



CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

Name(s) Riley K. Adams	Project Number J2301
Project Title Experimental Methods of Eradicating Invasive Pampas Grass	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Pampas Grass, <i>Cortaderia selloana</i>, is an invasive plant originally from South America. It is causing problems along the California coast, including areas of coastal sage scrub. There are over 1,500 acres of Pampas Grass from San Diego to Santa Barbara. Pampas Grass is a difficult plant to remove. The plants are very large and have sharp leaves. The entire plant must be dug up or sprayed with an herbicide. My yard is filled with Pampas Grass. I wondered if I could find alternative ways to remove Pampas Grass that might be environmentally friendly and involve less labor. I tested four methods of eradication.</p> <p>Methods/Materials I sprayed some mature <i>selloana</i> plants with vinegar which is 5% acetic acid. I sprayed another group of <i>selloana</i> plants with Round-Up, a commonly used herbicide. The third method I tried was my own idea. I used an opaque tarp to cover the plants in order to block sunlight and inhibit photosynthesis. Finally, I tried a method I had heard used with other plants. I applied dry ice to freeze the roots and kill the Pampas Grass. I tested and photographed the 35 experimental plants for five weeks.</p> <p>Results After one week of testing, plants treated with dry ice appeared most withered. After two weeks, it appeared the plants treated with vinegar were turning brown quickest. On the third week of testing, the Round-Up seemed most effective in destroying Pampas Grass. After four weeks of testing were completed, I pull two experimental plants from each group to see how each treatment had affected the roots. I used a cable and a truck to remove the plants and recorded how difficult it was to pull each plant. I removed the rest of the experimental plants after five weeks. Plants treated with dry ice were easiest to remove, followed by Round-Up treated plants, the vinegar, and last, the tarp method.</p> <p>Conclusions/Discussion Using Round-Up or dry ice seemed to work best in eradicating the Pampas Grass in this experiment. In watershed areas where Round-Up is not allowed, an operator's license is required to spray Aqua-Master to eradicate the plants. This is an expensive process. Dry ice applications might serve as an alternative method of eradication. Vinegar or tarps might even work on smaller <i>selloana</i> plants.</p>	
Summary Statement The goal of this project was to explore a variety of methods for eradicating invasive <i>Cortaderia selloana</i> , Pampas Grass, and compare the results for suggested methods to methods which were my own ideas.	
Help Received My parents and brother helped me prepare the plants for experimentation as well as help me pull the plants out of the ground. I interviewed and had questions answered by Amy Trujillo, from the San Elijo Lagoon Conservancy regarding Pampas Grass. I received guidance with my report and identifying native	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Stacey Bacheller; Kaitlyn Miller	Project Number J2302
Project Title If Solar Radiation Increases: Is Our Food Supply at Risk?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Introduction: Increasing amounts of ionizing radiation are passing through to the earth because of ozone depletion. What is the effect of ionizing radiation on plants?</p> <p>Methods/Materials Procedure: Five groups of corn, and five groups of soybeans were radiated ranging from no radiation to high doses of radiation. The groups were radiated three times per week for four weeks and measured for germination and growth.</p> <p>Results The treated plants germinated more quickly and grew faster, initially. The germination and growth of corn by the end of the experiment was similar for all groups. However, increasing doses of radiation impacted the germination of soybeans, the highest dose group had a 13% reduction of germination compared to the control. The growth of soybeans at the end of the experiment was similar for all groups.</p> <p>Conclusions/Discussion Conclusion: We found that our hypothesis was only partially correct. Unexpectedly, the radiation appeared to cause faster germination and faster growth initially. However, by the end of the four-week experiment the radiated plants growth rate slowed, while the control groups growth rates increased. If the changes in germination and growth rates are seen over the life of the plants the radiation impact on agriculture may be significant.</p>	
Summary Statement To study the effect of increasing levels of solar radiation reaching the earth and the impact on the germination and growth rate of corn and soybean seeds.	
Help Received North Oaks Radition Center provided a linear accelator and my father, a radiation oncologist, provided guidance on the project.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Susmitha Bhat	Project Number J2303
Project Title Effect of Various Pollutants on the Aquatic Plant, Egeria densa	
Abstract Objectives/Goals I chose to do this project to understand the effects of pollution on aquatic plants to help better protect the ecosystems in the future. Of the several pollutants that can get into the water system, I picked motor oil, bleach, used cooking oil, and mosquito repellent to do my experiments with. I wanted to find which of these pollutants cause the most damage to the aquatic plant, Egeria Densa. Methods/Materials I setup the first round of experiments using one control (regular tap water) and created the polluted environment with 2%, 4%, 6%, 8%, and 10% concentrations, each of motor oil, laundry bleach, used cooking oil and mosquito repellent. All these were placed in an array of 21 different beakers. I grew 5cm sprigs of Elodea in each of these beakers and watched them grow for 3 weeks. I then repeated similar procedures at lower pollutant concentrations of 0.4%, 0.8%, 1.2% and 1.6%. Lastly, I observed the pollution-damaged leaves under a microscope and took pictures of the cell structure. Results For all the levels of concentrations that I experimented with, compared to the control, the plants in the polluted waters either did not grow, or the leaves turned translucent. Since relative length measurement was not an option, I devised a new methodology to compare the effects of different pollutants. I took the digitized image of the cell structure and recorded the RGB color values (using GNU software called GIMP) for various points within the JPEG image. Using this method, I found that the bleach was the worst pollutant followed closely by motor-oil. Used cooking oil, and mosquito repellent were not too far either. Conclusions/Discussion My hypothesis that the pollutants that I picked would have an adverse effect on the aquatic plant was correct. However, I did not realize that some of the pollutants would discolor the plants losing all the chlorophyll (as in the case of bleach) even at 0.4% concentration levels. I have many ideas on how to do further research in this area. I would like to see if they would return to their regular growth patterns if transplanted into fresh water. That experiment would let us know if the effects of man-made pollutions are reversible.	
