CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Bethany Blake

Project Number
J1001

Project Title
Our Sticky Situation: Household Dispersants and the Gulf Oil Spill

Abstract

Objectives/Goals
The purpose of my project was to compare various household cleaning agents used as dispersants to break up an artificial oil slick on seawater to find the most effective and environmentally friendly solution.

Methods/Materials
I tested six different dispersants: lavender oil, orange oil, organic lavender dish soap, Dawn dish soap, ammonia, and Lysol disinfectant bleach spray. Before I could test any of the dispersants I had to prepare the oil slick samples in a way that was similar to the oil slicks in the Gulf. First, I filled a 502.75 ml glass with 473.18 ml of ocean water. Then, I released the 10 ml of used motor oil from the syringe into the glass at rim level. After that, I stirred all twelve (mini) oil slicks in a circular motion 10 times to agitate, just as weather disturbs the waters of the Gulf.

Results
Overall, the essential oil extracts were useless. All they did was clump with the motor oil because they lacked cleaning agents. The organic lavender soap dispersed at the same rate as the ammonia and Lysol bleach spray. However, the lavender soap would be a better choice because it is not nearly as harmful to an ocean environment as ammonia and bleach, which is why the latter products are unrealistic solutions.

Conclusions/Discussion
Our best dispersant was the Dawn dish soap because it worked better than the lavender soap and better than the harsher cleaning agents. Dawn soap was the best solution overall because it dispersed the oil throughout the water column in the glass, and seemed to do so without harming the things around it.

Summary Statement
This project is a search for a commonly available and environmentally friendly, yet effective dispersant that could be used to clean up an oil slick.

Help Received
Mom helped buy seawater, motor oil and supplies. Dad helped organize the workspace, assemble and print some of the slides and the circle graph. My dentist explained the meaning of "null hypothesis."

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Grant A. Coe

Project Number
J1002

Project Title
Plastic or Fungi?

Abstract

Objectives/Goals
The purpose of this project was to find an alternative to plastic and Styrofoam that does not pollute the Earth and does not harm the people and animals on it. My hypothesis for this project was that the Espresso Oyster fungi on both substrates would have the most mycelial growth out of the other fungi species used in this project.

Methods/Materials
The control in the experiment was coffee grounds with water and no mycelium, and wood chips with water and no mycelium. The variable in my project was the four different fungi species. The Espresso Oyster, Shiitake, Lions Mane, and Wine-Cap were the four fungi species used in the experiment. The way that I measured this variable was by measuring the height of the mycelium and substrate mix and by rating the mycelial growth on a scale of 0-5, five being the most ideal packing material.

Results
The results I found were that the Espresso Oyster on coffee grounds grew zero millimeters in height, but I gave it five on the mycelium scale. It did not break at all, and it held together well. The Wine-Cap on wood chips grew zero millimeters in height, and I gave it a zero on the mycelium scale. It crumbled in my hands, and it did not hold together at all.

Conclusions/Discussion
These results show that part of my hypothesis was correct. The Espresso Oyster on coffee grounds had the most mycelial growth, but the Espresso Oyster on wood chips did not do so well. If I were going to do this project again or expand on it, I would use other substrates such as corn cobs, horse manure, rice hulls, denim, or recycled paper. Something else I might try would be to compare this mycelium alternative to other alternatives to find out which worked best.

Summary Statement
If people stopped using plastic and used fungi mycelium, there would be less polution, less oil use and the environment would be much better.

Help Received
Aunt helped with gathering materials. Dad and Aunt (via the telephone) helped with assembly.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Anushka Das

Project Number
J1003

Project Title
A Study of Oil Spill Bioremediation Using Algae

Abstract

Objectives/Goals
The objective was to study the effectiveness of 3 common algae - Chlorella, Scenedesmus and Ulothrix - in bioremediation of motor oil in pond water.

Methods/Materials
There were 2 identical setups with pond water and distilled water. Each setup had 4 groups, each having 3 jars with 3 different amounts of fertilizer and same amount of motor oil. Group 1 had no algae, and groups 2, 3 and 4 had same amount of the 3 algae respectively. 2 jars with only pond and distilled water were kept to check how pH and DO changed in my environment without oil, fertilizer, and algae. pH and DO were measured on Day 1 and Day 29. On Day 8, 15, 22 and 29, oil content per water droplet of each jar with oil was measured. On Day 29, the total remaining volume of oil was measured.

Results
For distilled water setup, oil content per droplet and total oil loss did not show much difference between jars on Day 29. For pond water setup, result showed that different algae impacted differently. For oil content per droplet, Chlorella group had 14% less oil than no algae group, whereas Scenedesmus and Ulothrix group had 1% and 5% less respectively. For oil loss measurement, Chlorella decreased 42% more oil than no algae group. Scenedesmus and Ulothrix had reduced 8% and 21% more respectively. For pond water on Day 29, pH had decreased slightly in all jars compared to that of pond water on Day 1. For distilled water, a slight increase in pH was seen in all jars with oil, compared to that of distilled water on Day 1. For pond water, DO had decreased in almost all jars on Day 29 compared to that of pond water on Day 1, whereas for distilled water setup, DO had increased in almost all jars with algae compared to that of distilled water on Day 1.

