CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Clint Akarmann

Project Number
J0801

Project Title
How to Save Our Soil from Water Erosion

Abstract

Objectives/Goals
This project was designed to test which ground cover would better protect soil from water erosion. Since Southern California has been particularly hit by the devastating rain storms and by the consequent mudslides of the winter 2004-2005, this was an important subject to investigate.
The hypothesis was that grass and trees (sticks) would better protect soil from water erosion.

Methods/Materials
In this study, 9 containers were filled with an equal amount of soil collected in a mudslide area. A 1cm notch and 10 drainage holes were made in one extremity of each container. The following ground covers were tested; Container 1: Grass; Container 2: Grass and Sticks; Container 3: Furrows Perpendicular to Slope; Container 4: Woodchips; Container 5: Water Barriers; Container 6: Pine Needles; Container 7: Rocks at the Bottom of Slope; Container 8: Plain Soil; Container 9: Rocks on the Entire Slope. The containers were placed on a 15 degree angle slope, weighed every night before watering, and watered morning and night for 9 days.

Results
The greatest soil runoff was seen with Container 8: Plain Soil (-3.8% weight change), followed by Container 5: Water Barriers (-2.5%), and by Container 3: Furrows Perpendicular to Slope (-1.8%). Some soil got displaced toward the bottom part of the slope with Container 7: Rocks at the Bottom of Slope. No erosion or soil movement was observable with any of the other models.

Conclusions/Discussion
The hypothesis was supported because grass and trees (sticks) held the soil together and prevented it from being carried away by running water. The worst erosion patterns were seen on unprotected soil directly impacted by the water drops. Due to natural and human factors, water erosion and landslides have always been widespread in Southern California. Since people will continue to move in those geological unstable areas, it is critical to find ways to protect their lives and their properties. Establishing an appropriate ground cover is essential to ensure an efficient erosion control and to preserve California.

Summary Statement
Testing of the efficiency of nine different ground covers to protect soil collected in a mudslide area from water erosion.

Help Received
Parents and teacher guided me through the scientific method.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Daniel J. Barton

Project Number
J0802

Project Title
What Material Absorbs Motor Oil Spills the Best?

Abstract

Objectives/Goals
The purpose of my science project is to determine what material absorbs motor oil spills the best. I believe that cat litter will absorb the motor oil spill the best because it is made to be absorbent.

Methods/Materials
Take measuring spoons and pour 1 tablespoon oil in all 4 plastic lids. Let oil spread in base of lid. Take measuring spoon and pour 1 tablespoon of material in heap on top. Wait 24 hours. Measure amount absorbed by scooping material off with spoon then sucking up oil left with dropper. Subtract amount of oil left from the total amount poured in the beginning (1 tablespoon). Repeat the process for 6 trials.

Results
Dirt was the most absorbent in 3 of the 6 trials with sawdust a very close second. Sawdust proved most absorbent in the other 3 trials. Cat litter was less absorbent than the dirt and sawdust but also exhibited good absorbtion. Sand was by far the least absorbent of all the materials tested.

Conclusions/Discussion
After my investigation I learned the dirt was the most absorbent material out of the four I used. I was amazed that regular dirt from your yard can be used to absorb oil. Based on the results of Trial 1 where the dirt proved to be the least absorbent, I concluded that the moisture content of the dirt may have affected it ability to absorb the oil. The sawdust was next in line. It did a good job and would be my second recommendation. The cat litter did a fair job but I guess it depends on the type you use. I used clay cat litter. Other types that have a silica/sand base might absorb better. The sand was the worst absorbing material. The oil just puddled around the sand instead of absorbing into the grains. I learned that the dirt is the most efficient material to absorb motor oil spills. I believed that the cat litter would be the most absorbent material, but now I know that the dirt is best. Different types of dir could change the absorbtion level though. If the dirt is more clay-like, it won't absorb as much as if it were a more dry type of dirt. In conclusion you don't need to go out and buy cat litter, sand or sawdust. All you need to do is dig some extra dry dirt from your garden, sprinkle it on top of your motor oil spill, and the problem will be solved.

Summary Statement
My project is to determine what material absorbs motor oil spills the best.

Help Received
Mother applied title and data onto the board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Ryan P. Durazo

Project Number
J0803

Project Title
Levee Erosion

Abstract

Objectives/Goals
Which commonly used materials work best?

Methods/Materials
Materials: Soil made of at least 30% clay, 1 square foot of mesh, Mondo Grass, Shovel or Spade, Metric ruler, 4 12" 6" cm alminum plates, Water, Room with little temperature change, and 6 plastic containers.
Procedure: 1. Build Levees 2. Pour in water 3. Test for Erosion 4. Test ever day for ten days.

