinated the fastest because many farmers and gardners use fertilizer to help their plants grow quickly and healthy. There are also many agricultural companies that continually research, test, and market new types of fertilizer. I think I burned the seed with too much fertilizer. I would be interested in experimenting with different amounts of fertilizer to see what

Summary Statement
My project was to determine which pre-treatment method would help lettuce seed germinate the fastest.

Help Received
Dad helped coordinate the project and Mom helped type report.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Daniel E. Castanon

Project Number
J1609

Project Title
The Effect of the Timing of the Application of Potassium on Antirrbinum majus Growth

Abstract

Objectives/Goals
The objective of my experiment was to see how the timing of the application of potassium affects plant growth.

Methods/Materials
There were four groups of twelve plants each. Group A received no potassium. Group B received 1.25 ml of potassium at the time of planting. Group C received 1.25 ml of potassium two weeks later. Six weeks later, group D received 1.25 ml of potassium. Plant height and leaf length and width were measured for five weeks. Leaf amount was measured for the last five weeks of the experiment. Each plant's root growth was rated.

Results
Group A had the greatest average height. Group B had the lowest average height. Group A had the greatest average leaf length and width and group B had the lowest. Group A had the greatest average number of leaves and group B had the lowest. Groups A and C tied for highest average root amount and group B had the lowest average root amount.

Conclusions/Discussion
The application and timing of the application of potassium did not positively affect plant growth. Group A did the best on most of the measures and tied with group C on root growth. Excess potassium can cause nitrogen deficiency in plants and may affect the uptake of other ions. Excess potassium can compete and limit other nutrients from entering into the plants. In addition, excess potassium can harm a plant by reducing growth, burning or scorching leaves, causing dead spots and wilting.This experiment expands our knowledge of the effects of potassium in general and how too much can harm a plant.

Summary Statement
This project explores the effect of potassium and the timing of its application on plant growth.

Help Received
Mother helped edit grammar; science teacher provided technical support; father explained MicrosoftExcel

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Raymond Cho

Project Number
J1610

Project Title
Are We Eating Genetically Modified Papaya?

Abstract

Objectives/Goals
My goal of this project is to find out what percent of California's Hawaiian papaya is genetically engineered and whether the genetically engineered papaya tastes different from normal papaya.

Methods/Materials
50mg X-Gluc; 100ml Phosphate buffer saline; 1 Microscope; 1 Digital camera; 1 pipetman; 1 surgical knife; 1 tweezer; 12 petri dishes; 1 tupperware.
a. Buy some papayas
b. remove all the seeds
c. remove jelly coat off the seeds
d. cut open seeds in half
e. put cut seeds into a petri dish
f. apply X-Gluc and phosphate buffer saline
g. put petri dishes into the tupperware
h. wait 24 hrs.
i. record number of genetically engineered seeds
j. take pictures
k. eat the papayas

Results
Every single papaya that I had bought had some genetically engineered seeds. Some of them even had almost 50% of their seeds geneticaly engineered. The taste of the genetically engineered papayas were identical to the normal papayas.

Conclusions/Discussion
Majority of the Hawaiian papaya that which I tested were geneticaly engineered because of cross-pollination. I know this because only about 1/2 or 1/4 of the seeds in most of the papaya were genetically engineered.

Summary Statement
We are eating genetically modified hawaiian papayas.

Help Received
Dr.Melanie Bondera for providing positive seeds and procedure on how to do this experiment; Mother for going out and buying papayas; Father for letting me use his laboratory and buyinf the necessary supplies.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Darren W. Coates

Project Number
J1611

Project Title
Death in a Water Bath

Abstract

Objectives/Goals
My objective was to learn at what temperature three different types of vegetable seeds die. This is important when seeds are treated for disease control and for seed storage. My hypothesis was that corn, bean and spinach seeds would die at different temperatures because of differences in seed size and cool season versus warm season types.

Methods/Materials
Ten corn, bean and spinach seeds were placed in a water bath for ten minutes at each of five temperatures (43.3 deg C,48.9 deg C,54.4 deg C,60.0 deg C and 65.6 deg C). My control was 43.3 deg C which should have caused no damaging effects. My research on this subject showed that all seeds would be killed at 65.6 deg C. Seed treatment for disease control is usually done at 48.9 deg C. The water bath treated seeds were placed between two moist paper towels and germination was checked daily.

Results
The best treatment temperature for seed germination was 48.9 deg C. All of the seeds germinated by day 4. At my highest temperature (65.6 deg C), all of the spinach seeds died but 90% of the corn seeds and 70% of the bean seeds germinated but at a slower rate than at cooler temperatures.

Conclusions/Discussion
My hypothesis was correct in that the three types of vegetable seeds died at different temperatures. All of the spinach seeds died at 65.6 deg C, as expected. The results for beans and corn were surprising - a majority of the seeds survived 65.6 deg C which did not agree with my references. Better germination at 48.9 deg C than at 43.3 deg C was also unexpected and could possibly be used as a standard seed treatment. I was able to increase my knowledge of seed germination and the effects of temperature on seed growth with this research project.

Summary Statement
My project tests the germination of three types of vegetable seeds at five different temperatures.

Help Received
Father photographed experiment, purchased seed and provided electronic thermometer.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Esther L. Cohenzadeh; Kaitlyn Lindsay; Emily Thomas

Project Number
J1612

Project Title
The Physiology of Plants in a Simulated Martian Atmosphere

Abstract

Objectives/Goals
This experiment had two objectives.
1. The first objective was to determine whether plants could survive in a simulated Martian-like environment.

2. The second was to find whether plants could change the atmosphere from carbon dioxide to oxygen.

The first hypothesis was that the plants would survive, but not thrive. The second, was that they would partially change the atmosphere.

Methods/Materials
Three terrariums were built. Different soils were researched and combined to create a mixture that would replicate the Martian soil. Three types of plants were chosen and planted in each terrarium. Carbon Dioxide was introduced into the two Martian terrariums. The plant growth, oxygen level, and carbon dioxide level were monitored for ten days. Oxygen probes and carbon dioxide probes were used to measure the gas levels in each terrarium. A computer program called LoggerPro was used with the probes to create charts of the daily gas levels.

Results
1. The first results were that the Primrose and Wheatgrass survived in the simulated Martian-like environment, while the Nasturtium died.

2. Second, the plants changed a mainly carbon dioxide atmosphere to a mainly oxygen atmosphere.

Conclusions/Discussion
In conclusion, this study found that certain plants can survive in a Martian-like environment. The experiment also showed that plants can change a mainly carbon dioxide atmosphere to mainly oxygen. In addition, the hypothesis was mostly correct.

Summary Statement
This project is about the survival of plants in a simulated Martian-like environment and their ability to change a Martian-like atmosphere.

Help Received
Dr. Boolootian helped obtain and introduce the carbon dioxide; teacher helped cut five gallon containers

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Zachary J. Creighton

Project Number
J1613

Project Title
Does Greater Leaf Diameter Increase Transpiration Rate of Rose Geranium (P. graveolens)?

Abstract

Objectives/Goals
I wanted to find out if transpiration rate of rose geranium is changed by the increased diameter in leaves. I think it is interesting how plants transpire, the way this actually works is still partly a mystery to scientists. It is fascinating how water can travel up a 300 foot tree. This information could be useful to people who keep plants indoors.