Conclusions/Discussion
Data showed that algae were able to influence biodegradation of oil in pond water. The absence of bacteria in distilled water setup was the possible reason for algae not being able to reduce oil there. The bacteria in pond water were able to utilize algae as oxygen source and break oil into CO2 and H2O. The most effective was Chlorella followed by Ulothrix and Scenedesmus.
Overall the jars with more fertilizer suffered more oil loss within the same algae group with pond water.

Summary Statement
The purpose of my project was to study whether the common algae can accelerate the bioremediation of motor oil and to gather quantitative measurements of the effectiveness.

Help Received
My science teacher Ms. Rossi and mentor Ms. Katherine Rostkowski guided me during the project. Parents bought me the matrials and helped me during experiment.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Brittenny D. De la Cruz

Project Number
J1004

Project Title
Cleaning Oil Spills in the Deep Blue Sea

Abstract

Objectives/Goals
The purpose of this science project was to see which eco-friendly method would have a stronger and more efficient effect in taking the motor oil out of seawater. These methods were absorption, filtration and freezing. It was hypothesized that the freezing method would have the stronger effect because dry ice is made of carbon dioxide and could hopefully freeze the oil quickly leaving me to just scoop it out.

Methods/Materials
Making a few improvements to the three methods, my materials were for Absorption: pantyhose, human and pet hair and as my improvement, biodegradable cat litter. For Filtration: 2 lt. plastic bottle, sand, gravel, coffee filters, a straw, cotton batting, and my improvement adding activated carbon. For Freezing: Dry Ice with my improvement being, smashing the dry ice from pellets to dust. In all my methods I used Sea Water, Motor Oil, Measuring Instruments, and Safety Equipment.

Results
As a result of my project I found that my improvements helped each method individually. The biodegradable cat litter made the absorption process fast but too messy. The changing of the dry ice from blocks, to pellets, to dust, made the freezing process very effective both cleaningwise and timewise. The activated carbon made the filtration process the most effective because the water was 99.9% free of the oil however it took the most time.

Conclusions/Discussion
In the end I found out that my hypothesis was incorrect. The Freezing process, although was very effective, was the most dangerous due to the low water level at the end of the experiment. The Absorption process was fast but very messy in each experiment. Lastly, the Filtration process was the method that had a stronger and more effective effect in cleaning the motor oil out of the seawater.

Summary Statement
This science project is about using green methods to clean oil spills in seawater.

Help Received
Mother and Father helped me with parts of the experiment that required two people.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Douglas R. Dean

Project Number
J1005

Project Title
Which Material While Being Contained Inside a Sandbag Best Diverts Water During a Simulated Flood?

Abstract

Objectives/Goals
If I drop 32 ounces of water against sandbags containing different materials, then the mixture of sand and fine gravel will divert the largest amount of water. I chose to do this project, because when I saw the victims of horrible floods globally, I felt devastated and compelled to do something to help. I hope to find an environmentally friendly solution and a material that is common in all areas. After completion of this experiment I decided to further test the ability of sand and gravel; Which percentage combination of sand and gravel best diverts water? I tested 50/50, 25/75, and 75/25. The final results are that 50/50 of sand and water best diverted sand and water.

Methods/Materials
I tested five different types of materials (course gravel, fine gravel, garden soil, sand and mixture of fine gravel and sand) inside sandbags and poured 32 ounces of water against each material, testing to see how much water each type of sandbag diverted. I recorded the results. Tests were repeated three times to obtain accurate results. Observations were made immediately, during and after. Independent variables were the amount of water used, the type of sandbag, materials used, the angle the water travels down, and how much of each material I put in each sandbag. Dependent variable was the amount of water diverted. Constants used were 32 ounces of water in each test, the same amount of material in each sandbag, the same measuring bucket to measure the amount of water diverted and the amount seepage from the sandbag, and I used the same wood and buckets that the water traveled down.

Results
My hypothesis was correct; the mixture of sand and gravel diverts the most water. Both materials are easily found and environmentally friendly. The final results of my second testing are that 50/50% combination of sand and coarse gravel best diverted water.

Conclusions/Discussion
I will continue to test my project; I will test the efficiency, test the placement of the bags (different order or combinations), and the different types of sand to see which are more successful at diverting water.

Summary Statement
Which material while being contained inside a sandbag best diverts water during a simulated flood?

Help Received
Father helped drive me to get supplies and take pictures.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Alexander J. Elfar

Project Number
J1006

Project Title
Which Natural Material Absorbs Oil the Most?

Abstract

Objectives/Goals
The objective of this investigation was to determine which natural material absorbed the most oil. My hypothesis was that human hair would absorb the most oil and 100% cotton the second most amount of oil.