Results
The steel levees had an average erosion of 2.7 centimeters. The mesh levees had an average erosion of 1.53 centimeters. Finally the average of the Mondo Grass levees' erosion was 1.2 centimeters

Conclusions/Discussion
The steel levees had the most ersion. The mesh levees had moderate erosion. Finally, the Mondo Grass levees had the least erosion. My hypothesis was correct.

Summary Statement
My project is about testing materials that are commonly used in levees and seeing which one holds the levee together best.

Help Received
My dad helped me build the levees and my mom helped me make the board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Kristen R. Ewert

Project Number
J0804

Project Title
Refrigeration 9-1-1

Abstract

Objectives/Goals

After reading about the tsunami in Indonesia, Hurricane Katrina, and the earthquake in Pakistan, I wondered what people do in case of natural disaster if they don#t have electricity and a refrigerator. I wondered if I could make something to keep food or medicine cool, and if I could make it out of things we would have around the house.

Hypothesis: The temperature in the inside pot will decrease as more water is evaporated. The pot with the sand and water will reach the lowest temperature.

Methods/Materials

Nine pots were assembled with an 8" outside terra cotta pot, 6" inside pot, annulus filled with soil or sand, beans, and a pot lid. Water was added to pots 4 through 9, and all pots were weighed. The pots were then placed in a dry sauna. The following measurements were noted every 45 minutes: sauna temperature, sauna humidity, and inside temperature of the 6 inch pots. After 3 hours, each pot was weighed again. The difference in weight showed the amount of evaporation that had occurred. The average amount of evaporation was compared to the average temperature in each group of pots.

Results

Average evaporation of 0.3 lbs of water from the wet soil pots resulted in an average temperature decrease of 6.6°F as compared to the dry sand pots.

Average evaporation of 0.2 lbs of water from the wet sand pots resulted in an average temperature decrease of 4.0°F as compared to the dry sand pots.

Conclusions/Discussion

The experiment demonstrated that in a natural disaster people can use things around the house to cool food or medicine to help them last longer. Part 1 of my hypothesis was correct in that as evaporation increased, temperature decreased. Part 2 of my hypothesis was incorrect because soil, not the sand was more effective for evaporative cooling.

Summary Statement

My project is about using evaporative cooling and normal household items to cool medicine and food in a natural disaster without electricity.

Help Received

Seven Oaks Country Club for letting me use their sauna. My mother and father for helping me on the computer. My dogs for not knocking over my project.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Emily A. Fortner

Project Number
J0805

Project Title
The Sun Cooks!

Abstract

Objectives/Goals
Can a solar oven be built to cook food at a certain temperature? A solar oven can use energy directly from the sun to cook food. My objective was to build a solar oven that could use the sun's energy to cook rice and chicken at temperatures between 93.3 to 148.9 degrees Celsius.

Methods/Materials
The oven was assembled using cardboard, plexiglass, porcelain tiles, pebbles, plastic reading magnifiers, two thermometers, and a black iron pan. Then, a control was run to test the temperature (dependent variable) of the oven. In two more trials, rice and then chicken were placed in the oven and the oven temperature was recorded every half hour over a specific period of time. The outside temperature was recorded at the same time.

Results
According to my experiment, the temperature of the solar oven did not reach 93.3 to 148.9 degrees Celsius during the time measured. The oven did increase 17.2 to 27.8 degrees Celsius over a time of one and a half to two hours for the three trials. The highest temperature reached was 65.6 degrees Celsius. After one and a half to two hours, the oven temperature began to decrease in all three trials.

Conclusions/Discussion
My hypothesis was not supported by this experiment. I was not able to get the oven temperature to 93.3-148.9 degrees Celsius to cook foods. In addition, the solar oven did not maintain the heat for a long period of time. Two factors may have contributed to the low oven temperatures: the time of year and the design of the oven.

To prove my hypothesis, I would ask myself the following questions: Can I redesign the solar oven to both increase the oven temperature and maintain higher temperatures? Does using the oven during the hottest months of the year cause higher oven temperatures? I would like to redo my oven by putting a glass lid on top instead of plastic, using different materials to seal the oven lid, and making the oven box shallower. I would like to complete my experiment during the month of July or August.

Summary Statement
My project was to make a solar oven that would cook rice and chicken at a temperature range of 93.3-148.9 degrees Celsius.

Help Received
My father assisted with locating materials and cutting the box. My mother taught me some more advanced Excel functions.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Jennifer E. Fox

Project Number
J0806

Project Title
Using Plants to Remove Pesticides from Storm Water Run-Off: A Continued Study

Abstract

Objectives/Goals
My goal is to remove pesticides from farm run off water with plants and air. I hope to filter the chemical out of the run off water before releasing the water into rivers.