Methods/Materials
Total Leaf Diameters of Cuttings Tested: Two Controls
1. 2 inch diameter (1 leaf) 1. Stem (No leaves)
2. 8 inch diameter (2 leaves) 2. Clay- covered graduate only
3. 10 inch diameter (3 leaves)
4. 12 inch diameter (4 leaves)

Stem diameter of cuttings were measured to 0.3 in. approx. Leaf diameters per cutting were totaled. The number of leaves per cutting was equal in each experiment. Narrow, 25ml. graduates were filled to 21 ml.with distilled water. The stems were recut under water and put in and sealed with clay 2 ½ inch from the base of the stem. The water level was recorded then placed in a west facing window. Each day transpiration rates, weather and temperature were checked at proper time, beginning 24 hours after they were first put in the graduates.
A total of 4 experiments were done.

Results
Average Total Transpiration After 5 Days: (Listed according to leaf diameter size in ascending order. 2 in.-12 in.)
2 in. group - 2.35 ml. 8 in. group - 5.86 ml. 10 in. group - 3.65 ml. 12 in. group - 7.78 ml. Controls: Stems had 1 ml evaporation through their xylem. Control # 2 had no water loss. This was to show water does not evaporate through clay.
12 inch leaf diameter transpired 5.43 ml. more than the stem without leaves, 6.5 ml. more than the 2 in., 4.13 ml. more than 8 inch., 1.92 ml. more than 10 in. leaf diameter.

Conclusions/Discussion
According to my experiments and research, I conclude that greater leaf diameter increases transpiration rate in rose geranium (p. graveolens). I saw that the 12 inch leaf diameter#s water level dropped more than all the other leaf diameters, having a 7.78 ml. transpiration rate. My hypothesis was right, because the greater the leaf diameter the more stomata the cutting has for transpiration to take place. Water is also

Summary Statement
This project proves that greater leaf diameter does increase transpiration rate of rose geranium (p. graveolens).

Help Received
Thanks to my sister for helping me with this project and to my Mom for typing my report.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)

Spreeha Debchaudhury

Project Number

J1614

Project Title

Sunless Sunflowers: How the Intensity of Artificial Light Affects the Growth of Sunflower Plants

Abstract

Objectives/Goals

The objective was to test how the intensity of artificial light affected the growth of sunflower plants. My hypothesis was that the plants closest to the light will grow the tallest, then wilt, because of phototropism; the plants farthest away, will not have enough light to carry out normal cellular processes and barely grow; the plants in the middle group will grow the second tallest, but be the healthiest

Methods/Materials

Sixteen sunflower seeds and terra cotta pots, potting soil, fertilizer, four agro-lights, a plant light intensity meter, thermo-hygrometer, moisture meter, soil pH meter and timer were used. The soil was checked to ensure it had a pH of 6 to 7.5 for optimum growth. The moisture level of the soil was measured regularly and kept between 5 and 6. The thermostat and the thermo-hygrometer were set to 65°F. The control plant, was placed outside at sunrise. Simultaneously, the timer turned on the agro-lights for the 15 experimental plants, kept in three groups (five plants each) at a distance of 20, 60, and 100 cms from the artificial lights. The control plant was placed under artificial light at sundown so that all 16 plants got the same Critical Light Exposure Period of 14 hours. The plants were measured every week during the 5-week study period.

Results

In the first experiment, plants in Groups 1, 2, and 3, exposed to a light intensity of about 9,000, 6,000, and 2,000 footcandles, respectively, grew to an average of 8.64, 6.192 cm, and 2.96 cm. Graphs and scatter plots demonstrated light intensity vs. plant group/plant number, plant height and plant growth each week. The results of the second and third experiments corroborated those of the first.

Conclusions/Discussion

My hypothesis was correct: the plants nearest to the light, Group 1, grew the tallest but burned because of phototropism. The pigment phytochrome, maintaining the circadian rhythms of plants, was tricked into thinking that it was summer, when the sunflower petals and leaves open the widest. The plants farthest away from the light, Group 3, performed inadequate photosynthesis to carry out normal cellular processes, which stunted their growth. The phytochrome in Group 3 plants was deceived into believing it was winter, when most plants do not grow. The plants in Group 2 grew the second tallest, but were the healthiest, being neither burned nor etiolated.

Summary Statement

The project is a study of how different intensities of artificial light affect the overall growth of sunflower plants

Help Received

Mom bought digital camera; Dad taught how to do excel spreadsheets; Ms. A. Dev provided two relevant websites; teacher gave relevant comments.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Brenda A. Fisher

Project Number
J1615

Project Title
Is It All Downhill from Here?

Abstract

Objectives/Goals
My objective is to test if there was higher mortality of Pinyon Pines on steeper slopes and on hotter slopes (south aspect) during the last drought. Steeper slopes have greater water runoff and south aspects have the highest insolation.

Methods/Materials
At a site in pinyon-juniper woodlands I set up 16 random plots, four in each aspect. I counted the number of trees and recorded if they were alive or dead and measured the slope they grew on using a contractor's level and a protractor. I added the results for each aspect and slope to the results from my project last year and then used a Chi-square Goodness of Fit Test to see if the differences among slopes and among aspects were significant. I also compared the differences in mortality at last year's site with this year's site to see if the sites differ.

Results
The south aspect had the highest tree mortality (67%), followed by north (56%), east (38%) and west (30%). The differences were significant (chi-square = 9.67).
The least steep slope, 0-15 degrees, had the greatest mortality (67%) followed by the 16-30 degree slope (36%) and last was the steepest slope (29%). These differences were significant (chi-square = 7.61).
At the 2005 site 54% of the trees were dead but at the 2004 site 46% were dead. The differences between the two sites were not significant (chi-square = 0.68).

Conclusions/Discussion
My hypothesis that the hotter south aspect would have the highest mortality was correct. My hypothesis that the steepest slope would have the highest mortality was wrong, the least steep slope had the highest mortality. There were more trees and shrubs on the least steep slope that might have competed for water. Even though the two sites were not significantly different, by adding data from the two together I increased the sample size and got different results than from one site alone.

Summary Statement
I looked at how slope and aspect might have affected mortality of Pinyon Pine trees during the drought.

Help Received
Mom helped type. Dad taught me how to do chi-square test. Mom, dad, and sister helped set up plots and count trees.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Bryce A. Flocks

Project Number
J1616

Project Title
A Comparison of the Effectiveness of Organic Worm Castings and Non-Organic Fertilizers in the Growth of Annual Rye Grass

Abstract

Objectives/Goals
To compare the effectiveness of organic worm casting fertilizer to two non-organic fertilizers in the growth of Annual Rye Grass. If it can be shown that worm castings are an effective fertilizer, then it is hoped that individuals and also municipal waste facilities will be encouraged to benefit the environment by recycling plant material and soiled paper to create worm castings for home and agricultural use.

Methods/Materials
Methods: Obtain materials. Fill trays with equal amount of soil except tray labeled worm casting (50% soil and 50% worm castings). Trays equally seeded and exposed to sunlight. Trays labeled: No-Fertilizer, Peters, Miracle-Gro, Worm castings. Mixed Miracle Gro and Peters per instructions. Fertilized trays labeled Miracle-Gro and Peters every two weeks and at the same time watered other two trays with equal amount of water. Trays also equally watered by rainfall and as needed. Clear plastic tubs (mini green houses) placed over trays until seed germination to keep birds from eating seeds and to encourage germination in cold weather. Measure and observe growth of grass in each bin every two weeks after germination. Record data in notebook.
Materials: Soil from under oak tree, Miracle Grow lawn food, Peters all purpose plant fertilizer, Worm castings from my worm bin that includes food scraps and paper scraps, Four black plastic planting trays, Annual Rye Grass seeds (Lolium multiflorum), Seed measuring cup, Ruler, Plastic bins (mini -green houses), Measuring spoon, Camera, Film, Water, Four one-gallon containers for water and for Miracle-Gro and Peters fertilizers diluted per instructions.