Summary Statement A study of the development of aquatic plant, Egeria Densa, when subjected to polluted environments	
Help Received Brother helped with GNU tools; Father helped in brainstorming topics on pollution.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Tara Clark; Michaela Zertuche	Project Number J2304
Project Title Nano-Nano: Do Nanoparticles in Cosmetics Have an Effect on Protists?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals We chose this project because we both wanted to learn the health risks of materials in everyday products. We researched items such as makeup, paper, etc. and found that nanoparticles are in a majority of commonly used objects today. If we expose cells to nanoparticles, we think that the nanoparticles will diffuse into the cells because of their particle size.</p> <p>Methods/Materials In this experiment, we used Zinc Oxide, Titanium Oxide, Amoeba, powder foundation makeup, Paramecium, a microscope, and viewing chambers. We made a 5%, 8%, and 10% solution of the nanoparticles with water and exposed them to the protists. We viewed the reaction under a microscope.</p> <p>Results In our experiment, we chose non-ciliated organisms to mirror the potential effect on cells. Our results have shown that our 5%, 8%, and 10% nanopowder solutions all affected the amoebas and paramecium. Within 20 seconds, all of the protists had died. Our hypothesis was supported knowing that none of the protists had survived during our experiment.</p> <p>Conclusions/Discussion Our hypothesis of whether or not nanoparticles would diffuse into the cells was supported. The nanoparticles did majorly affect all of our protists. Now we know that products containing zinc and titanium oxide can be bad for our skin surfaces.</p>	
Summary Statement Our project is about investigating the effect of nanoparticles on protists.	
Help Received Schmahl Science Workshop Bio-Mobile Lab for help and materials	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Elizabeth de la Torre	Project Number J2305
Project Title The Effect of Ashes on Seed Viability and an Epigeic Worm's Mortality	
Abstract Objectives/Goals In 2005, Rancho Palos Verdes suffered a 200 acre wildfire. This project investigates the effect of residual ashes to the viability of seeds indigenous to the area, expressed through seed germination rates and seed embryo root elongation; and the mortality rate of the epigeic (surface dwelling) earthworm <i>Eisenia fetida</i> . While wildfires are destructive, ironically, ashes are occasionally a recommended fertilizer, and some chaparral plant species have adapted to particular fire regimes. Methods/Materials Each species of seed was exposed to 5 concentrations of ashes in 5 containers, 10 seeds each, with sterile silica sand, (a 6th cup, excluded ashes: control), kept in a dark germinator (20-23.9°C) until germination started, then 16-18°C dark-8hrs to 22-24°C light-16hrs, and examined upon control's 65% (or maximum) germination. Prior exposure, each species was treated to overcome dormancy. <i>E. fetida</i> was exposed to the same 5 concentrations in 5 containers, 10 worms each, with sterile soil (a 6th container excluded ashes: control), kept in the dark (20-24°C) 14 days; then mortality was recorded. Both procedures were replicated 3 times. Substrates were kept 35% moist @ 6.8-7pH. Ashes were made from vegetation common to the wildfire area. Results For all 6 seed species, the mean germination rates: 7%, 23%, 38%, 58%, 64%, 85%; mean elongation (cm): .53, 1.97, 2.21, 3.13, 3.78, 4.16. <i>E. fetida</i> 's mortality ranged: 33%, 3%, 0%, 7%, 0%. Results were based on 5 ash levels + control in this sequence: 2.35cm, 1.17cm, .59cm, .29cm, .15cm, none. Tested ashes contained surplus phosphorous (>14ppm) & potassium (>220ppm). At the highest concentration level 3 species of seed failed to germinate. Conclusions/Discussion Thus, while research suggests some flora benefit from ashes, ashes at all 5 concentration levels inhibited the germination rates and embryo root elongation of all 6 species of herbaceous plant seeds, native to Rancho Palos Verdes' chaparral and coastal scrub. The overall mean germination rate decreased up to 92% and the overall mean root elongation decreased up to 87%, compared to the control groups. The elevated level of phosphorous & potassium found in the ashes may have caused or contributed to the reduced germination rates and root elongations. <i>E. fetida</i> suffered up to a 33% mortality. Thus, residual ashes, especially high concentrations, following a wildfire, should be dispersed to promote restoration.	
Summary Statement Ashes inhibited seed germination and root elongation, and caused <i>E. fetida</i> to suffer up to a 33% mortality. Thus dispersal of the residual ashes to less destructive concentrations may reduce the risk of erosion and aid restoration.	