Methods/Materials
simulated a filter by using plants and an aquarium pump as an added air source. The variety of plants i used were all hollow stemmed like common Cattail. When they died they acted like straws adding oxygen into the ground and water. To see if the pesticides have been removed I took tadpoles and timed there death rate.The longer the tadpoles lived the more malathion has been removed. Another way to test the removal of pesticides is to check the pH level. the pH level of tap water is 7 the pH level of water and malathion is 6. the water is cleaner.

Results
My filter was effective in removing the pesticide Malathion. All my tadpoles died during the course of the experiment but the time it took them to die increased as the experiment went along. The best result was plant Smooth Scouring Rush with added air. On the last day of the experiment, the sample from that filter had the only tadpole in the experiment that didn't die and the pH changed from 6 to 7.

Conclusions/Discussion
Pesticides can be filtered from farm water run off. A mixture of hollow stem plants and air added from an outside source worked best in my experiment.
This is a cheap way for farmers to clean there run off water with natural resources. all farmers have to do is channel his run off into a pond or basin. Plant a hollow stemmed plant and wait for about a week. Then just release the water into the river cleaner and safer for everyone..

Summary Statement
I made a filter and added plants and a air pump to the contaminated water to remove the pesticides.

Help Received
my teacher helped me check my papers

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Shaheen Jeeawoody

Project Number
J0807

Project Title
Bioremediation: Cleaning Up Oil Spills in Our Water Communities

Abstract

Objectives/Goals
Biodegradation is a natural process whereby microorganisms break down organic molecules into harmless substances. To accelerate this process, materials can be added to contaminated environments, and this process is known as bioremediation. The purpose of my project is to investigate the factors affecting the process of bioremediation in an oil-contaminated water medium.

Methods/Materials
In the first part of my procedure, I filled 42 Mason jars with distilled water and motor oil. I varied the amount of Pseudomonas putida bacteria, oxygen, nutrients, temperature, and acidity in the jars. I took samples from each jar every week for the next 4 weeks by placing three drops of liquid from right below the water level in each jar on brown paper and I measured the diameter of the oil stain left behind after three hours. In the second part of my procedure, I wanted to find out whether there were oil-eating bacteria in soils. I collected soil samples from a gas station, commercial manure, homemade compost, dirt park, and forest park soil on the same sunny day. I filled six tubes with distilled water, 0.02% tetrazolium indicator, and motor oil. In the first five tubes, I placed a scoop of soil and capped the tubes. In the sixth tube, I placed Pseudomonas putida bacteria and capped the tube. I set aside the tubes and observed them for a week.

Results
The percentage of oil degraded increased with an increasing amount of bacteria present and when oxygen was bubbled in the jars. With nutrients, the percentage of oil degraded reached a maximum and then decreased. A temperature of 36°C and a pH of 7 to 9 had a faster effect on the biodegradation process. I also found that all soils, except for the homemade compost, contained oil-eating bacteria in varying amounts, with the most bacteria in the gas station soil sample.

Conclusions/Discussion
Bioremediation occurs efficiently and quickly if oil-eating bacteria are present in an environment with the right levels of oxygen, nutrient, temperature, and acidity. Bioremediation is an efficient process, as oil is naturally eaten by bacteria; it is also environmentally friendly, as the waste products, which include carbon dioxide and water, are harmless. It can be used in a variety of places and environmental conditions. With bioremediation as a secondary treatment method, we can get rid of oil or other contaminants in the environment efficiently.

Summary Statement
The purpose of my project is to investigate the factors affecting the process of bioremediation in an oil-contaminated water medium.

Help Received
Teacher gave helpful tips; Mother purchased supplies and let me use a corner of her school lab for my experiments; Father proofread report and sister helped with glueing display board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Genevieve M. Johnson; Mary E. Smith

Project Number
J0808

Project Title
Alternative Paper Sources

Abstract

Objectives/Goals
1. To reduce the number of trees being cut down to supply people with craft and writing paper.
2. To identify other sources of paper pulp that would not use up any more natural resources than are already being used.
3. To test the papers made from using these alternative paper sources for strength, flexibility, and smoothness.

Methods/Materials
1. First we created four types of paper, using recycled items from the household: grass clippings, old newspapers, a used pizza box, and paper dinner napkins, with leaves mixed in. A fifth type of paper was attempted using citrus peels and pulp, but it failed and could not be used for testing.
2. Next we tested the strength of each paper by placing the sheets across a pre-measured open space and placing pennies on top, one by one, until the paper fell. We then weighed the pennies in ounces and recorded the results. We repeated the test three times for each paper type.
3. Next, the paper types were tested for flexibility using a protractor, and measuring the angle that we could fold each one before breaking or cracking occurred. Again, the test was conducted three times for each.
4. Finally, the papers were tested for smoothness by rolling an ink roller over the surface to observe for any dips or bumps causing uneven inking, and by using a pen and pencil to write on them.