Results
Worm castings in a 50% soil to 50% worm casting mix encourage more growth of Rye Grass over a four-week period from germination when compared to Peters and Miracle-Gro non-organic fertilizers and when compared to the control. The grass growing in the worm castings grew 82.26% taller than in the control (non-fertilizer) measured at the end of the experiment. The grass growing in the Peters grew 50% taller than in the control. The grass growing in Miracle-Gro grew 25% taller than in the control.

Conclusions/Discussion
Worm castings are an effective fertilizer and good for the environment. If individuals and waste facilities recycle plant food scraps and soiled paper into worm castings, this will reduce the amount of waste that is now filling up these facilities, saving valuable land.

Summary Statement
This project compares the effectiveness of organic worm castings to two non -organic fertilizers in the growth of Annual Rye Grass.

Help Received
My mom and dad helped me put my board together and proofread my report. My teacher, Mr. Steely taught me how to use Excel spreadsheets.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Radhika S. Gosavi

Project Number
J1617

Project Title
Phytoremediation of Zinc

Abstract

Objectives/Goals
The objective of my study was to see if mustard plants could be used for phytoremediation of Zinc.

Methods/Materials
To study whether zinc can be phytoremdiated, mustard plants were grown in nutrient solutions spiked with 2 ppm and 3 ppm zinc. Nutrient spiked with 0.05 ppm zinc was used as the control. The plants were grown hydroponically in these solutions for 3 weeks.At the end of the experiment,the plants were tested for zinc accumulation using AAS (Atomic Absorbtion Spectrophotometer)The relative growth, zinc accumulated in the plant tissue and the bioconcentration factor values for zinc was then calculated to study whether the mustard plants could tolerate and remove the zinc from the nutrient solutions.

Results
The mustard plants did not show signs of toxicity till day 14.The results obtained are summarized below:
·The relative growth of the control and the test 2 (3 ppm) is almost same but the relative growth in test 1(2 ppm) is much more than the control or test 2 (3ppm).
·The test plants show more accumulation of zinc than the control and the amount of zinc accumulated in the plants is maximum at 2ppm concentration. It decreases as the concentration is increased to 3 ppm.
·The BCF value decreases as the concentration of Zinc in the nutrient solution increases.

Conclusions/Discussion
From these experiments, it was found that, since the amount of Zinc accumulated in the plant growing in the experimental nutrient went up, it indicated that the mustard plants were removing the Zinc from the test nutrient solution by phytoremediation. It was found that the mustard plants could tolerate and remove up to 3ppm zinc from the environment and so were moderate accumulators of zinc.

Summary Statement
The mustard plants can moderately accumulate Zinc and they could best be used for phytoremediation when the zinc concentration is around 2 ppm.

Help Received
Mr. Lee guided me ;Used AAS at The Water Quality Lab, City of Watsonville under the supervision of Mr.Crane ; Mother helped proof read; Dad helped format this paper; Professor Allen Barker, University of Massachusetts, MA helped design the experiment

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Darrick L. Gowens

Project Number
J1618

Project Title
Comparing Varying Levels of Oxygen Aeration in Increasing Plant Production

Abstract

Objectives/Goals
The objective of my project is to determine if the amount of aeration has any effect on plant production.

Methods/Materials
I am using a stone that will aerate the water with various amounts of time. I am using vermiculite as a growing medium in five different containers. I built screened boxes to hold the vermiculite medium to set inside the container. In four of the containers, I placed an aeration stone. I added water to each of the containers and planted each container with the seeds.
In the control group, I will use the same amount of growing medium in each growing container. I will place the seeds one and one-half inches apart. I will record the germination rate. Then I will allow the plants to grow for twelve weeks before I harvest the plants for weight, the length of the taproot, the height of the plant and the diameter of the taproot and stem of the plant.
The experimental variables that I am using are the varying amounts of aeration that is added to the water.
· Three hour aeration period
· Six hour aeration period
· Twelve hour aeration period
· Twenty-four hour period

Results
The average days of germination was eight and one-half days in all groups (aeration and control group). The average height of the plant is twenty-nine and one-half centimeters tall. The difference between the plants that are aerated and the control group is eight and three-quarters centimeters taller in height. The average length of the plant taproot is twenty-three and eights-tenths centimeters long. The difference between the plants that are aerated and the control group is one and three-quarters centimeters longer. The average width of the plant taproot is fifty-two thousandths. The difference between the plants that are aerated is five thousandths. The average width of the plant stem is one hundred twenty-five thousandths. The difference between the plants that are aerated is eighteen thousandths. The average weight of the plant is two and five tenths of a gram. The difference between the plants that are aerated is thirty-five hundredths of a gram. The more aeration that is given to a plant after germination, the larger and healthier the plant will become than plants with less or no aeration.

Conclusions/Discussion
My conclusion on adding aeration to growing plants hydroponically was that I discovered the more you aerate the water the stronger and larger the plant will become.

Summary Statement
My science project is to determine if the amount of aeration has any effect on plant production.

Help Received
My grandfather guided me in building the plant boxes. My mother advised me of errors and in board setup.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Katie M. Hannah

Project Number
J1619

Project Title
Fun with Phosphorus

Abstract

Objectives/Goals
My goal was to see if the amount of phosphorus in fertilizer affected plant growth. I was interested in this area because I love plants and gardening. I knew from the beginning that I would do something with plants and when my teacher suggested phosphorus I knew that that would be perfect.

Methods/Materials
To do this project take 20 red cups and put 1 cup of soil in each cup. Next put 3 radish seeds in each cup. Get 3 boxes of water soluble fertilizer. Each box should have a different amount of phosphorus. A low amount of phosphorus, a medium amount of phosphorus, and a high amount of phosphorus. Separate the 20 plants into 4 groups labled "Low","Medium","High", and "None".Water each plant everyday with tap water. Every 7 days water the plants with their water soluble fertilizer. Record observations everyday. Once each week measure the plants and record the growth of each plant.Repeat ths for 29 days.

Results
Resuls showed that the plants watered with a low amount of phosphorus grew more than any other plant group. The low group also bloomed quickest. The group that bloomed the 2nd most was the medium group. Then high, and last was the control group,or none.

Conclusions/Discussion
This project shows that plants watered with a low amount of phosphorus will grow more than plants watered with a medium or high amount of phosphorus. Also plants that had no added phosphorus grew the least so this shows that plants need added phosphorus for maximum growth.

Summary Statement
I tested if the amount of phosphorus in fertilizer affected plant growth.

Help Received
I received help from my science teacher, she helped me choose me subject. I also recieved help from my parents, they took me to the store and paid for all of my suppleys.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Rami J. Harb

Project Number
J1620

Project Title
Chill Out: Investigating Seed Tolerance for Freezing Temperatures

Abstract

Objectives/Goals
To investigate seed tolerance for freezing by measuring the germination rate after being frozen for various intervals. I predict seeds frozen will have germination rates lower than non-frozen seeds, and seeds frozen longest will have lowest germination rates.