Help Received My father provided supplies, equipment, encouragement, and helped me build an indoor greenhouse.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Jagjot S. Dosanjh	Project Number J2306
Project Title Investigating the Effects of Different Pollutants on Hydroponic Plant Growth	
Abstract Objectives/Goals I wanted to see how different pollutants in the environment will effect the growth of plants. Methods/Materials Collected pollutants (Exhaust, motor oil, fertilizer, soapy water, pesticide) Made a solution with water. 1 tablespoon of pollutant with 1/3 cup of water. Hydroponically grew plants. (radish) 4 cups with different pollutants. 4 seeds per cup 24 cups all together including the control. 96 seeds Recorded germination rate and growth for 2 weeks. Results Germination rates- Control all seeds germinated 4-5 days Exhaust - 50% germination 5-6 days pesticide - 12% germination 7-8 days motor oil, fertilizer, soapy water - 0% germination Growth -Control Average 1.69 inches Exhaust - 1.09 inches Pesticide - .07 inches Conclusions/Discussion Pollutants do have an effect on plant growth. Some effect the plants more than others. Motor oil, fertilizer, and soapy water. the solution rate was most likely too strong. Motor Oil will choke out the plant by blocking stomatas. We need to be aware of how pollutants are getting into our environment.	
Summary Statement My project will determine how pollutants effect plant growth and germination rates	
Help Received Teacher taught scientific method. helped get supplies.	



**CALIFORNIA STATE SCIENCE FAIR
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Name(s) Jake Forrester	Project Number J2307
Project Title Are Eco-Friendly Laundry Detergents Really Eco-Friendly?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals "If plants are watered with eco-friendly laundry detergents and regular laundry detergents then the plants being watered with eco-friendly laundry detergents will grow normally and the plants being watered with regular laundry detergents will weaken or die." The problem was "Can you water your lawn or plants with discharge water from a washing machine to conserve water?"</p> <p>Methods/Materials The experimental procedure began with planting three plants each in five planters using the same soil. Four solutions of water and laundry detergent were mixed, two regular (Tide and All) and two eco-friendly (7th Generation and Ecos). The fifth solution was the control solution, water. The plants were watered regularly with the solutions. Each week, the plants' sizes were measured and their conditions noted. The soils were tested for pH, Nitrogen, Potassium, and Phosphorus levels.</p> <p>Results For 7th Generation, two plants grew and one plant died. For All Detergent, all plants grew. For Tide, one plant died while two plants grew. For Ecos, two plants died and one plant grew. For water, one plant died and two grew.</p> <p>Conclusions/Discussion The hypothesis for this project was proven wrong because the plants watered with eco-friendly laundry detergents did not grow better than the plants watered with regular laundry detergents. Ecos, an eco-friendly detergent, caused the most damage to the plants. Tide, a regular detergent and 7th Generation, an eco-friendly detergent, did not seem to affect the plants negatively or positively. All, a regular detergent, seemed to benefit the plants' growth and performed similarly to the control solution, water.</p>	
Summary Statement This project tests whether or not the discharge water from a washing machine that contains eco-friendly laundry detergent can be used to water grass and plants in order to conserve and reuse water.	
Help Received Mom helped plan experiment, type report, setup board; Dad helped plant plants, take measurements, test soil; Science teacher helped discuss ideas, review work, and provide suggestions.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Hans Hansen; John Waggoner	Project Number J2308
Project Title Death Metal: Heavy Metals and Their Effect on Plants	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our objective was to determine the effects of heavy metals on the survival of plants and the tropic responses of their roots. We also wanted to determine if the response is the same for garden plants and wetland plants.</p> <p>Methods/Materials We tested the effect of copper chloride and zinc chloride on the growth of three species: radish and lettuce, which are garden plants, and the wetland plant, jaumea. We grew the plants hydroponically in solutions with 0.1, 0.01, or 0.001 g of the metal salt and compared them with controls grown in nutrient solutions made with Flora Gro. To test the effects of heavy metals on gravitropism seeds were germinated in the heavy metal solutions and set to grow in water. After one day the angle of deviation of the roots from vertical was measured.</p> <p>Results After 1 week, almost all of the garden plants in the 0.1g treatments were dead, but none of the wetland plant jaumea. Copper did the most amount of damage. Zinc was less poisonous. In the gravitropism experiments, the angle of deviation of the roots from vertical increased with increasing concentration of metal. Radishes showed a greater deviation from vertical than lettuce. Jaumea roots did not show sufficient variation from vertical to draw a conclusion that heavy metals affect its tropic responses.</p> <p>Conclusions/Discussion High concentrations drastically affect the survival of lettuce and radish. They do not seem to have an effect on jaumea as very few died. Wetland plants may have a greater tolerance for heavy metals in their water. Heavy metals seem to have a negative effect on the tropic responses of garden plants. They did not however seem to affect the wetland plant.</p>	
Summary Statement We tested the effect of different heavy metals, at different concentrations on the growth and gravitropic response of the garden plants, lettuce and radish, and the wetland plant jaumea.	
Help Received Ms. Britts for transportation and support. Dr. Philippa Drennan for giving us the copper chloride and zinc chloride, and for her advice. Mrs. Fricke for her advice and trust when we were dealing with heavy metals in her classroom.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Morgan N. Johnson	Project Number J2309
Project Title Safe or Sorry?	