Results
1. The strongest paper was the one made from the recycled pizza box. The grass clippings and dinner napkins made equally the weakest papers.
2. All of the papers were equally flexible, and could be folded completely in half without breaking.
3. Smoothness was not determined because the ink absorbed into the papers too completely to tell if dips or bumps were present on the surface.

Conclusions/Discussion
1. The papers made from grass clippings, old newspapers, used pizza boxes, and used dinner napkins with leaves were all usable papers for crafts or writing.
2. More research should be done to compare the strength, flexibility, and smoothness of these paper sources to the current source, trees.

Summary Statement
The purpose of this project was to create usable paper from household items that are usually thrown away.

Help Received
Mother helped type part of the report, Father taught safe use of blender and printed out photographs for board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Rose Leopold; Ella Madsen

Project Number

J0809

Project Title

Will Wetlands Work? Will Building a Wetland in the Soquel Creek/Capitola Beach Reduce E. coli and Coliform Levels?

Abstract

Objectives/Goals

The objective of our project is to determine whether building a subsurface constructed flow wetland in the Soquel Creek/Capitola Beach will reduce the e.coli and total coliform levels that flow into the ocean. Our hypothesis is that the e.coli and total coliform levels will decrease because certain plants and gravel will filter out the bacteria.

Methods/Materials

First we built a 60 inch x 8 inch x 9 inch wetland out of redwood, black plastic lining, River Pea Pebbles, common bulrush plants, monkey flowers, and horsetail plants. We built an incubator out of a Styrofoam cooler, a light bulb, a cord, and a thermometer. For each sample we tested five gallons of Soquel Creek water (strictly to the state water quality laws) using many materials such as: sterile Whirl-Packs, pipettes, sterilized jars, distilled water, re-agent sets, sterile Quanti-Trays, an iron, a black/UV light, and bio-hazard bags. We used this process to test six samples (IN and OUT) of the Soquel Creek water thoroughly before and two days after it entered our wetland.

Results

For five out of six tests the e.coli levels decreased. The percent of the five tests that decreased ranged from 13% to 91%. The total coliform bacteria decreased four out of six times. The percent of the four that decreased ranged from 49% to 93%. The two tests that increased for total coliform went up possibily because the gravel was not pre-washed. Overall, the e.coli bacteria decreased by an average of 48% and the total coliform levels decreased by an average of 12.4%.

Conclusions/Discussion

After concluding our tests, we discovered that building a subsurface constructed flow wetland in the Soquel Creek/Capitola Beach would most likely decrease e.coli and total coliform levels flowing into the ocean. We proved our hypothesis correct in saying that the bacteria levels will reduce.

Summary Statement

The purpose of our project was to determine whether a subsurface constructed flow wetland would decrease e.coli and total coliform levels in the Soquel Creek.

Help Received

Surfrider Foundation donated supplies and taught how to test water; Parents drove us to the Soquel Creek/Capitola Beach and gave general support; City Councilman explained wetland proposal; Adult Friend taught about wetlands

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Rebecca S. Lim

Project Number
J0810

Project Title
Plastic Identification Analysis and Recycling Test: A Model for the Future

Abstract

Objectives/Goals
To find the most efficient way where plastic waste can be reduced for the increasing demands in the future where raw materials will not be readily available.To determine the factor/s that affect how well a plastic recycles for creating a perfect thermoplastic material.To find an alternative way besides landfilling, incineration, and recycling,where mixed plastic waste and virgin plastics can create an efficient method of standard plastic manufacturing without the expected results of fragility or aging.

Methods/Materials
Primary-Prepare plastic films (2x4 strips)and virgin pellet samples of the following 6 recyclable thermoplastics: PET, HDPE, PVC, PP, PS, and PC. Perform 8 identification analysis tests:thermoplastic/thermosetting;diphenylamine spot;Beilstein;density;solubility;burn;Pyrolysis;and stretch-tear tests.Using the order of easiest to most difficult to recycle, compare and contrast the identification results of chemical and mechanical properties to find the factor/s that makes one polymer more recyclable. Using the 4 fluids (distilled water, saturated sodium/magnesium/calcium chloride) from the density test, determine the best fluid where the 6 types of mixed pellets have the most distinctive sinking, floating, or suspension mark in the fastest time. Divide it into levels by experimenting with a small cup with a portion of the pellets and mark off the levels.