Methods/Materials
Materials: Ralphs# 16oz bag of Lima beans, Garbanzo beans, Small Red beans, Blackeye peas, and Black Beans, Jolly Time 32oz bag of Popcorn seeds
Methods: 1. Arrange 10 piles of 30 seeds for each seed. Place each pile into a plastic bag. Label bags control 1 and control 2, A1 and A2, B1 and B2, C1 and C2, and D1 and D2.
2. Place A#s in the freezer for 8 hours, B#s for 16 hours, C#s for 24 hours, and D#s for 32 hours.
3. Fill the controls with water.
4. After appropriate freezing time, remove group from the freezer and fill each bag full with water. Place the bags somewhere dry and allow seeds to soak for 24 hours.
5. After 24 hours of soaking, take all bags in the group and empty the water. Wet a paper towel and place it inside the bag. Lay the seeds in the bag on the paper towel. Close the bag and place it in a dry area. Complete this for every bag in the group.
6. Observe the seeds and #inspect# them for germination.

Results
Lima beans Blackeye Garbanzo Black Small Red Popcorn

Group	Percent Germination				
Control	22 98	90	97	95	98
A	14 77	73	85	97	95
B	24 77	82	95	94	98
C	57 98	83	92	88	93
D	10 89	85	96	97	97

Conclusions/Discussion
Since many of the beans germination percentages were similar if not equal to the control group#s germination rate, my prediction was incorrect. It appears that freezing does not affect the germination of the beans I chose. This is important since if seeds can survive frozen, then we could save them for in case of a natural disaster. Also, if we can find out how long seeds can survive on storage shelves, we could save them for times of food shortage.

Summary Statement
The ability of assorted beans and other seeds to germinate after being frozen for different lengths of time.

Help Received
My science teacher was involved in editing of my report and helping me understand the significance of my results.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Matthew R. Howard

Project Number
J1621

Project Title
Roosters Rule?

Abstract

Objectives/Goals
Determine whether or not fertilizer added to garden soil will contribute to a greater harvest. Evaluate two types of organic fertilizer - chicken and steer manure.

Methods/Materials
Radish and onion seeds were planted in three different containers. One container was filled with a premium garden soil, another was filled with the same soil mixed with a little steer manure and the last container was filled with the same soil mixed with a little chicken manure.

Results
The radishes were harvested from each cantainer. The radishes from each container were counted and weighed. The container with the chicken manure out produced the other two containers by a ratio of at least 1 1/2 to 1.

Conclusions/Discussion
The harvest from the container with chicken manure out produced both the garden soil only and the garden soil with steer manure. Chicken manure has twice the amount of nitrogen and 4 times the amount of phosphorus than steer manure. These nutrients are essential for plant development and growth from seed to harvestable vegetables.

Summary Statement
Garden soil mixed with a small amount of chicken manure will out produce soil alone and soil mixed with steer manure.

Help Received
My parents helped with a small amount of computer work.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Chad D. Hughes

Project Number
J1622

Project Title
Soil Temperature and Seed Germination

Abstract

Objectives/Goals
The main purpose of this project was to show why corn is planted and at certain times of the year. If you plant at the wrong time then it takes longer for the crop to grow or it may not grow at all. To find the right soil temperature will help farmers know when to plant for the best yields.

Methods/Materials
In this experiment three pots of soil were used. Each pot was planted with ten corn seeds. Pot one had a bag over the top with a heat light and a heating pad, so the soil could reach 85 degrees F. Pot two was close to the heat lamp that reached 70 degrees F. Pot three was left alone and the soil was 60 degrees F. The data from this experiment was collected every day by observing each pot and counting the seeds that had germinated.

Results
The results showed that pot one grew very fast. Within six days it had seven seeds that had sprouted. The other two pots only had one seed sprouted. The data showed that the warmer the soil the faster seeds would sprout.

Conclusions/Discussion
This experiment provides information that is important for farmers to know; The proper time to plant corn. The hypothesis that stated the warmer the soil, the faster corn will germinate and grow is supported by the results. This is why corn is planted from May till July instead of December to March. Proper soil temperature will save money in fuel and labor.

Summary Statement
The purpose of this project was to determine if soil temperature affected seed germination; the data showed that the warmer the soil the faster seeds would sprout.

Help Received
Father helped type report

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Kyle M. Ivey

Project Number
J1623

Project Title
The Speed of Sprouting Seeds: Techniques for Seed Germination

Abstract

Objectives/Goals
The objective of my project was to determine which soaking solution would germinate bean seeds most effectively. As a higher percentage of seeds successfully germinate, crop yields will increase. More efficient farming will lead to conservation of resources, including water, energy, fertilizers, and labor. After researching different seed soaking methods, I hypothesized that Humic acid would germinate the bean seeds most effectively.

Methods/Materials
In order to decide what kind of seed to use in the experiment, I did a pre-study with corn, bean, and pea seeds, soaking ten of each in the liquids that would be used in the actual study. Bean seeds responded with the greatest amount of variation, so I used them for my experiment. I soaked three sets of 10 bean seeds in separate cups containing the following: distilled water, hydrogen peroxide, malt, humic acid/water, potassium nitrate/water, and fish emulsion/water. I kept the seeds damp with the solution. The seeds were in between coffee filters to keep them moist. I recorded the germination results over a four-day period.

Results
Both number of seeds that sprouted and how quickly they germinated determined the best soaking method. The seeds in the Humic acid began sprouting first, with those in hydrogen peroxide following close behind. All 30 seeds soaked in hydrogen peroxide sprouted by the fourth day; 23 sprouted in the Humic acid. In both the fish emulsion and the water, 17 sprouted. Although the seeds sprouted in the fish emulsion, by the fourth day mold had grown on them. There was no response from the seeds soaked in Potassium nitrate or malt.

Conclusions/Discussion
The results were not consistent with my hypothesis. Although seeds did germinate in the Humic acid/water solution, they did not do so as fully as in the hydrogen peroxide. My conclusion is that hydrogen peroxide is the best solution (out of the ones I used) for germinating beans.

Summary Statement
The aim of the project was to identify an effective solution for germinating bean seeds.

Help Received
Advisor helped with Internet research and bibliography.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Taimi M. Jacobson

Project Number
J1624

Project Title
Is Spinach Made in the Shade?

Abstract

Objectives/Goals
Does the amount of light affect the germination of spinach seeds?

Methods/Materials
Spinach seeds were planted in individual "cells" in a styrofoam getminating tray.
To create different light strengths, shade cloths that block out in 50%, 75%, or 90% of the sunlight were used. To get direct sunlight (100%), no shade cloth was also used.

Results
Fourteen seeds germinated in Tray A (direct sunlight), 5 in Tray B (50% shade cloth), 8 in Tray C (75% shade cloth), and 3 in Tray D (90% shade cloth).

Conclusions/Discussion
As the seeds germinated, it was observed that the hypothesis was wrong. It was thought that spinach would not germinate to its fullest under the direct sunlight, but under the 50% shade cloth.
With this information it was determined that direct sunlight provided the best germination, while the rest of the light conditions were far behind.

There are four possible explanations as to why the spinach germinates best without the shade cloth. The first is that spinach seeds require direct sunlight. The second is that the soil must reach a certain temperature and the shade prevents the sunlight from heating up the soil. A third explanation could be that the repeated wetting and then drying out of the soil is a factor that the spinach seeds may prefer; for example, this might prevent the growth of harmful microorganisms. Last, the shade cloth helped create an atmosphere that was both damp and still, which would promote the growth of potentially harmful microbes.