Methods/Materials
Eight natural absorbents: chicken feathers, cotton balls, green moss, human hair, sand, natural sponge, sawdust and wool were weighed, placed in mesh jewelry bags and soaked with motor oil and water in a mason jar. Each absorbent was soaked for 50 minutes on each side, removed from the liquid, hung to dry with string and tied onto a clothes hanger for 24 hours. The mesh bags were removed and weighed. Both the percentages and grams of oil absorbed were calculated.

Results
The results of this experiment indicated that 100% cotton absorbed the most amount of oil and human hair absorbed the sixth most amount of oil.

Conclusions/Discussion
The results of this experiment indicate that my hypothesis that human hair would absorb the most oil and cotton the second most amount of oil was rejected. Human hair absorbed the sixth most amount of oil and cotton absorbed the most amount of oil.

In trials two and three, hair absorbed more oil than in trial one. This may have been due to the cleanliness of the hair since the hair used in trials one and two were from the same client, but collected on different dates. Trial three partially contained the same hair from trial two, and hair from another client with different hair texture. The type of hair and the cleanliness of the hair may have affected the absorption of oil. However, the increase of oil absorption in trials two and three for human hair did not affect the ranking of oil absorbed and still placed sixth. However, I observed that all the oil was absorbed by hair in trial two and makes me think that cotton may have absorbed water and oil, therefore increasing the total ending weight of the soaked absorbent.

In order to help determine how much of the absorbed liquid was water and how much was oil, I should have isolated the absorbent to soak in water only, oil only and an oil and water mixture. Perhaps the isolation of each liquid would help determine if hair or cotton was the best natural absorbent.

Summary Statement
The purpose of this experiment was to determine which natural material absorbed the most oil.

Help Received
My grandfather provided me with motor oil, sawdust and rubber gloves. My mother drove me to various places to obtain and purchase all my materials. My science teacher, Mr. Frank, for inspiring me to do an experiment with oil.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Ryan J. Eveloff

Project Number
J1007

Project Title
Geothermal Cooling: Energy Savings Grounded in Fact

Abstract

Objectives/Goals
My question is: Can I build a working model of a geothermal unit and find the levels of airflow and heat generation that allow the experiment to work the most effectively? I hypothesized that with enough effort, I could build a working model. I also presumed that the best possible combination of heat generation and airflow were low heat and high airflow. I am trying to prove that geothermal cooling works and is a significant energy source that needs to be explored.

Methods/Materials
The experiment consists of a heat exchanger installed in a model house constructed of foam core and Plexiglas. The experiment includes a water circulation pump, a five foot "ground loop" constructed of copper piping and a tank to simulate the ground at a depth of six feet. Lights were used to generate heat inside the model house.

Results
The experiment shows that the unit worked most effectively with the least heat generation and most airflow.

Conclusions/Discussion
My results showed that airflow plays an important role in the efficiency of geothermal cooling, and that less heat generation resulted in more efficient cooling. The experiment also showed that geothermal cooling works and can cool an area with the proper ground loop length and airflow. Lastly, my project concludes that geothermal cooling should be explored by society for a greener future.

Summary Statement
My project demonstrates the geothermal cooling process, looks at several variables and shows how geothermal energy can be used to save money and reduce reliance on non-renewable energy sources.

Help Received
My father used power tools to make Plexiglas cuts based on my design and to cut copper pipe for me. He also instructed me on how to use a soldering iron and Dremel tool. My mother used cutting tools to cut foamcore based on my design and also instructed me on use of a hot glue gun. Worked with my

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Camila Garcia

Project Number
J1008

Project Title
Effectiveness of Oil Absorbing Materials

Abstract

Objectives/Goals
The objective was to find the most effective oil collecting material.

Methods/Materials
The material used were cell-u-sorb, hair booms, hay booms, the process of bioremediation and a pan with no material in it. Each material was placed in a baking pan filled with motor or vegetable oil and water, and left alone for 24 hours. Then the residue oil was measured in a sterile beaker where the oil and water separated and then it could be measured. The residue oil was subtracted from the starting amount. This was repeated 4 more times and then the whole experiment was repeated as well, but with vegetable oil.

Results
Most of the trials showed that cell-u-sorb left the least amount of residue oil, bioremediation left the second least, then the hair boom, followed by the hay boom, and the least effective was the pan with no material in it. Cell-u-sorb and bioremediation usually absorbed 96 to 99.5% of all the oil, the hair and hay boom usually absorbed 40 to 50% of all the oil, and the empty pan didn#t change at all.

Conclusions/Discussion
The oil collecting material that leaves the least amount of oil spilled in water is cell-u-sorb, then bioremediation, then the hair boom, then the hay boom, and the empty pan in last. The original hypothesis was that the hair boom would be the most effective material and absorb 10% or more than all the other materials, which was partly wrong because the hair boom was not the most effective material, but it did absorb 10% more than some of the other materials. In conclusion, the most oil absorbing material was cell-u-sorb.