Results
Flammability makes a plastic easy to recycle but it is a disadvantage in plastic manufacturing.We don't need new thermoplastic invention, rather an environmental safe processing alternative where waste and virgin materials can be reused with the same good qualities. A plan with 3 zones was constructed: 1st Zone-Cleaning and Particle Size Reduction. Zone 2:Suspension of mixed pellets at levels due to density variations. Zone 3:Proceed with production of each pellet after vacuum and drying from divided levels.

Conclusions/Discussion
Instead of creating an easy to recycle,flammable material,a simple alternative is using the 3-zone process. However, there still maintains to be a problem due to the increasing use of chemical additives. The future may continue the work I have been doing through means of high technological advancements,perhaps by looking into a device that mechanically breaks chemical bonds of polymers and forms new copolymers that act as a #bridge# between different polymers, the problem our world faces may be resolved.

Summary Statement
My project tested various alternatives of recycling plastics through processes of applying the chemical and mechanical characteristics in order for the future to discover other options available other than environmentally harmful ways.

Help Received
My parents helped gather materials; Chris Hinton-Talco Plastics gave permission to use lab; Jerry Sieger-CCC Co. gave tour of manufacturing process; Cal State Fullerton Chemistry Depart. allowed for use of lab materials

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Caitlin A. McCarthy

Project Number
J0811

Project Title
Which Are More Efficient in Flood Prevention: I-wall or Earthen Levees?

Abstract

Objectives/Goals
In my experiment I tested which type of levee is more efficient in flood prevention, an I-wall or an earthen levee. I hypothesized that the I-wall levee would hold longer.

Methods/Materials
To test this question I built each type of levee in a separate container. Each container was separated into a river side and a land side by the levee. I poured water into the river and checked the moisture level on the land side every 0.95 liters. I repeated each experiment three times to insure the accuracy.

Results
My hypothesis was proved incorrect. Surprisingly the earthen levee held longer than the I-wall levee. It took an average of 8.2 liters of water for the I-wall levee to fail, and the earthen levee 15.1 liters of water to fail.

Conclusions/Discussion
The earthen levee failed due to the soil and peat moss above the clay giving way. The I-wall levee failed from below through the aggregate. I am surprised my project turned out this way.

Summary Statement
My project analizes the stability of I-wall and earthen levees in order to compare their flood prevention capabilities.

Help Received
Mother supervised on-line research; Mother helped shop for materials; Father cut aluminum I-wall;Cousin and mother helped me form clay core; Mother poured water while I made observations and documented results; Mother emptied heavy container after every test.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Taylor J. Nutter

Project Number
J0812

Project Title
The Reduction of Fertilizer Contaminates in Agricultural Runoff

Abstract

Objectives/Goals
The goal of my project is to find a filter which is made out of biological materials, which are effective in filtering out both nitrate and phosphorous levels from agricultural runoff.

Methods/Materials
I plan to test and prove my theory by passing agricultural runnoff through a variety of biofilters. My materials are a Hach Field Test Kit along with different biological materials which make up my biofilters.

Results
Through my trials I was able to successfully create only one filter out of the seven that reduced the contaminates in agricultural runoff. My control had a nitrate level of 1056 mg/L and phosphorous level of .33 mg/L. The filter which was most effective, fir bark and coir fiber combination, reduced the nitate level to 286 mg/L and phosphorous levels to 0mg/L.

Conclusions/Discussion
As a tool for decreasing the amount of nitrate and phosphorous in agricultural runoff, the mixing of fir bark and coir fiber resulted in being the most successful. In conclusion, I can confidently state that my project was a success. Seeing that the fir bark/coir fiber combination filter performed exceptionally well in reducing the nitrate as well as completely eliminating the phosphorous in the agricultural runoff. Through my findings many agricultural businesses will now be able to have cleaner runoff resulting in a healthier ecosystem.

Summary Statement
My project is an expirement to determine whether or not certain natural materials are effective in filtering out nitrate and phosphorous in agricultural runoff.

Help Received
My father took me to a local nurery to collect my control sample.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Bryanna E. Paulson

Project Number
J0813

Project Title
The Effectiveness of Enzymes as Degradation Agents in Motor Oil

Abstract

Objectives/Goals
One day after a rain I noticed motor oil run-off from cars in the street drain. I wondered if there was a way to clean up the pollution without hurting the environment even more. I found a product on the internet created to clean motor oil stains. The cleaner contained bromelain, papain, and various other types of enzymes and chemicals. I decided to design experiments using bromelain and papain enzymes to break down motor oil. The goal of my project was to see whether bromelain or papain enzymes were effective in degrading motor oil on the water#s surface or in a shore environment. I believed both would work, and that bromelain would be more effective than papain. I also believed that in the #shore# tests, the soil microbes might also help with cleanup.