As for the real life implications of this experiment, if the process of germinating spinach could be improved just a little bit, it will save money, water, and make land use more efficient. A faster germinating spinach plant would affect the lives of many people who work with or around spinach, such as farmers, chefs, grocers, people who make dye out of its green color, and even the people who drive the large trucks that transport the spinach. A little improvement in the growth of spinach will go a long way, and might even help feed thousands all over world.

I would like to suggest future experiment in which the conduction of the light remains constant, but such factors as ventilation, soil sterility, temperature and degree of humidity are varied.

Summary Statement
The germination of spinach seeds under various natural light conditions.

Help Received
Father helped type report; Mother helped drill holes and build in wooden shade support frame.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Adam Z. Kalawi

Project Number
J1625

Project Title
Does the Color of Light Affect Plant Growth?

Abstract

Objectives/Goals
My objective is to find out how different light colors affect plant growth.

Methods/Materials
- 4 boxes
- Colored Transparencies: Red, Blue, Green, Yellow, and Clear.
- 5 flower pots and plastic bowls (for drainage)
- 15 lima bean seeds
- Potting soil
- Tap water
- 5 rulers
- Scissors
- Box cutters
- Construction paper in Red, Blue, Green, Yellow, and White.
- Tape
- Cup
- Paper towel

I built three boxes with 5 different colored transparencies on top and front. I planted seeds about ½ inch into the pots and let them grow. I recorded measurements every 2-3 days. The Plants were shown different colored light. There were 3 different plants for each different colored light. I measured overall height and leaf width for the tallest and best plant of each color.

Results
The red grew the tallest, but the transparent was the healthiest. The blue died midway through the project and the yellow was close to beating red. The green did poorly.

Conclusions/Discussion
My hypothesis was somewhat correct because red was the tallest and green was the worst living plant. I did not expect that the transparent plant would be the healthiest. I conclude that if you want a healthy plant show the plants the full color spectrum, but if you want a tall plant you should only show the plant red light.

Summary Statement
Finding out how different colored lights affect plant growth.

Help Received
My mother helped setting up project and using the paper cutter and box cutter.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Mary M. Karcher

Project Number
J1626

Project Title
The Effect of Sugar on Bean Plant Growth

Abstract

Objectives/Goals
My project was to determine if bean plants grew stronger and healthier by the addition of the right amount of sugar to their watering. I believe that plants that receive 50 grams of sugar per liter of water would help bean plants grow to be stronger, healthier and larger because they would get energy from the sugar.

Methods/Materials
36 bean plants were grown in potting soil. The same amount of soil was used in each pot and it had no added nutrients. The plants were grown under 24 hour light, for the same length of time. They were watered everyday with 22.18 milliliters of water. The amount of sugar in the water was either: no sugar, (control), 25 grams of sugar per liter of water, 50 grams of sugar per liter of water or 75 grams of sugar per liter of water. The plants grew for 28 days. Each plant was removed gently from the pot, rinsed in water, and measured. The roots and the plant itself were measured separately.

Results
The plants with watered with 50 grams of sugar per liter of water were the strongest, healthiest and the largest. This was determined by measurement and visual inspection.

Conclusions/Discussion
The plants with watered with 50 grams of sugar per liter of water were the strongest, healthiest and the largest. This was determined by measurement and visual inspection.

Summary Statement
My project determined whether sugar effected bean plant growth.

Help Received
Mother helped type and used the X-Acto knife.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Eric S.K. Koons

Project Number
J1627

Project Title
Compost or Fertilizer

Abstract

Objectives/Goals
The objective of my project was to find out if compost or store bought fertilizer helps vegetables grow taller.

Methods/Materials
I had 12 pots and 4 different groups of 3. For 3 out of 4 I filled to the top with Black Magic Potting Soil and the last group I filled half with the soil and half with compost. In one of the groups I put 3 fertilizer stakes in each of the pots and in another group when I watered them I put 3 drops of liquid fertilizer in their water. One group was my control with only potting soil. All of the pots had 3 beans in them. I grew my plants under a grow light, which was on for 14 hours a day. I watered them all about every 3 days or when they were dry. I recorded all my information and every day recorded all the plants heights.

Results
The liquid fertilizer plants had the tallest average growth and the compost had the lowest average growth out of the plants in my experiment.

Conclusions/Discussion
My conclusion is that the plants fed with liquid fertilizer in their water will grow the tallest, but I found the compost plants had the thickest stems out of the beans in my experiment even though they were the shortest.

Summary Statement
My project is to find if liquid fertilizer, stick fertilizer, compost, or just soil makes vegetables grow tallest.

Help Received
Mother helped get materials; Father helped put light up; Ms. Ligeti helped put write up together

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Melissa Moseman; Brianna Nelson

Project Number
J1628

Project Title
What Do Plants Need Most?

Abstract

Objectives/Goals
The purpose of this project is to find out which factor is most important for plant growth: sunlight, water, or good quality soil. We made a hypothesis that water is the most important factor, then sunlight, then soil.

Methods/Materials
Method: We planted ten seeds in each pot, four in sand and four in good soil. We labeled each pot with a letter from A to H. Each letter has a different combination of the amount of water, the amount of sunlight, and the quality of the soil that they^Ore in. We put the plants that had high amounts of light in a window, and the plants that had low amounts of light in a closet. We decided that, on the moisture meter, the plants with low amounts of water should be about a 2, and the plants with high amounts of water should be about a 9, and we watered accordingly. Once the plants started growing, we began to record what day they sprouted, how many stalks were in the pot, how many leaves were on each stalk, how tall each plant is, what color it is, and how healthy it looks. After one month, we judged the plants on their height, the number of stalks in the pot, the number of leaves on each stalk, their color, and their health, and then compared that to our hypothesis.

Materials: 8 pots, 1 bag of sand, about 100 pebbles, 1 bag of potting soil, 2 packets of Columbine seeds, 1 bottle of Miracle Gro, 1 measuring cup, 1 ruler, and 1 moisture meter.

Results
The plants in the shade grew quickest, but weren't as strong. The plants in the sunlight took longer to grow, but were much healthier.

Conclusions/Discussion
We thought that water was the most important factor in plant growth, but based on our rankings, we decided that sunlight is the most important factor. We learned that plants can grow without much sunlight, but they are white, skinny, and weak. With sunlight, plants are greener and stronger than if they were not in light.

Summary Statement
We tested which factor was most important to plant growth: sunlight, water, or good soil.

Help Received
Parents drove us to each other's houses, and payed for materials.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Raman V. Nelakanti

Project Number
J1629

Project Title
Factors Affecting Nodule Formations in Legumes

Abstract

Objectives/Goals
Rhizobium leguminosarum bacteria share an important relationship with legumes. Rhizobium bacteria fix nitrogen for a legume plant and in return, the bacteria get shelter and nutrients in a nodule. The purpose of the experiment was to find what factors are important in the formation of nodules on legumes.

Methods/Materials
Legumes were planted in a community garden and in the laboratory with potting soil, vermiculite, and vermiculite with inoculated rhizobium. At termination, the roots were searched for nodules. The material used were: 12 pots, 2 bags of vermiculite, a bag of potting soil, 36 snow pea seeds, Bacteria (Rhizobium leguminosarum) from the Carolina Biological Supply Company (Catalog # ER-15-5270, non-pathogenic), nutrient broth, an inoculating loop, and a Bunsen burner.

Results
There was an average of 12 nodules in community garden plants, 3 for potting soil, and none in both the vermiculite with and without bacteria.