Summary Statement
This project tested different oil collecting materials and saw which one left the least amount of oil spilled in water in a certain amount of time.

Help Received
Parents, grandma, and sister helped make booms, and take pictures.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Connor J. Golden

Project Number
J1009

Project Title
Carbon Sequestration in Farming: What Is the Optimal Planting Density of Cover Crops in Vineyards?

Abstract

Objectives/Goals
I chose to investigate carbon sequestration in farming. I specifically wanted to look at the effect by varying the planting densities of cover crops and
to calculate how much carbon could be absorbed. My hypothesis was that there would be an optimal planting density beyond which less carbon would be absorbed.

Methods/Materials
Plant two different cover crop mixes in two separate locations with varying seed densities between 20 lbs/acre and 200 lbs/acre. Control growth with identical irrigation and fertilization routines over a five month period. Harvest green-growth in two samples of 1 sq. ft. areas in four sampling sites at each of the locations. Dry samples in a dehydrator for 4 hours. Weigh the samples in grams. Calculate carbon content using a cited algorithm from published research. Tabulate, graph and analyze data.
Materials - 1.Site One: cover crop seed mix: mustard, berseem clover, purple vech annual rye-grass, Austrian peas, rye-grain, barley 2.Site Two: cover crop barley seed 3.drill seeder with adjustable seed density 4. A square foot harvest template 5.scissors 6.sample bags 7.dehydrator 8.measuring scale in grams 9.computer and spreadsheet and word processing software

Results
The graphed results show that there is basically a linear effect of increased sample weight with increased seed planting density up to 120lbs/acre after which
sample weight declines. The only anomaly in the graphed results occurred at the 30lbs/acre sample site. These sample weights were extremely small compared to other areas. I believe that this site happened to have sub-normal growth.

Conclusions/Discussion
The data clearly shows that there is an optimal carbon absorption at a seed density just beyond 120lbs/acre, beyond which carbon absorption falls off. The hypothesis is verified.
By calculating the optimal planting density of cover crops for carbon sequestration in vineyards we can minimize the farming costs of cover crop seed while maximizing carbon absorption. This gives us one element needed to calculate the total carbon absorption on our farm. This is useful as we try to offset the bio-diesel fuel consumption from our trucks and tractors and helps us work toward becoming a carbon-neutral vineyard business.

Summary Statement
To find the optimal planting density of cover crop for maximum carbon absorption in vineyards.

Help Received
Jerry Yates, our vineyard mgr. and Adam Gaska, a farmer, discussed planing rates and drove the tractor/seeder; my mom glued the data to the board; my dad helped collect samples; Mr. Zellman discussed my project and references.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Natalie T. Hovsepian

Project Number
J1010

Project Title
Saltwater Desalination: Creating More Freshwater

Abstract

Objectives/Goals
My project was to determine at which heat level I could collect the most freshwater by desalinating saltwater with a homemade model.

Methods/Materials
Saltwater similar to sea water was made by adding 35g of salt to every liter of water. 200mL of saltwater was put into a teapot and boiled once at low heat, a second 200mL at medium heat, and a third 200mL at high heat. A turkey basting tube was attached from the teapot to a stainless steel bottle in a bowl of ice. As water evaporated it travelled through the tube and into the bottle, condensing into fresh water. I then measured the amount of fresh water collected at each heat level and compared my results.

Results
The most fresh water was collected at low heat for each of the three trials.

Conclusions/Discussion
I was successful in proving my hypothesis correct by performing this project. Being careful to cover all gaps where vapor could escape, I was able to discover how best to desalinate salt water in order to collect more fresh water condensate. I had been correct in guessing that putting the salt water onto low heat would allow more fresh water to slowly collect. I was able to come to this conclusion because I was aware of the inevitable gaps and flaws of my model. Because I was aware of its imperfections, I was able to base my conclusion on the fact that if I allowed the water vapor to evaporate slowly on low heat, I could work around the flaws and collect as much fresh water condensate as possible.At an ideal facility, heat level would not matter and humans can be provided with drinking water taken from our vast oceans.

Summary Statement
Creating freshwater from saltwater using a home made model.

Help Received
My mother helped review my results and my science teacher Miss Skaff guided me through the science fair process.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jessica H. Hui

Project Number
J1011

Project Title
Bringing Ozone Back into Style

Abstract

Objectives/Goals
Water treatment is important for developing countries where clean water is of shortage. In this experiment, my goal is to develop a new wheel-based dissolved ozone-making method for water treatment. I hypothesize that this new method will be safer and more cost-effective than the traditional bubbling method that leaks ozone into the environment.

Methods/Materials
A homemade rotating wheel (covered by 4 layers of plastic nets) is built to #drag# air into water, forming dissolved oxygen (Figure 1). Then, the dissolved oxygen becomes dissolved ozone in the presence of an underwater UV light (Figure 2). The dissolved ozone may be further irradiated by the UV light and is partially turned into hydroxyl radicals. I used ink color removal, potassium iodide oxidation and bacterial killing as markers to demonstrate the power of this new method for water treatment while using a traditional bubbling method as a reference.