Abstract Objectives/Goals My project was to determine which substance of toxic and non-toxic weed killers would work the fastest, be the cheapest, and stop regrowth on a flat 10# x 40# rectangle of weeds and grasses. I thought out of vinegar, bleach, rock salt and Roundup that the vinegar was going to work the fastest and stop regrowth, while the Roundup would be the cheapest. Methods/Materials Eight consecutive 10#x 40# rectangle patches of weeds and grasses were measured and marked. One with two cups of rock salt, then skipping a patch, the second with two cups of vinegar, then skipping another patch, the third with two cups of bleach, skipping the final patch, the fourth with a quarter of an ounce of Roundup mixed with two cups of water. I used a different sprayer for each liquid and a measuring cup for the rock salt. I watched and observed the patches over a two week time span. Results The vinegar was the fastest to kill the weeds and grasses, with the entire patch brown in three days. The vinegar was shortly followed by the bleach, with six days. After those the rock salt was brown within seven days. Lastly the Roundup was brown on the final day of my experiment, the fourteenth. Roundup still does not have any regrowth. The rock salt was by far the cheapest at \$0.12 for the patch. Conclusions/Discussion My conclusion is that each substance worked in my two week time span. Overall I think the best choice for someone who is looking for a non-toxic, very cheap weed killer was the rock salt. I am currently conducting the same experiment a second time to verify my results; I am making sure my results were not affected by precipitation, temperature and wind.	
Summary Statement My project is about which non-toxic weed and grass killer is effective and safe for pets.	
Help Received My mom supervised the spraying of each substance.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Caroline E. Lamoureux	Project Number J2310
Project Title Caffeine's Effect on Daphnia's Heart Rate	
Abstract Objectives/Goals The objective of the experiment is to determine whether caffeine (in the form of Monster energy drink) affects a daphnia's heart rate. Methods/Materials Five solutions were formed by mixing 0 ml, 59.15 ml, 118.29 ml, 177.44 ml, and 236.59 ml of Monster energy drink in a liter of spring water. Ten daphnia were placed in each solution and after five minutes their heart rates were observed under a microscope. Monster energy drink was used in the experiment as caffeine because it contains high amounts of caffeine (16 mg of caffeine per 160 ml of Monster energy drink). Results The results showed that when the scientist increased the amount of caffeine in the solution, the daphnia heart rates increased. In pure spring water (0 ml of Monster energy drink; the control group) the average daphnia heart rate was 117 beats per minute. When 59.15 ml, 118.29 ml, and 177.44 ml of Monster energy drink were added to a liter of spring water, the average daphnia heart rate (beats per minute) increased to 122, 134, and 177, respectively. When 236.59 ml of Monster energy drink was added to a liter of spring water, the resulting solution killed the daphnia. Their deaths may have been the result of too much caffeine or another chemical contained in Monster energy drink. Conclusions/Discussion The scientist proved that caffeine does affect a daphnia's heart rate. As more caffeine was added to the solution, the daphnia's heart rate increased. Caffeine has been used for hundreds of years in drinks, foods, and medicines. Caffeine is a known stimulant that elevates heart rates, which the experiment's results fully support. Since caffeine affects heart rates, people should carefully consider the affect of consuming large amounts of caffeine.	
Summary Statement My project tests how a daphnia's heart rate is affected by different levels of caffeine.	
Help Received Father helped collect materials; Used microscope from NorthCreek Academy	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Karley J.K. Lassley	Project Number J2311
Project Title Comparing the Effectiveness of Indigenous Plant Extracts as a Pesticide for Inhibiting Mosquito Larvae Development	
Abstract Objectives/Goals The purpose of my science project is to determine if indigenous plant extracts will inhibit mosquito larvae development. The reason I am doing this investigation is to determine if it is really necessary to use pesticides made with harmful chemicals. Nobody enjoys being bit by mosquitos, but is it really safe for our environment to use so many synthetic chemicals? Methods/Materials For my control test I will place 10 mosquito larvae in a container filled with water. For my next group I will place 10 mosquito larvae in a container with a mixture of 5% test substance to 95% water. For my last test group I will place 10 mosquito larvae in a container with a mixture of 15% test substance and 85% water. I will repeat the steps with each of my test substances; oleander, chrysanthemum, and eucalyptus extracts. Each test will consist of 10 trials. I will observe and record how long it takes for the mosquito larvae to die. Results The solution of 15% Chrysanthemum to 85% water was the most effective, killing 100% of the mosquito larvae. The solution of 5% chrysanthemum to 95% water was also very effective killing 96% of the mosquito larvae. The solution of 15% oleander to 85% water killed only 21% of the mosquito larvae. The 5% oleander to 95% water killed only 33% of mosquito larvae. The 15% eucalyptus to 85% water solution killed only 27% of the mosquito larvae. The 5% eucalyptus to 95% water solution killed only 27% of mosquito larvae. Conclusions/Discussion After completing my science project I found that my hypotheses were incorrect. My hypotheses stated that oleander would kill the most mosquito larvae, while chysanthemum would kill a limited amount and finally that eucalyptus would not kill any mosquito larvae. While all the substances did eventually kill the mosquito larvae, the chrysanthemum solutions were the most effective in the shortest amount of time.	
Summary Statement This project is to determine if it is possible to control the mosquito population by killing the larvae with local indigenous plant extracts.	