Conclusions/Discussion
The presence of rhizobium bacteria is a factor affecting nodule formation. The results from my field observation and from the positive control group indicate that the factors affecting the formation of nodules, is not just the presence of the Rhizobium bacteria, but also the time factor, temperature factor, as well as the nutrient factor and others.

Summary Statement
The main point of my project was to find what factors such as time, nutrients, and moisture, affect nodule formation in legumes.

Help Received
Mr. Lee, my advisor, taught me the scientific method and got me the materials needed for the project.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Carolyn C. Pandol

Project Number
J1630

Project Title
Does the Color of Light Affect Plant Growth?

Abstract

Objectives/Goals
I would like to know which color in the light spectrum is most needed for plant growth.

Methods/Materials
Materials: 1)Tinker Toy set 2) 4 colors of plastic wrap and clear wrap 3)tape 4) five small styrofome cups or bowls 5)a package of turnip seeds 6)water 7)fertilizer 8)digital gram sclae or triple beam balance 9)scissors 10)potting soil
method: 1)make 5 boxes out of tinker toys and cover with wrap, different color for every box 2)fill bowls(cups) with potting soil and fertilizer 3) water well 4)plant seeds 5)leave outside in full sun for 3 weeks or more 6) take plants out and wash excess dirt off roots 7) weigh roots and tops separatly

Results
Red was the largest overall. Green was much the same in the growth pattern but was smaller. Blue had the second-largest ratio but was otherwise average. Purple had the largest ratio and the smallest roots. Control was all around average!

Conclusions/Discussion
The plants covered by red plastic grew the largest overall. Plants cover by blue plastic had a greater top to root ratio which confirmed my research.

Summary Statement
I would like to know what color in the light spectum is most needed in plant growth.

Help Received
Dad helped with weighing of plants and most of the project ;

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
LeeAnn A. Patrick

Project Number
J1631

Project Title
Good Vibrations: How Does Music Affect Plant Growth?

Abstract

Objectives/Goals
My objective was to find out if music affected plant growth and if so, how?

Methods/Materials
First I ordered 50 fast plant seeds for the experiment. Then I built four boxes out of plywood and I fitted sound proof foam insulation. I planted the fast plant seeds in black planters and put together the reservoirs for watering. I put a planter and reservoir in each box with a CD player out front and headphones inside with the plants. Everyday for twenty days I checked on the plants and recorded their growth.

Results
Silence grew the best and healthiest followed by spoken word (Harry Potter). Classical music (Vivaldi concertos) ended up just under spoken word. Bringing up the rear was a very small and unhealthy plant that was 'listening' to heavy metal and (harsh) world music (Mudvayne and Rammstein).

Conclusions/Discussion
From my twenty days of information gathering I have drawn the conclusion that all music/spoken word affects plant growth negatively. Some plants were affected more negatively than others. So I can just repeat an old saying, 'Silence is golden.'

Summary Statement
Discovering how music and spoken word affect plant growth.

Help Received
Mother helped take photos and set up board; Father helped build boxes and set up project; Got advice from my science teacher, Mr. Kinsella.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Dallas S. Peters

Project Number
J1632

Project Title
The Effects of Ocean Water as an Irrigation Supplement on the Growth of Rice Seedlings

Abstract

Objectives/Goals
My project objective was to determine the tolerance of different salinity levels from diluted ocean water on rice seedlings growth.

Methods/Materials
Purified drinking water, ocean water samples,M-201 Oryza sativa (rice seeds). Dilute the ocean water samples by 1/4, 1/2, and 3/4 with the purified drinking water. Then use these samples to irrigate the rice seedlings twice a day for nine days, once the seeds have started to sprout. Count, measure, and record growth of rice seedlings every other day.

Results
The seedlings irrigated with water diluted with 1/4 ocean water(containing salinity levels of 6.7 parts per million) had very little affect on the seedlings growth when compared to the control. The test sample irrigated with the water diluted with 3/4 ocean water(containing salinity levels of 8.8 parts per million) had a very damaging affect on the young seedlings.

Conclusions/Discussion
My conclusion is that smaller amounts of salinity from ocean water would not make a strong impact on the growth and stand density of rice seedlings.

Summary Statement
The tolerance of different salinity levels from diluted ocean water on rice seedlings growth.

Help Received
Recieved seeds from James E. Hill, UC Davis, Extension Agronomist; Mother helped type report; Verbal interview with Mike Hillhouse, ranch foreman, Koda Farms; Seeds and information from Dr. Catherine Grieve, USDA-ARS, U.S. Salinity Lab

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Jason R. Regier

Project Number
J1633

Project Title
Determining the Effects of Nutrient Concentrations on Hydroponically Grown Lettuce, Year 2

Abstract

Objectives/Goals
The purpose of my science project is to determine the effects of different concentrations of fertilizer on hydroponically grown lettuce.

Methods/Materials
Red Leaf lettuce seeds were germinated in individual starter cups.Three separate hyproponic tanks were constructed. A Styrofoam panel was placed within each tank. Holes were drilled through the panels to form "pockets" for each starter cup. Aerators were connected to each tank to supply oxygen. Artifical plant lights were hung over each tank to substitute for sunlight. Water and MAXSEA 16-16-16 fertilizer was added to each tank.

Results
The plant weight varied from tank to tank depending on the amount of fertilizer added per gallon of water. Plant health also was affected by the amount of fertilazer added.

Conclusions/Discussion
As a result of conducting this investigation, I learned that variations in fertilizer can impede the growth rate of plants. Plants may produce less or more plant weight due to the amount of fertilizer added.

Summary Statement
To determine the effects of nutrient concentrations on hydroponically grown lettuce.

Help Received
Mother helped type report; Father help construct planting beds

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Stephanie Rae P. Samson

Project Number
J1634

Project Title
Photoperiodism in Mung Bean Plants

Abstract

Objectives/Goals
This project deals mostly with photoperiodic responses of mung bean plants when exposed to amounts of light to dark varying from 8 hours of artificial light and 16 hours dark and vice versa. I hypothesized that plants exposed the largest amount of light to be tested (the ratio 16:8) would express the most positive photoperiodic responses.

Methods/Materials
1. Fill all 25 of your pots or cups to about 3cm from the top with Miracle Grow brand potting soil, then place 7 seeds in each of the pots about 2cm below the surface and water them every other day.
2. Once the plants in each pot have reached 4cm, you are ready to begin your experiment. If all 7 or if 6 seeds sprouted, pluck out the weakest of the pot until there are 5 left.
3. Clear the testing area.
4. Install and plug in your fluorescent lighting.
5. Set your timer to the hours of your choice. Make sure there is exactly a 16 hour period between the "on" and "off" times.
6. Set your plants as directly beneath the fixture as possible.
7. Label each cup. Five are to be labeled 8:16, another five 10:14, 12:12, 14:10, and 16:8, representing the amount of light to dark each is to receive in a 24-hour period.
8. Move plants into light or darkness according to their labels. Have a dark area prepared.
9. Water and rotate the plants every other day.
10. Be sure to note any differences in the physical appearance of plants; these may include wilting and a slightly different coloration as well as new leaves and flowering.
11. Make final measurements and observations at the end of your experiment in about 3-4 weeks.

Results
In the end, I had to reject my hypothesis, discovering that the plants in the 14:10 group prospered best overall. The 16:8 group had the lowest survival rate against the insects and were rather malnourished.