Results
Results in Figure 3, 4 indicated that the dissolved ozone-making apparatus effectively removes the ink color from the water sample without any detectable ozone leakage. A time course of the dissolved ozone for the removal of the ink color was successfully demonstrated in Figure 5. Results in Figure 6 successfully showed a time course of the dissolved ozone treatment for the generation of free iodine from potassium iodide. The results indicated an increasing effectiveness of the treatment over time. Surprisingly, I have found that the dissolved ozone-making apparatus effectively removed chlorine from tap water (Figure 7). Finally, I have used the dissolved ozone-making apparatus for bacterial killing in water. The results in Table 1 indicated that the 137±46 bacterial colonies/0.1ml is completely reduced to zero in 9 minute of the treatment in all three experimental groups.

Conclusions/Discussion
This homemade rotating wheel-based apparatus is easily built at a low cost and safe to use without leaking ozone. I have demonstrated that this wheel-based apparatus removes ink color, oxidizes potassium iodide and kills bacteria more effectively than that of the traditional bubbling method. It has the potential to be a safer and more cost-effective technology for water treatment in developing countries.

Summary Statement
In this project, I constructed and evaluated a rotating wheel-based dissolved ozone making apparatus for safe and cost-effective treatment of water.

Help Received
Professor Matthew Hui (former Amgen scientist) from Chinese Academy of Science helped me build the homemade wheel-based machine for dissolved ozone making at my house. My mother and stepfather for support.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Andrew S. Izzo

Project Number
J1012

Project Title
A Drink from the Sun

Abstract

Objectives/Goals
The goal of this project is to see if light can be manipulated and utilized to make the desalination process faster and more efficient. By varying levels of light penetration to the desalination rigs this research will assess that whether a darker film will produce more fresh water than a clear one.

Methods/Materials
Using multiple shades of window tint ranging from 100% Visible Light Transmission to 5% VLT, several measuring devices, and 4 plastic containers, desalination rigs will be constructed and the experiment will be conducted using ocean water. The rigs were placed in the testing area for 48 hours and once the testing period was over the amount water was measured and compared.

Results
In Trial 1 the 100% VLT produced the greatest volume at 22.4 mL. The other darker VLTs produced less than this in percent changes ranging from 51% to 72%. In contrast, in Trial 2 the 100% VLT produced only 13.3 mL significantly less than trial 1 but still greater than the darker VLTs which ranged from 36% to 62%. Trial 3 was similar to Trial 1.

Conclusions/Discussion
Based on this experiment the most effective light filter for desalination is none at all. The control (100% VLT) produced more desalinated water than all the others in all three trials. The darkest light filter (5% VLT) produced the least. One potential explanation of this is that the light filters used all reflected approximately the same amount of heat and light, and this reflection prevented heat conduction into the rigs.

Summary Statement
My project is about finding a better way to harness light to speed up the desalination process to make fresh water.

Help Received
Parents helped edit all papers, Father helped build display board

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Maisam A. Jafri; Tarun K. Reddy; Derek G. Xiao

Project Number

J1013

Project Title

Individual Water Purification System

Abstract

Objectives/Goals

If we can create a water purification system for individual houses so that it recycles "used" water, then lots of water and money would be conserved. This purification system, the IWPS (Individual Water Purification System), would incorporate five types of water purification methods so that the resulting, "recycled" water would cost less and be more pure than other existing brands.

Methods/Materials

The IWPS is a five-stage purification system. Stage A consists of an almost vertical PVC pipe with one opening in the middle and one at the bottom. The middle opening should have a slanted piece of mesh placed in it to filter out solid waste. Stage B consists of one large container for sedimentation, as only the lighter particles can flow on to Stage C, which contains the Lustar Hydrosponge, a sponge used to grow aerobic bacteria for eating remaining unwanted particles and for aerating the water. After this, Stage D uses chemicals to neutralize the pH levels and bond with remaining dirt particles so that they can be easily filtered out mechanically. The last stage, Stage E, uses ultra-violet light to kill any remaining bacteria.

Results

The IWPS-produced water is far more pure than EPA standard for water purity and compares favorably with other sources of water. In many areas (copper and nitrites contamination, alkalinity, hardness), the IWPS water has the lowest level of contamination. The IWPS is also very water-efficient, as only six ounces of water weren't recycled out of 10 gallons of water we tested. Finally, the IWPS water costs considerably less than existing water sources, like tap water, bottled water, and reverse-osmosis system (projections based on the average consumption of 4 gallons per day).

Conclusions/Discussion

The main goal of the Individual Water Purification System was to conserve water, which we succeeded in doing; for the ten gallons we tested in our system, only six ounces flowed out into the "sewer", which means 99.53% of the water will continue being reused in the system. The quality of this water not only exceeds the EPA standards, but also compares favorably to other popular water sources in almost all categories tested, as the only contaminant that it has higher levels of is chlorine. Also, our calculations project the cost of the IWPS is lower than that of current water sources, making the IWPS the best water system in terms of water efficiency, water purity, and cost.