Help Received Rory D. McCabe, M.S. provided mosquito larvae and mosquito information; Carl Gong helped with experimental flow chart; My mom helped type my written work and photograph the experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Monica B. Le	Project Number J2312
Project Title Examining Toxicity Rate of Household Cleaners through the Use of Gryllus assimilis	
Abstract Objectives/Goals The objective of this project was to determine the toxicity rate of household liquid cleaning projects by timing the time of death of gryllus assimilis (field crickets). I substituted human test subjects with the gryllus assimilis because of the gryllus assimilis sensitive respiratory system, and the liquid cleaners that I used were Clorox, Pine-Sol, Windex, and water (control) Methods/Materials I tested by first taking a correctly cut piece of O-Cel-O sponge, and placing it into a (red) Solo party cup. Second, I poured four (4) mililiters (mL) of the correct chemical into the ten (10) mililiters (mL) graduated cylinder, and poured the chemical liquid within the graduated cylinder onto the sponge. Third, I took two (2) adult field crickets and inserted them into the cup. Fourth, I quickly take the correctly cut piece of Kirkland Signature food wrap, and put it over the cup. Fifth, I immediately started my stopwatch, and examined the crickets within the cup. Last, when the field crickets died, I immediately stopped my stopwatch, and recorded the time under the correct trial number and liquid. Results The results of my testing showed that Clorox had an average death rate time of 271.86 seconds, a high of 26 seconds, and a low of 720 seconds. Pine-Sol had an average death rate time of 319.33 seconds, a high rate of 47 seconds, and a low rate of 965 seconds. Windex had an average death rate time of 650 seconds, a high of 103 seconds, and a low of 1,439 seconds. Water had an average death rate of 3,065.33 seconds, a high rate of 217 seconds, and a low rate of 12,403 seconds. Conclusions/Discussion My results concluded that Clorox is the most toxic out of my tested house hold cleaners and that one should take care when using this product. A person needs to consider how toxic their cleaners might be when using it in a confined area, and when using it around people who have breathing issues.	
Summary Statement I replaced humans with gryllus assimils (field crickets), and proved that Clorox was the most toxic cleaning liquid and that water was the least toxic liquid within this project.	
Help Received Miss Given - teacher; Mom - board set up; Dad - transportation and binder materials; Katy Tomlinson	



**CALIFORNIA STATE SCIENCE FAIR
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Name(s) Evan R. Lew	Project Number J2313
Project Title Green Fluorescent Protein	
Objectives/Goals To determine if inorganic mercury is able to penetrate the cell membrane of mammalian neurons.	
Abstract Methods/Materials Materials: The Mutant GFP and mercury (HgCl ₂)The fluorometer, fluorescence microscope, sonicator, centrifuges, UV spectrophotometer, pH meter, rat brain neurons. We will use a fluorescence microscope to visualize the light emitted from the rat neurons. The fluorescence microscope will be used at UCSB. Mercury (HgCl ₂), Buffer, Salt, Culture media, Virus. Methods: A. Treatment of Purified GFP with Mercury Measure Fluorescence Emission (Using a fluorometer) # Ignite the xenon lamp with 40,000 volts # Load GFP sample into cuvette # Load cuvette into fluorometer # Determine the excitation wavelength maximum by detecting fluorescence emission at 512nm and then scanning the excitation wavelengths from between 350nm to 500nm (Fig. 7) # Set excitation wavelength to 466 nm for all experiments. # Add mercury to GFP in different amounts # Record the fluorescence emission at 513 nM (Fig. 8) Treatment of Neurons with Mercury Expression of GFP in Mammalian Neurons # GFP gene is cloned into a virus for infection of neurons # Neurons are taken from the brains of rat fetuses and kept alive in cell culture # Then neurons are infected with the GFP-containing virus # The GFP protein is expressed in the neurons # Mercury is added to the neurons and GFP fluorescence was then examined under a fluorescence microscope (Figs. 10 & 11) # Pictures were taken and analyzed	
Results We found that the inorganic mercury was not able to penetrate in the 5 minute time limit we gave it but only after 9 hours did the mercury get into the neurons.	
Conclusions/Discussion the mercury was not able to penetrate the cell membrane	
Summary Statement To determine if inorganic mercury is able to penetrate the cell membrane of mammalian neurons.	
Help Received Dad described lab concepts and techniques. Handled mercury. Showed me how to use instruments;Lingyan Zhang Handled mercury. Used fluorescence microscope. Treated neurons with inorganic mercury; Dylan Peterson Described lab concepts and techniques. Showed me how to use	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Safa S. Moinuddin	Project Number J2314
Project Title Salty Seeds: The Effect of Salinity on Lettuce Seed Germination and Growth	
Objectives/Goals The purpose is to determine the effect of salinity in the water supply on the seed germination and growth of two different species of lettuce seeds to determine which species is better suited to be grown in California considering the increase in salt content of our irrigation water.	
Abstract Methods/Materials A base salt solution with molarity 0.35M was prepared using table salt and distilled water. Petri dishes were marked with their seed type and concentration of salt solution, and lined with filter paper. Romaine and Iceberg lettuce seeds were bleached, rinsed, and seven seeds were placed in each Petri dish. The base salt solution was diluted to concentrations of 0.0004M, 0.004M, 0.04M, 0.09M, 0.18M, 0.26M, and 0.35M, and 2ml of each solution was added to the corresponding Petri dishes. A control sample with 0M (distilled water) was also used. All samples were sealed in plastic bags and placed in a cool, dark environment for 3 days. All samples were then inspected for number of seeds germinated, and the radicle length of each seed was measured.	