Conclusions/Discussion
Plants that received a 16:8 ratio of light-to-dark in 24 hours actually were unhealthy, contrary to my hypothesis. The plants that showed the most positive photoperiodic responses were those in the group that received a 14:10 ratio of light-to-dark in 24 hours.

From my research and data, I can infer that plants in the 16:8 group did not prosper because of lack of respiration time; they grew slowly and were not able to heal and defend parts of the plant damaged by

Summary Statement
This project deals mostly with the photoperiodic responses of mung bean plants and what amount of light to dark in a 24-hour period would promote the healthiest growth and greatest development.

Help Received
Dad and Mom: bought me supplies; my brother: photography; my grandparents: transportation; Mrs. Susan Rizk: science-related advice; Ms. Sue Okada: interview

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Alexandra L. Shew

Project Number
J1635

Project Title
Live Oaks: Stratification Time vs. Germination Rate

Abstract

Objectives/Goals
The live oak tree is a large part of the native California landscape. Live oak seedlings are found to be limited when the oak woodlands community is examined. A member of the black oak group, the acorn produced by the live oak needs cold stratification to germinate. Studies reveal that a temperature of 3-4 degress Celsius for stratification was optimal in allowing the germination process to begin. The goal was to determine the optimal length of stratification and whether too much stratificaion could effect germination.A hypothesis stated the longer the stratification the greater the germination rate.

Methods/Materials
Live oak acorns were gathered from a single tree. These acorns were planted in groups of 20 at 2-week intervals for 8 weeks beginning with immediate planting on gathering day. The remainder of the acorns were placed in refrigeration at 3 degrees Celsius for the duration of the experiment. After all planting was completed the acorn tubes were housed in the same temperature with regular watering for two months. The planted acorns were checked for germination at three intervals.

Results
The hypothesis of longer stratification producing greater germination was incorrect.It was found that the live oak acorns from the 4-week stratification group produced the greatest germination. Groups before and after that period fall in germination rate. At 4 weeks, 15 out of 20 acorns germinated. Before that period the average was 2-4 germinated out of 20. The post 4 week average was 8 out of twenty.

Conclusions/Discussion
Live oaks need a small specific time of cold temperature stratification to germinate. Varying winter temperature in California effect their germination and reduce the amount of seedlings. Studies to evalutate if temperature changes are due to normal weather cycles or global warming would add to this experiment. It would be exciting if correlation to global warming could be brought home to a specific species of oak so prominant in California.

Summary Statement
My project compares how varying stratification times effect the germination rates of live oak acorns.

Help Received
Mom helped gather acorns. Teacher checked on progress. Mom provided transportation to check acorns.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Jennifer A. Shipley

Project Number
J1636

Project Title
The Mysteries of Plants and Light: The Effects of Wavelengths of Light on Plant Food Production

Abstract

Objectives/Goals
Is plant food production affected by different wavelengths of light? My hypothesis is that the plant under the green filter, which only allows green wavelengths through, will not absorb a wide enough photosynthetic light spectrum for healthy food production. Knowing which wavelength is most effective in food production is a valuable tool in artificial plant settings.

Methods/Materials
I made five experimental chambers. I cut the bottom off of tissue box. I lined the inside with Mylar reflective film sheeting. I covered three tops with Roscolux colored filters, numbers 4690 (red), 67 (light sky blue) and 94 (Kelly green). One chamber was covered with black tape, the fifth had no covering. I placed 5 Chinese minuet cabbages under the chambers. The plants were exposed to a full spectrum Bulbrite plant growth light bulb for 48 hours.

I placed each leaf sample in 100 milliliters of boiling water for 30 seconds. Wearing goggles, I removed the chlorophyll from each leaf by placing each in 100 milliliters of Ethanol alcohol at 750 C for five minutes. The ethanol was heated in the 250-milliliter beaker placed in 600-milliliter beaker full of water over a hot plate. After five minutes, I removed the leaf from the alcohol with tongs. I dipped each in a cup of water to cool and rinse them. I dried them with a paper towel. I dripped about 20-25 drops of Lugols solution onto the leaf. I labeled each sample and used a digital camera to take pictures. I transferred the picture of leaf onto the computer in Microsoft Word. I enlarged the picture of the leaf and placed a grid over it. I rated each cell of the grid on a scale of zero to five, five the darkest number and zero almost white. I transferred the whole grid to Microsoft Excel where it added the total of all the cells, and then I went back to Word to find the amount of characters. I divided the total from Excel by the number of characters. This gave me the average number value for each cell of each leaf.

Results
It turned out that the green filter sample produced
the least amount of food. The plant under the blue filter produced the most amount of food.

Conclusions/Discussion
The green filter only allowed the green wavelength through, which was reflected from the green leaf. Whereas the blue and red filters allowed the wavelengths through which were absorbed by the leaf.

Summary Statement
A plant depends upon certain wavelengths of light for its own food production.

Help Received
Father assisted in creating graphs. Mother supervised experiment.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Courtney J. Smith

Project Number
J1637

Project Title
The Effects of Various Ozone Levels on Gossypium barbadense C.V. Pima S-6

Abstract

Objectives/Goals
The purpose of this study was to determine if Gossypium barbadense c.v. pima S-6 exposed to low, medium, and high levels of ozone would affect the G. barbadenses' roots and shoots. This study was conducted to help know how ozone affects plant growth.

Methods/Materials
Three chambers were programmed at a high level of ozone, three at medium, and three at low. Each chamber contained 12 pots, with two seeds each, totaling 216 plants. Each week, two pots were taken from each chamber. One plant per pot, exhibiting the poorest growth, was eliminated. Each plant was washed and cut, separating the root and shoot. Each root and shoot were weighed, measured, and dried in force-air ovens. Dry weights were recorded for each root and shoot. This was completed over a six week study period and was repeated for another six weeks. Each group was identified as a generation.

Results
The results of this study showed that the average growth of plant roots grown in varying levels of ozone were as follows: high 0.19 g, medium 0.47 g, low 0.84 g. The average growth of plant shoots were as follows: high 0.74 g, medium 1.15 g, low 1.86 g. Plants exposed to low levels performed best, exhibiting the highest growth rates.

Conclusions/Discussion
Ozone affected the growth of the G. barbadenses' roots and shoots. However, ozone affected root growth more than the shoot. Ozone contributes to poor air quality in the Central Valley, which in turn affects the yeilds of crops grown. This results in less profits for farmers.

Summary Statement
The purpose of this study was to determine the affects of various levels of ozone on the growth of Gossypium barbadense c.v. pima S-6; the data showed that plants exposed to low levels exhibited the highest growth rates.

Help Received
Used lab facilities and equipment at UC California Kearney Agricultural Center under the supervision of Dr. David Grantz

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Elena Vergara

Project Number
J1638

Project Title
Bean Plants and the Amount of Chlorophyll They Have with Different Types of Soils

Abstract

Objectives/Goals
My project was to determine if different types of soils have an effect on the amount of chlorophyll in pinto bean plant.

Methods/Materials
First, I planted nine plants,three tests in each type of soil. After fifty-nine days, I took a nine centimeter square piece leaf and crushed it. I added 20 milliliters of rubbing alcohol and boiled each solution in a test tube to obtain a chlorophyll solution. I filtered each solution to get rid of any leaf fragments and poured it into a small bottle to allow the solution to cool. I placed each sample in the spectrophotometer, which gave me a transmittance reading equal to the amount of chlorophyll in the solution. I measured the amount of chlorophyll at both a 660-nanometer and 440-nanometer wavelengths. I graphed and charted all of my results and compared to make my final conclusion. My materials were: nine pinto bean seeds, spectrophotometer, seventeen test tubes, three ring stands, heat plate, glass pot, 4 test tube clamps, rubbing alcohol, Whitney Farms Potting Soil, Whitney Farms Seed Starting Mix, and my Backyard Soil.