Summary Statement

To conserve water, the IWPS was designed as a five-stage water purification system intended to purify all water-- whether this is toilet water, sink water, or water from the shower-- coming from the house so that it can be reused.

Help Received

All work was completed only by the three members of the IWPS Project. We were supervised by Maisam's dad while building the system.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Gerardo de Jesus Lancaster

Project Number

J1014

Project Title

Water Reuse: The Effect of Detergent in the Irrigation of Food Crops

Abstract

Objectives/Goals

The objective is to determine if food crops can be irrigated using gray water and to observe the effect of the water on the crop's development and growth.

Methods/Materials

Thirty six identical planting pots were prepared in a standard way with potting soil and two different crop seeds. These plant subjects were separated into groups of six, with the purpose of each group being irrigated with a different water or detergent solution. Groups (A-C) consisted of one crop, while groups (D-F) consisted of another. The irrigation of crops took place as follows: Groups (A) and (D) were irrigated with freshwater. Groups (B) and (E) were irrigated with a common detergent solution. Groups (C) and (F) were irrigated with a biodegradable detergent solution. The detergent solutions consisted of 1 ml of detergent titrated with 1.8 L of freshwater. This ratio of detergent and water is proportional to the detergent concentration in the average washing machine. All crops were irrigated equally with a moderate amount of water. Each crop was measured individually utilizing various parameters, such as height, health, and hydration. With these parameters I was able to observe both the quantitative and qualitative characteristics of all subjects.

Results

It was observed that crops irrigated with the biodegradable detergent solution achieved benefits in growth by demonstrating a significant height increase in comparison with the control. Crops irrigated with common detergent solutions did not display significant increases or decreases in growth. Instead, they maintained a consistence with the results of the control, crops irrigated with freshwater.

Conclusions/Discussion

Crops irrigated with biodegradable detergent solutions displayed benefits in height, in comparison with the control. These crops even proved to have the best health and hydration among all other groups. Crops irrigated with common detergent solutions exhibited consistency with the control. The effect that a biodegradable detergent has on crops can be best described as a fertilizer, due to the benefits it presents to the growth of food crops. All in all, water reuse for the irrigation of food crops is a potential and safe way to save water.

Summary Statement

Determine the effect on the growth and development of food crops when irrigated using biodegradable or common detergents.

Help Received

Mother helped glue board; Father helped review report.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Bridget Langholz

Project Number
J1015

Project Title
Density Matters: Living Roofs Provide Better Insulation

Abstract

Objectives/Goals
I#m into architecture and therefore I find living roofs intriguing. Green roofs have many advantages including managing water runoff, keeping a building cool, filtering water, producing food, and keeping an area green. Green roofs are awesome but since I couldn#t focus on their cool looks, I decided to test their heat insulation compared to a regular roof.

Methods/Materials
First I built three 1 foot by 1 foot cubes. Then I researched the best plants for the project. The plants had to be drought resistant because of the climate they will endure

My procedure was the following:
1.) Take room temperature.
2.) Put thermometer inside model house.
3.) Turn on heat lamp
4.) Set timer for exactly one hour
5.) When timer goes off, immediately check and record the temperature of the thermometer.
6.) Wait 15 minutes and take room temperature again.
7.) Repeat 4 times for each model house.

Results
My results clearly show a significant difference between the heat insulation of the asphalt shingle roofs and the living roofs. For the sedum roof on average, the temperature decreased .5 degrees. The armeria roof showed a slight temperature increase of .75 degrees which means it is not as effective as the sedum. The sedem roof may be slightly better because it is a lot denser than the armeria, giving it an advantage. The asphalt roof performed awfully. On average, the temperature increased 9 degrees.

Conclusions/Discussion
Living roofs definitely provide better insulation than asphalt shingle roofs. The volume and density of the plants greatly outperform the thin asphalt shingles. My procedure was thorough and controlled.
If you live in a city and you don't have a front yard, you could put in a lawn and garden on your roof. If you can find drought resistant, dense plants you will have great insulation. This is particularly good for cities like Los Angeles where cooling insulation is needed all year long and it is hard to find space for a garden. An office building could have a farm on top of it so there would be a better use of space. Overall, there are cool possibilities for using energy efficient living roofs.

Summary Statement
My project compares insulation properties of living roofs to asphalt shingled roofs.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Georgie S. Mathews

Project Number
J1016

Project Title
Oil Clean Up Crew

Abstract

Objectives/Goals
My objective was to find out if the bacteria Vibrio fischeri could efficiently degrade oil. I hypothesized that Vibrio fischeri would efficiently degrade oil.