Results For Iceberg lettuce seeds, almost all of the seeds germinated at nearly all of the salt water concentrations studied. Average radicle length increased from 19.3mm in the 0M control to 24.1mm in the 0.004M solution and then decreased down to 6.9mm in the 0.35M solution. For Romaine lettuce seeds, almost all of the seeds germinated at all of the salt concentrations studied except for the highest concentration of 0.35M at which only 4 seed germinated. Average radicle length was highest at 24.3mm in the 0M control, and dropped drastically at concentrations higher than 0.004M to a low of 2mm at the 0.35M concentration.	
Conclusions/Discussion Although the seeds seem to prefer some salt in the irrigation water over none, higher levels of salinity cause less growth in both Romaine and Iceberg lettuce seeds. The ideal salt concentration seems to be around 0.004M. Overall, Iceberg lettuce seemed to tolerate higher concentrations of salt better than Romaine lettuce.	
Summary Statement Iceberg and Romaine lettuce seeds grow best with some salt in the irrigation water, and growth is inhibited when salt concentration is high, but Iceberg lettuce tolerates higher salt concentrations better.	
Help Received My mother helped me to understand molarity and purchased materials for me.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Calvin D. Nishimoto	Project Number J2315
Project Title Investigating the Effects of Automotive Fluids on the Regeneration of Planarians	
Abstract Objectives/Goals My project is to determine if water containing trace amounts of automotive fluids has an effect on planarians regeneration. Methods/Materials I conducted my experiment by first adding used and unused motor oil, used and unused coolant, and used and unused transmission fluid to spring water. I then filtered the water before placing two planarian tails in ten cups of each test variable. I then observed and recorded how many planarians regenerated. Results After completing my investigation, the used motor oil and unused coolant most negatively effected the planarian's regeneration rate. Conclusions/Discussion My conclusion is that when you dump hazardous wastes in to our ground water, even though it gets filtered, it can still be harmful to our environment. In addition, used motor oil and unused coolant were the worst fluid contaminants.	
Summary Statement In my project, I determined that filtered automotive fluids had a negative effect on planarians regeneration.	
Help Received Stereoscope from science teacher; Dad got me automotive fluids and supervised my experiment	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Madeleine J.B. Pardini	Project Number J2316
Project Title The Effect of the Herbicide Roundup on Red Worms	
Abstract Objectives/Goals The objective of my science project was to determine if the commonly used herbicide, Roundup, is toxic to red worms, a beneficial soil organism. Methods/Materials Two samples of 50 red worms (<i>Eisenia fetida</i>) each were collected from a compost pile. Each group was weighed and recorded, then put into a container with a mixture of dirt and shredded newspaper. Compost foods (watermelon, banana and used tea leaves) were divided into two groups and one group was sprayed with Roundup. The compost foods were added to the containers, creating one as a control (no Roundup) and the other as the Roundup treated container. The worms were observed over a 12-day period and were counted and weighed at the end of the observation period. Results The control container contained 49 red worms and weighed 23 grams whereas the Roundup treated container contained only 40 worms and weighed 19 grams. There was a 20% decrease in the worm population in the Roundup treated container as opposed to only a 2% decrease in the control container. Conclusions/Discussion My conclusion is that Roundup is toxic to red worms, however its effect may be more significant on smaller or weaker red worms as there was no significant weight change in the Roundup treated container.	
Summary Statement My project is about the possible toxic effect of the herbicide, Roundup on red worms, a beneficial soil organism.	
Help Received My father sprayed the herbicide Roundup on the compost foods for the treated sample.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Alejandra Quintero	Project Number J2317
Project Title Babies in Danger	
Objectives/Goals Test the effect of marine paint on the hatching of marine microorganisms surrounding the area where marine paint is found.	
Abstract	
Methods/Materials MATERIALS: Wooden beads, marine paint (Interlux), brine shrimp eggs, a petri dish, magnifying glass, 100 ml. graduated cylinder, mini scoop to measure eggs, scoop to measure salt, plastic cups with lids, distilled water, Kosher salt, spoon, trays, a permanent marker, and a ruler. PROCEDURE: Measure 100 ml. of distilled water in a plastic cup. Then add 3 scoops of Kosher salt. Mix salt with a plastic spoon until salt dissolves. put a mini scoop of brine shrimp eggs. Close cup with the plastic lid. Repeat the process until you have 48 cups. Place 6 cups in each tray. At the end there should be 8 trays full. Then paint 24 wooden beads with marine paint (Interlux). Add a painted bead to every cup in 4 trays that means 24 cups will have a painted bead and the other 24 cups wont(Control Variable). After brine shrimp eggs hatch(5th day), mix cup gently with a spoon. Pour 50 ml. of water, with brine shrimp, into the 100 ml. graduated cylinder. Grab a Petri dish, a ruler, and a marker. With the ruler and the marker draw 2 straight lines to make four equal sections(quadrants). Then, place those 50 ml. of water with brine shrimp from the 100 ml. graduated cylinder into the Petri dish. Count how many brine shrimp are there in each quadrant. The total for each cup should be the sum of the four quadrants multiplied by three. Record data for every test in a data table. Repeat this process until all the cups have been observed. (Don't forget to separate the data of the shrimp exposed to marine paint and the ones not exposed to marine paint).	