Methods/Materials
I carried out this project by using Chevron motor oil, distilled water, and samples of moist soil in small, clear cups. I performed four trials of the experiment, each with 20 samples: bromelain in a shore environment, papain in a shore environment, bromelain on water#s surface, and papain on water#s surface. I recorded the weight of the samples. I assessed the effectiveness of the degradation process by calculating the differences between the beginning weight measurements and the ending weight measurements. Biodegradation, a decay process performed by organisms, diluted the oil into carbon dioxide and water (water soluble compounds), causing the weight loss.

Results
When papain was tested on the water#s surface, the weight difference was 3.50%. When bromelain was tested on the water#s surface, the weight difference was 0.70%. In the shore environment simulations, the papain mixtures had a weight difference of 18.74%. The bromelain mixtures in the shore environment simulations had a weight difference of 2.40%. My final results showed a significant difference in the effectiveness of the enzymes in the two environments. The results also showed papain to be much more effective in degrading oil.

Conclusions/Discussion
My findings showed that the papain enzymes were more effective in degrading the oil in both environments. The results also showed that both kinds of enzymes were more effective in the soil environment. Using papain enzyme as an agent of degradation appeared to be an effective, nontoxic method for cleaning up motor oil.

Summary Statement
The goal of my project was to discover which enzyme, bromelain or papain, is more effective in degrading motor oil in two different environments.

Help Received
I would like to thank the people that helped me to complete this project. I thank my mother for assisting me during my experiments. I also thank my father for his support and my sister for helping me set up my board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Alexander A. Pinto

Project Number
J0814

Project Title
Can the Addition of Polymer Improve the Performance of a Sandbag?

Abstract

Objectives/Goals
My objective was to engineer a better sandbag by adding polymer to it.

Methods/Materials
I built a flood table with a spillway and made 2 types of sandbags (with and without polymer). I built a dam (2 rows deep, 11 in total) and flooded the table with 4 liters of water. I had a helper take away the catch basin after 20 seconds. I measured this amount of water using graduated cylinders. I did this 10 times for each type of sandbag dam.

Results
The dam with regular sandbags had similar results in all 10 trials; about 1 liter of water passed through in 20 seconds. The dam made with polymer sandbags let more and more water through with each trial. By trial 9 and 10 the dam was useless; almost all 4 liters passed through within 20 seconds.

Conclusions/Discussion
My hypothesis was false. Adding polymer to the sandbags did not improve their performance. The polymer sandbags absorbed so much water that it lifted the corners and edges, creating passageways. The polymer sandbags became like solid bricks, forcing the water to go in between the bags. With each trial the force of the water made these passages bigger. I recommend that we focus on flood prevention instead by building better levees, clearing creeks, and planting vegetation.

Summary Statement
Can the Addition of Polymer Improve the Performance of a Sandbag?

Help Received
My brother Gregory helped with pulling the catch basin away after 20 seconds. My mother helped with the typing . Mr. Dolan, my 6th grade science teacher, taught me how to follow the scientific method.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Catherine A. Priamos

Project Number
J0815

Project Title
Oil Spills: How to Effectively Clean Up While Maintaining Normal Plant and Animal Life

Abstract

Objectives/Goals
To find out which is the fastest and most effective way to clean up an oil spill while maintaining normal plant and animal life. The methods include sorbents, bioremediation and skimmers.

Methods/Materials
Using 4 aquariums with fish and water plants, I create an oil spill using used motor oil. One was a control aquarium, in another, I used oil eating microbes, yet another, I used a sorbent, and the last, I used a skimmer (turkey baster).

Results
The sorbent was the fastest and most effective. Following closely in effectiveness was bioremediation, but it took a long time. The least effective and slowest was the skimmer.

Conclusions/Discussion
For a small scale/contained oil spill, sorbents seem to be the fastest and most effective clean up method, closely followed by bioremediation.

Summary Statement
My project is about finding out which is the fastest and most effective way to clean up an oil spill while maintaining normal plant and animal life.

Help Received
Mom took pictures, bought materials and helped make graphs and insert photos. Dad lifted filled tanks, got motor oil from car, sprayed adhesive for backboard, and disposed of dead fish until I got used to it.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Alena J. Raymond

Project Number
J0816

Project Title
What's Hot, What's Not? Solar Oven Testing

Abstract

Objectives/Goals
My objective was to discover which shape of parabolic solar oven, between a trough and a cone, would reach a higher temperature quicker, and if insulation would make a difference in reaching higher temperatures. My hypothesis stated that the parabolic cone shaped oven would reach higher temperatures quicker and that insulation would make a significant difference in reaching those temperatures.

Methods/Materials
I built four solar ovens, two trough and two cone shaped, one of each design with insulation and one without. Both designs were based on the same parabolic shape. The inside of each oven was lined with reflective mylar. On five separate testing days, temperatures were recorded every five minutes for the first hour of the testing period and every thirty minutes for two additional hours. The temperature readings were taken on the cooking surface, which was positioned at the focal point of the parabola.