Results
The bean plants planted in Whitney Farms Potting Soil had the most chlorophyll, the beans plants planted in My Backyard Soil (mostly moist sand) had the second greatest amount of chlorophyll, and the bean plants planted in Whitney Farms Seed-Starting Mix had the least amount of chlorophyll. On average the bean plants planted in Premium Potting Soil had 36.7 at a 440 wavelength and at a 660 wavelength it had 98.03. On average, the amount of chlorophyll that the bean plants planted in Seed-Starting Mix had is 29.5 at a 440 wavelength and had 49.13 at a 660 wavelength. On average, the amount of chlorophyll and the bean plants planted in Backyard soil (mostly moist sand) had are 33.7 at a 440 wavelength and had 98.03 at a 660 wavelength.

Conclusions/Discussion
My conclusion is that the bean plants planted in Whitney Farms Potting Soil had the most chlorophyll, the beans plants planted in My Backyard Soil (mostly moist sand) had the second greatest amount of chlorophyll, and the bean plants planted in Whitney Farms Seed-Starting Mix had the least amount of chlorophyll. So, my hypothesis was incorrect; although these results were not significantly different.

Summary Statement
My Project was to see if different types of soils have an effect on the amount of chlorophyll in the leaf of a pinto bean plant.

Help Received
I received help from my science teacher, Mrs. Kathy Blakemore, my overall supervisor. I also used a spectrophotometer from Temescal Canyon High School under the guidance of Ricardo Gutierrez, a teacher at Temescal Canyon High School. My mom helped me glue my papers on my board and Tom

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Sarah Waliany

Project Number
J1639

Project Title
Novel Ways to Increase the Vitamin C Production in Lettuces without Genetic Manipulation

Abstract

Objectives/Goals
This study was conducted to increase the production of Vitamin C in leafy lettuces without genetic manipulation.

Methods/Materials
For eight months, 224 leafy lettuces (Grand Rapids) were grown. They were exposed to the same temperature and soil, and they received 200 ml of water per flat each day.
Phase 1: Planting of lettuce leaves: After germination, only 224 seedlings that were 2.5 inches tall were selected to be transplanted and divided into seven groups. Each group contained 32 seedlings.
Phase 2: After transplanting, once a week for the next eight months, Group 1 received chewable Vitamin C tablets; Group 2, pectin powder; Group 3, blended ripe strawberries; Group 4, D-galacturonic acid; Group 5, L-galactono-1,4-lactone; Group 6, homogenized orange peels; and Group 7, nothing. The substances were mixed with distilled water before they were applied to the soil around the lettuces.
Phase 3: Once a month, lettuce leaves were plucked, and their preservation was observed at room temperature every six hours for the next 24 hours.
Phase 4: Once a month, lettuce leaves were blended with distilled water. The amount of Vitamin C was measured from this extract by using DCPIP (dichlorophenolindophenol), and their acidity was measured by using pH strips.

Results
The average amounts of Vitamin C found in lettuce leaves extracts from Groups 5, 4, and 2 were 2.1 mg, 1.6 mg, and 1.4 mg per gram of lettuce leaves, respectively. The average amounts of Vitamin C in Groups 6, 3, 1, and 7 were 1.1 mg, 0.8 mg, 0.5 mg, and 0.18 mg per gram of lettuce leaves, respectively. The average pH levels of Groups 5,4,2,6,3,1, and 7 were 4.35, 4.85, 5.35, 5.7, 5.75, 6.025, and 6.325, respectively. Lettuce leaves in Group 5 showed the most preservation, while the lettuce leaves in Group 7 showed the least preservation. Lettuce leaves in Groups 1, 2, 3, 4, and 6 showed moderate preservation.

Conclusions/Discussion
This study showed that it is possible to increase the Vitamin C production by using natural means rather than genetic manipulation, thereby increasing the nutritional value and shelf life of lettuce leaves.

Summary Statement
The purpose of this project was to increase the Vitamin C production in leafy lettuces by giving them natural substances.

Help Received
My uncle helped me understand the chemistry.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Travis C. Wallace

Project Number
J1640

Project Title
Does a Magnetic Field Affect Plant Growth?

Abstract

Objectives/Goals
To determine the effect magnetic fields have on the growth of plants.

Methods/Materials
Start with 30 Styrofoam cups and place five holes in the bottom of each cup for water drainage. Fill each cup with a mixture of potting soil and dirt. Soak each cup with water. Separate the cups into groups of ten making three separate groups. The control group of cups is magnet free. In Group #A# place (2) 60 grade #A# cow magnets on each side of cup far enough apart that they won#t stick to each other. In Group #B# place (4) 60 grade #A# cow magnets one on top of the other on each side of cup, again making sure they do not stick to each other. Separate each group so magnetic fields will not interfere with control group or interact with Group #A# and #B#. Place four radish seeds in each cup and water each plant with 250 ml of water each day. As plants grow log and chart daily the number of leaves, the length of stems and width of stems. At four weeks remove plants carefully so as to include roots and dry each group of plants and weighing daily until the weight stays the same.

Results
Analysis of all data by use of graphs failed to conclusively prove that the hypothesis was correct. Some data, number of leaves and dried weight, showed a trend to larger plants in the #B# group. Other factors such as rate of growth and smaller weights as plants dried out did affect the results. Overall it seemed the experiment with EMF#s did not effect plant growth in a positive way. In general, the hypothesis was not proven.

Conclusions/Discussion
Interpretation of the data show in general magnetic fields (EMF) did not affect the plant growth. Both stem height and leaf width was inconclusive. The number of leaves and dried weight showed stronger growth in the "B# group. Overall the experiment concluded that the magnetic fields did not affect plant growth as expected.

Summary Statement
To determine the effect magnetic fields have on the growth of plants.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Emily C. Wong

Project Number
J1641

Project Title
What Are the Effects of Soil Sterilization on Pea Plant Growth?

Abstract

Objectives/Goals
This study examined the question of which type of soil pea plants grew better in- sterile, sterile with nitrogen fertilizers, or untreated soil.

Methods/Materials
A total of 24 pea plant seeds were planted, eight in sterile soil, eight in sterile soil treated with nitrogen fertilizer, and the remaining eight in an unsterilized soil control. Plants were observed over a 20-day period. Seedling germination rate and height were measured daily.

Results
Results showed that the plants grown in sterile soil with nitrogen fertilizers added were less healthy and stayed considerably smaller than those planted in sterile soil. The peas planted in untreated soil showed the poorest growth, with the least germination and very weak and diseased development. The results suggest that sterilizing the soil benefits pea plant growth, but that adding fertilizer may not always be beneficial for plant growth.

Conclusions/Discussion
This study showed that soil treatments can make a significant difference in pea plant growth. Specifically, pea plants grew best in sterilized soil, and worst in untreated compost. This may be because sterilizing the soil gets rid of harmful soil organisms that can affect the growth of the pea plant. Adding nitrogen fertilizer to sterilized soil did not improve growth; in fact, the pea plants did worse in fertilized sterile soil than in sterile soil alone.

Summary Statement
Which type of soil will benefit pea plant growth- sterilized soil, sterilized soil with nitrogen fertilizer or untreated soil?

Help Received
Father helped print pictures