Results The results after the testing showed that marine paint affects brine shrimp because the cups that had been exposed to marine paint had a smaller amount of living brine shrimp than the ones not exposed. Therefore the hypothesis was supported.	
Conclusions/Discussion In conclusion the final average of living brine shrimp in the cups exposed to marine paint was 106.95. The average of living brine shrimp in the cups not exposed to marine paint was 187.65. Therefore Marine paint does affect brine shrimp.	
Summary Statement I tested the effects of marine paint on brine shrimp, to see if it was toxic enough to kill the brine shrimp.	
Help Received My parents and my teacher helped me get the materials. Teacher helped setting up project at first.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Matthew P. Reilly	Project Number J2318
Project Title Detergent Effects on Plant Growth	
Objectives/Goals My Objective was to understand how runoff detergents affect plant growth. I hypothesized that runoff detergents would affect plant growth because detergents contain harmful chemicals that I thought would negatively affect plant growth.	
Abstract Methods/Materials For the Los Angeles County Science Fair, I used 12 total plants and four different solutions for watering them. For each watering solution, we had 3 plants, so my experiment was done 3 times each. I watered each plant 20 mL of its respective mixture every other day. For the California State Science Fair, I am taking it to the next level and repeating my experiment at three levels of detergent concentration for each solution: 1:100 or 1% (same as first experiment), 1:1,000 or .01%, and 1:1,000,000 or .00001%. I now have 30 plants and 10 solutions, so am again repeating each experiment 3 times. I am doing this to test if there is a safe level of detergent pollution.	
Results The results of my initial experiment showed that my hypothesis was correct. The plants watered with the solution containing Tide 2X Ultra or Tide 2X Ultra with Bleach Alternative did not grow much, and eventually withered and died. I was surprised that the plants watered with Planet 2X Ultra Detergent grew so well. I was surprised because the ideal pH for growing radishes is 6 which is close to that of pure water (pH of 7). The pH of the Planet detergent is 10.0-11.0, which is even higher than that of Tide which is 8.1-8.6. The Planet Detergent contains no harmful chemicals. Both kinds of Tide brand Detergent contain three harmful chemicals; Ethyl alcohol, Sodium borate, and 2-Aminoethanol. I determined that it was these chemicals that caused the plants watered with the two Tide brand solutions to die.	
Conclusions/Discussion I am looking forward to seeing the results of part II of my experiment, which will be complete just before the California State Science Fair. Again, I am testing for a "safe" level of detergent pollution. Regardless, I believe the results of my first experiment are valid as I was following an accepted scientific method in testing the results of chemicals on plants and animals, which is to test them at high concentrations.	
Summary Statement My project studies the effects of runoff detergents on plant growth and examines if there is a safe level of detergent pollution.	
Help Received A classmate started with me on initial project, but was unable to continue. Teacher recommended that I continue and enter the LA County Science Fair on my own. My Mother drove me to get supplies and helped make calls to local water biologists, and paste board together. Dad helped w/ pictures & graphs.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Jessica I. Rutten	Project Number J2319
Project Title The Greenest Clean	
Objectives/Goals The objective of my project was to determine whether liquid cleaning products effect growth and germination of garden plants, when brands claim their merchandise is environmentally safe, at one millionth percent of a dilution, to water. I believe that both the cleaning products utilized, Windex# and Greenworks#, will not have little visual effects, and need to be a higher concentration to create a result in the plant#s height and germination.	
Abstract Methods/Materials I grew thirty-six lima beans in paper towels, inside twelve transparent, plastic cups, under two constantly open windows. I observed their temperature with 2 temperature gauges, and hydrated my plants with one millionth of a dilution of Windex# to Greenworks#. I measured my dilution in milliliters with two measuring cups, and a teaspoon. I also found it important to use filtered water, when observing the control group, and hydrating the plants with the dilution.	
Results Results to my experiment supported my hypothesis. Trend lines where varied greatly, which brought concern to me, for a mathematical conclusion. I watched the plants germinate and grow, noticing wide spectrums of height. In both of my 10 day trials, I found that Water plants where the tallest, reaching 23 centimeters, in trial 1, and 14.7 centimeters in trial 2. The Water plants continuously molded, as so did the Greenworks plants. The water group, plant C, died in trial 1. In trial 2, plant A of Greenworks deceased on day 7. I took note that both Greenworks and Water molded over, in both trials, yet Windex had the smallest amount, according to visual observations.	
Conclusions/Discussion My experiment supports my prediction. The trend lines where varied, and a conclusion which solutions affecting the height, was not proven. Visual conclusions where made, even though I could not draw a mathematical conclusion. The molding of the sprouts, show only specific plants molding. Windex was the group with small percentages of mold. Both Water and Greenworks molded, bringing me to hypothesis that Windex could possibly have kept mold spores off of the plants.	
Summary Statement My experiment is a study of the effects of liquid cleaning products on plants, when it is enviromentally safe.	