Results
On three of the five test days, the trough oven without insulation was the quickest to heat up out of the four ovens. The trough oven with insulation reached the highest temperature over all and maintained higher temperatures over the testing period on each testing day. Neither of the cone ovens reached the highest temperature in the least amount of time on any testing day. On three of the five testing days, the cone oven with insulation reached higher temperatures quicker than the cone oven without insulation and stayed warmer throughout the testing period.

Conclusions/Discussion
My hypothesis that the parabolic cone shaped ovens would heat up the quickest was based on the idea that the reflection of the solar energy coming to a focal point would create increased heat as compared to that energy being spread along a focal line as in the trough shaped ovens. My results did not support this. The trough ovens had both a greater surface area of the reflective material, a larger aperture and a larger volume as compared to the cone ovens. These may be the main overriding factors in the outcome. The science of a parabola can be a great tool in the design and development of solar ovens. My project demonstrates that shape and use of materials are the most important factors in designing solar ovens. These practical considerations are especially important in remote areas and undeveloped countries.

Summary Statement
My project compares temperatures reached by two different parabolic solar oven designs, each with and without insulation.

Help Received
My father helped me build the ovens; My brother taught me about parabolas; My mother helped me oganize my data and cut and paste my backboard; Ms. Skiles (my teacher) taught me the scientific process.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Katelyn N. Reeves

Project Number
J0817

Project Title
Garbage Is a Waste: An Experiment to Determine if Garbage Can Be Used to Generate Electricity as a Benefit to Society

Abstract

Objectives/Goals
The objective is to determine if a flammable gas can be produced from decaying garbage.

Methods/Materials
This study simulates decaying garbage by using pre-soaked pinto beans sealed inside two plastic zip-lock baggies to create an air-tight environment. Three sets of samples were prepared; the first set of pinto beans was placed in direct sunlight, the second set was placed in a shady area, and the last set was placed in a dark area. These samples were used to examine the effect of sunlight and temperature on decaying garbage. Gas production and ambient temperature data were gathered on a daily basis. After observing that the gas production had peaked, the baggies were held over a lighted candle to see if the gas produced was flammable.

Results
Graphical results, produced from daily observations, indicate that pinto beans produce a gas and produce more gas when placed in sunlight and at higher outside temperatures. Photographic results indicate decaying pinto beans produce a flammable gas.

Conclusions/Discussion
My hypothesis is that decaying garbage creates flammable gases because garbage has a foul smell which could be created by flammable gases. Graphical results support this hypothesis because the plastic baggies containing decaying pinto beans bulged over time indicating gas formation. Photographic results show that when the baggies were held above a lighted candle, there was some additional flame that was probably caused by the gas because the bags with the most gas had more flame. My experiment expands our knowledge because it indicates garbage (pinto beans) can be used to make electricity. Disposing of garbage without using it for environmentally beneficial purposes is a waste.

Summary Statement
My experiment was to learn whether decaying garbage can produce a gas, what environmental conditions produce the most gas, whether the produced gas is flammable, and finally speculate whether such gas can be used to produce electricity.

Help Received
I discussed how to organize my daily observations with my parents. For safety, my parents helped me with testing the combustibility of the gas produced from the beans and simultaneously taking still photographs of the flames.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Christine K. Renschler

Project Number
J0818

Project Title
The Aftermath of Hurricane Katrina: Removing Lead from Floodwater Contaminated Wood

Abstract

Objectives/Goals
The samples of floodwater taken in New Orleans after Hurricane Katrina by the Environmental Protection Agency showed large amounts of lead and other toxic chemicals in the floodwater. After the flood water receded from New Orleans, remains of the chemicals are still present on the buildings.

The purpose of my project was to determine what would best remove lead from contaminated wood.

Methods/Materials
I soaked 50 popsicle sticks for 6 days in lead contaminated water (100mg/L Pb equivalent), to simulate the wood in the houses being soaked. Then, I let the popsicle sticks dry. After 9 days, I cleaned each popsicle stick with either water, soapy water, 5% sodium hydroxide, 5 % hydrochloric acid, or one of two solutions of EDTA, a lead chelator (9.64 µM and 964 µM). I measured the amount of lead removed from the popsicle sticks using a thioacetamide color reaction method and compared them to standard lead solutions to determine their concentration. Popsicle sticks soaked in water without lead served as negative controls.

Results
5% NaOH caused the wood to break down, so it could not be used. The average lead concentrations from 5 samples per cleaning solution were: water: 1.6 mg/L; soap: 1.3 mg/L; 5% HCl: 16 mg/L; EDTA (9.64 µM): 1.4 mg/L; EDTA (964 µM): 1.4 mg/L. HCl removed the greatest amount of lead.