Methods/Materials
To conduct this experiment I used sodium chloride, yeast extract, peptone, distilled water, an autoclave, sterile test tubes, a micropipette, sterile micropipette tips, sterile swabs, agar plates, Vibrio fischeri, Pseudomonas fluorescens, a digital scale, an incubator, motor oil, and sterile syringes. I tested the Vibrio fischeri for efficient oil degradation by comparing it's growth to another bacteria's. This bacteria was called Pseudomonas fluorescens and is commonly added to oil spills to degrade oil. I then grew each bacteria in two broths, one with and one without oil. After incubating the bacteria, I performed a serial dilution and plated each group on an agar plate and incubated them. I then recorded the growth of bacteria in CFU/mL.

Results
Vibrio fischeri grew an average of only 55,000 CFU/mL compared to Pseudomonas fluorescens which grew an average of 825,000 CFU/mL.

Conclusions/Discussion
My results proved my hypothesis wrong and I discovered that Vibrio fischeri did not degrade oil as much as Pseudomonas fluorescens according to this experiment. I think Vibrio fischeri would be a great bacteria for degrading oil in the deep ocean if it were genetically engineered to consume oil.

Summary Statement
I tested if the bacteria Vibrio fischeri could efficiently degrade oil.

Help Received
Mother helped handle bacteria; Dr. Orwin helped advise me on my procedure;

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Alexa M. Montegna

Project Number
J1017

Project Title
Boom or Bust! Creating an Organic Boom to Absorb Oil on Water Surfaces

Abstract

Objectives/Goals
Objective: My engineering project goal was to create an organic, environmentally friendly sorbent containment boom, which could serve as a realistic alternative to chemical sorbents that may be toxic to the environment.

Methods/Materials
Materials:
Boom Construction(per boom):
organic cotton tubing
organic cotton balls
organic sphagnum peat moss
empty 500 ml plastic water bottle
4 rubber bands
ruler
Boom Testing(per test):
20 gallon fish tank
10 gallons water
16 oz 10W-30 weight motor oil
digital kitchen scale

Methodology:
Construct a tubular floating device lined with the organic cotton and sphagnum peat moss.
Weigh boom.
Test boom by placing it in the fish tank filled with the 10 gallons of water and 16 ounces of motor oil.
Leave for 24 hours.
Reweigh boom and remeasure water and oil amounts.
Record data and repeat two more times.

Results
Results: My boom abosrbed nearly 100% percent of the oil and only a small percentage of water.

Conclusions/Discussion
Conclusion: This type of boom could serve as an environmentally friendly replacement to chemcial sorbants in fighting oil spills in the ocean.

Summary Statement
My goal was to create an organic sorbant boom that could provide an environmentally friendly option to help remove oil from water surfaces.

Help Received
Father provided technical assistance in creating the boom. Mother helped proofread written materials. Brother helped with computer generated graphs.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jason Mouradian

Project Number
J1018

Project Title
Pump-Master

Abstract

Objectives/Goals
My project's goal is to get the clog from the drain without using any chemicals.
And preventing tens of thousands tons of chemicals flowing to the ocean and rivers.

Methods/Materials
Materials: Chemicals,Cotton Balls, U-Pipe, Tube.
Methods:Tested all the chemicals and proved the pump-master is the best.

Results
Pump-Master is the most efficient and easy way to get the clog out without using any chemicals

Conclusions/Discussion
Pump-Master is the most efficient and easy way to get the clog out without using any chemicals. It can be used in residential and commercial buildings.

Summary Statement
To get clog out from your drain without using any harmful material for the earth.

Help Received
Dad helped build the prototype.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jennifer D. Pena

Project Number
J1019

Project Title
Waste for Waste: Get a Hair Cut, Save a Beach

Abstract

Objectives/Goals
The objective is to determine what type of human hair absorbs crude oil from salt and or fresh water the most.

Methods/Materials
Nylon stockings, crude oil, iodized salt, water, plastic containers, barrel, beaker, measuring cups, gloves, apron

Place nylon stocking stuffed with human hair of one variety and place in plastic container with crude oil

Results
The brunette hair soaked up the most crude oil from the salt and fresh water.

Conclusions/Discussion
My results supported my hypothesis, indecating the brunette hair would soak up the most crude oil. While researching, i was enlightened about the dangerous effects of oil spills and the chain reaction they cause.

Summary Statement
Using human hair to soak up crude oil from water.

Help Received
Local hair shoppes helped collect hair; Mother helped take pictures; Grandfater helped with oil disposal.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Vandana Reddy; Kanika Seth

Project Number
J1020

Project Title
Goo Be Gone: Absorptivity of Different Sorbents to Clean Up Oil Spills

Abstract

Objectives/Goals
Our goal with the experiment was to figure out how some common inexpensive material can help cleanup oil spills. Also, we wanted to find out if some shapes are more efficient in absorbing oil than others. We hypothesized that tweed will absorb the most oil because tweed is made up of cotton and wool and it is loosely woven together. We also think that the rectangle shape would absorb the most oil