Help Received Father helped with method of dilution.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Kristina M. Scheufler	Project Number J2320
Project Title Effects of Fruit Pesticide Residues on Brine Shrimp Mortality	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My family recently began to purchase organic fruits and vegetables. I became curious about the actual health benefits of organic fruits versus commercial fruits. I decided to design an experiment. The goal of my project was to determine if there might be a measurable difference in toxicity between organic and commercial fruit due to pesticide residues that could be detected through brine shrimp mortality.</p> <p>Methods/Materials In my experiment I tested approximately 230 brine shrimp in 46 different sample dishes. I carried out preliminary tests to become accustomed to transferring and observing brine shrimp behavior. I also wanted to see how long the shrimp would survive in purified water. The shrimp survived more than eight hours in purified water. I purchased commercial and organic samples of each test fruit. I tested bananas, strawberries, pears, oranges, apples and lemons. I weighed all the fruits and tried to test similar amounts. I soaked the fruits in bottled, purified water for 24 hours. I then extracted the fruit water samples and placed the already hatched brine shrimp into the sample water. After placing the brine shrimp in the water, I checked the brine shrimp every few minutes with a flashlight to see how long they would survive, in both the organic and commercial fruit sample water.</p> <p>Results For all types of fruit tested, the brine shrimp survived longer in the water soaked with organic fruits. Strawberries showed the least amount of difference between organic fruit water and commercial fruit water. Oranges showed the greatest difference.</p> <p>Conclusions/Discussion The findings seemed to support the hypotheses, that pesticides used in commercial fruit farming might affect brine shrimp mortality. These findings cannot be correlated directly to human health. However, the results suggest that commercial fruit skins may contain harmful pesticides and that further studies for effects on humans should be conducted.</p>	
Summary Statement This project attempted to determine if there might be a measurable difference in the toxicity effects of commercial fruit skin residues versus organic fruits on brine shrimp mortality.	
Help Received Thanks to my parents for driving me to the store to obtain my supplies. Thanks to my science teacher for providing equipment.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Aradhana Sinha	Project Number J2321
Project Title What Makes Acid Rain Lethal? Effect of Acid Rain and Its Components on Seed Germination	
Objectives/Goals The objective if this experiment is to examine the effect of Acid Rain and its components on seed germination, and compare it with the effect of untreated water. My hypotheses are: (1)Acid Rain will have a harmful effect on seed germination, and (2) SO ₂ and NO will be the most harmful parts of Acid Rain followed by the CO ₂	
Abstract Methods/Materials Methods--# Put seeds of one kind in 5 Petri dishes filled with water. # Repeat this for all the other types of seed to form 5 sets of each kind. # Leave one set be as the control. Put 1ppm SO ₂ in one set, .2ppm NO in another, and the industrial carbonated water in another. In the last set, combine the Industrial Carbonated Water, with the NO, and SO ₂ solutions in a 1:1:1 ratio. # Put all the seeds in the incubator. Set the temperature at 10 o Celsius for the peas and beans. Put everything else at 181/3o Celsius. # Calculate the germination percent (GP=seeds germinated/total seeds * 100) and gather Qualitative data daily. Also replace the water. Materials--Dishes: Silver Steel Caps,Capsules,Beakers,60ml plastic syringes,1ml syringe,Plastic bottle caps,Syringe needles (with lock)& Petri Dishes; Chemicals: NaNO ₃ ,Iron Sulphate,25% Sulfuric Acid,NaOH,Silicone Oil Lubricant,Sodium Bicarbonate,Vinegar,Industrial Carbonated Water &Water; Seeds: Organic Lemon Cucumber,Organic Sweet Corn,Organic Lentil,Organic Salinas 88 Lettuce and Organic Radish; Other Equipment: Crimper,Digital Ph Meter,Magnetic Stirrer,Digital Weighing Scale,Lab Coat,Gloves and Goggles.	
Results Acid Rain was more harmful than the water in seed germination. However, NO was the most harmful component of Acid Rain followed by SO ₂ and CO ₂ .	
Conclusions/Discussion My first hypothesis is correct. Acid Rain is very lethal. In my experiment Acid Rain treated seeds had a 43% lower rate of germination and 53% lower rate of sprouting compared to ordinary water (control environment). However my second hypothesis is incorrect. NO is the most lethal component of acid rain. It lowered the germination rate by more than 50%. SO ₂ is the next worst component. CO ₂ did not greatly reduce germination or sprouting, and in one case (radish) actually caused a better germination rate than water.	
Summary Statement My project is about finding out the effect of air pollution on water (acid rain) and subsequent seed germination.	
Help Received Dr. Mona Othman (USDA researcher) helped me by letting me use her lab and giving me ideas on how to carry out my experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Gracelyn M. Sweeney	Project Number J2322
Project Title How Do Eco-Friendly Cleaning Products Affect the Growth of Plants?	
Abstract Objectives/Goals My project objective was to find out how eco-friendly cleaning products would affect the growth of plants. Methods/Materials 1.Ten garden bean seeds were planted in identical pots if soil, one seed per pot. 2.Two pots each were watered with Nature's Orange, Green Works, Method and Seventh Generation all purpose cleaner. 3.Two pots were watered with tap water as a control group. 4.The growth of the seeds was recorded. Results The seeds watered with the eco-friendly cleaning product solutions did not do as well as the seeds watered with tap water. Conclusions/Discussion I concluded that the cleaning products, environmentally safe or not, will affect the growth of plants.	
Summary Statement My project is about watering seeds with eco-friendly product solution to determine the affect on their growth.	
Help Received My mom proof read all my paragraphs and my science teacher helped with some minor corrections.	