Conclusions/Discussion
My experiment proves that among the solutions tested, 5% HCl would be the best cleaning solution to remove lead from wood. One similar acid is vinegar, containing 5% acetic acid. It is cheap and would be widely available for decontaminating homes. It disproves my original hypothesis that EDTA would remove the most amount of lead.

Summary Statement
My project was about the environmental cleanup of lead contamination following the flooding caused by Hurricane Katrina using different cleaning solutions.

Help Received
Dad provided lab and supervised experiments; Aunt helped choose lead as the contaminant to study; Dr. Hemmi ordered chemicals and provided methods.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Shelbie Fay Strykers

Project Number
J0819

Project Title
The Absorption Rate of Natural Substances in Soil

Abstract

Objectives/Goals
For my science project I investigated how well natural materials absorb pesticides and herbicides.

Methods/Materials
I determined which natural materials absorb the poisons best by adding daphnia, a small water flea, to water that had been exposed to the pesticides and herbicides. First, I put one cup of regular gardening soil into 30 plastic cups and separated the cups into 6 groups, each group containing 5 cups. Next, I mixed in 1/2 cup of 4 different natural materials (ashes, wood shavings, lemon tree leaves, and orange peels.) I then added 1/2 cup of ashes to 1 cup in each group and did the same for every other type of natural material. One cup in each group was left with a plastic cup containing only soil. Then I labeled the pesticides and herbicides A-F and added the poisons to the cups. I poured 1/2 cup of pesticide A into every cup in one group. I did the same for every other pesticide and herbicide, each time using a new group of cups. I then left the cups untouched for a week.

At the end of the week, I inserted a sheet of filter paper into a funnel and placed the funnel into a container. I chose one cup of soil and emptied the soil onto the filter paper. Next, I poured one cup of water onto and through the soil, collecting the water underneath with the funnel and container. Once all the water was in the container, I added 10 daphnia to the water and recorded how long it took for all the daphnia to die.

Results
The results of my investigation indicates that the water exposed to the soil containing wood shavings took the longest to kill the daphnia, meaning that the soil mixed with wood shavings absorbed the poisons the best. The average daphnia death rate was approximately 7,445 seconds (about 2 hours.) The water exposed to soil mixed with lemon tree leaves killed the daphnia the fastest, meaning the soil with leaves absorbed the poisons the worst. The average daphnia death rate was approximately 704 seconds (about 11 minutes.)

Conclusions/Discussion
In conclusion pesticides and herbicides are less toxic when added to soil mixed with wood shavngs, so people spraying pestcides onto plant life should not use soil with wood shavings or wood chips in it. I also learned that contaminants, including the ones I tested, could be extremely harmful to our aquatic life.

Summary Statement
My science project is about how natural substances in soil effects the absorption rate of pesticides and herbicides.

Help Received
My mother helped me put pictures and data on my science display board, and developed my science project pictures.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Janeen A. Tugas

Project Number
J0820

Project Title
Determining the Effectiveness of Polymers in Absorbing Hazardous Materials

Abstract

Objectives/Goals
To determine if polymers are an effective way to pick-up (absorb) hazardous materials.
To determine if you can clean up and dispose of hazardous materials using the polymers.

Methods/Materials
3 trials were made 1,2,3. 3 groups were made A,B,C. In each group 2 tablespoons of each absorbent were put in its group(A-polymer,B-Cat Litter,C-Super Absorbent).
My materials were the 3 absorbents for it's group, 350 grams of Anti-Freeze, 200 grams of sand, 1 grams scale, and 1 mesh screen. After everything was in the 9 cups, I set it out for1 week. Then after the 1 week wait, I measured how much Anti- Freeze was absorbed with a grams scale. In group A I had to separate the polymer from each other. In groups B and C, I separted the Anti- Freeze from the absorbent with a mesh screen.

Results
My results showed that the polymer absorbed the most, without leaving any drops. Groups B and C had the same amount absorbed. Group A weighed 380 grams. Groups B and C only weighed 360 grams. Group A took 5 days for the Anti- Freeze to absorbed it all. Groups B and C absorbed as much as it could in a little amount of time. If I had combined B and C's leftover Anti- Freeze together, it would if took 3 cups of Cat Litter and Super Absorbent to absorb it all.

Conclusions/Discussion
Since now i found out that polymer absorbs the best, it could help our enviornment. The way how we could do that is to put the polymer into a contaminated area and see if it could absorb it well.Then dispose it properly.

Summary Statement
To see how polymers can effectively pick up hazardous materials to help our environment.

Help Received
Dad supervised while I conducted experiment. Teacher helped with writing.