Methods/Materials
Using measuring cups, pour 300mL of water and 100mL of oil into beakers. Cut various fabrics to standard size and place them in individual beakers. Wait 15 minutes before removing the fabric. Read the levels of water(A) and oil(B) and compute remaining water(A) and oil(C) [A-B]. Pick an absorbent fabric for the shape experiment

Results
Part A: Material Absorptivity: Based on the average of 2 trials, we found that flannel, which absorbed 22.5 mL, absorbed the highest amount of oil followed by tweed which absorbed 17.5 mL, wool which absorbed 15 mL, and cotton which showed the least absorption for motor oil, absorbed 5 mL of oil.
Part B: Shape Absorptivity: The results of 3 trials were averaged for the different shapes of tweed. It was seen consistently that when tweed was cut into a donut-shape or a rectangle-shape, it absorbed the most oil. They both absorbed 11.6 mL, followed by the circle which absorbed 10 mL of oil, and the star which absorbed 6.6 mL of oil.

Conclusions/Discussion
Our hypothesis was not proved to be correct for Part A. We thought that tweed would absorb the most oil. However, we found that flannel absorbed the more oil than tweed. Tweed absorbed only slightly less than flannel.
Our hypothesis was proved correct for Part B.The experiment showed that the fabric cut into a rectangular shape absorbed the most amount of oil. However, the fabric shaped like a donut matched the rectangle's absorption.
Our experiment brought out some additional questions, such as, boom cross sections, oil absorption but water repulsion and comparison with highly specialized materials.

Summary Statement
Investigating absorptivity of common inexpensive materials on oil

Help Received
Parents helped with the board and Excel charts. Science teacher reviewed project.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Emily A. Reynolds

Project Number
J1021

Project Title
Which Kind of Green Roof Building Insulates the Best?

Abstract

Objectives/Goals
What type of green roof building would insulate the best, one with grass on top or a clover ground cover? I think the grass will keep the inside of a green roof building the coolest because it is thicker.

Methods/Materials
I built three cardboard "houses" and put grass on one, clovers on one, and one inch of dirt on another. I put each of the buildings under a heatlamp for a half hour,an hour, two hours, and four hours. Then I measured the inside temperature of each of the buildings.

Results
The results showed the clovers kept the inside of the building the coolest and the dirt kept the inside of the building the warmest.

Conclusions/Discussion
I thought the grass would keep the inside of the building the coolest but the results showed that the clovers did. My hypothesis was not supported.

Summary Statement
My project is about whether grass or clovers put on top of a green roof building will keep the inside of the building the coolest.

Help Received
My dad drove me to Micheals to buy supplies. My dad bought me a digital thermometer .

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Alberto Rodriguez-Villareal

Project Number
J1022

Project Title
Can I Make a Difference?

Abstract

Objectives/Goals
The purpose of this project is to purify water with home based materials,having Haiti in mind.I think home base purifying system can be achieved by using these materials:big rock,metamorphic rock,t-shirt,white sock,cotton,gravel,filter paper,and sponges.

Methods/Materials
The materials were soda bottle, sponge, white sock, gravel, pencil, dirty water, paper, stopwatch, pH meter, litmus paper, electrical conductivity tester, digital scale and graduated cylinders.In experiment one,I chopped off the bottom of a soda bottle and flipped the bottom.Then,I inserted filter paper,as the first layer.I collected dirty water and poured 20mL of sample into purifier one and retrieved the result.I compared the results with the initial dirty water through observation.I repeated the same procedure as I add layers of different materials.In experiment two,I changed the sequence of layers of materials, to get a better result.I compared the samples retrieved from purifier one and purifier two.In experiment three,the pH and electrical conductivity were determined using a pH meter,pH paper and conductivity tester.In experiment four,I determine the density of the water samples and relate this to the amount of impurities present in water.I measured the mass of each sample,measured the volume and used the density formula.

Results
In experiment one,the purity of the water improved,however,the water still stunk.In experiment two,when I compared the sample water from purifier one and purifier two,there was a significant improvement.Water from purifier two using the new sequence,became clearer,however the odor remains the same.In experiment three,water sample 13,using purifier two,was a neutral substance, because its pH was 7.0.Using a conductivity tester,all water samples from purifier one and purifier two conducted electricity.Lastly,in experiment four,densities of all water samples were all 1 gram/ mL,except sample number three, samples 11 and 14 with densities of 0.9 gram /mL,0.9 gram/mL and 0.95 gram/mL respectively.

Conclusions/Discussion
This experiment was not successful because the water did not come out clean enough so you could drink.I found out that purifier two was better than purifier one. Therefore,the sequence of layering the materials affects the purification process,but I couldn#t be sure if it is safe to drink. I recommend that a bacteria experiment can be done to find out the presence of bacteria in each water sample.

Summary Statement
My project is to purify water using home based materials that can easily be retrieved by needy people in other countries like Haiti.

Help Received
Mrs. Genota provided materials and guided me throughout the process. She also encouraged me to continue and finish the project on time.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Katie A. Shewfelt

Project Number
J1023

Project Title
Slaying the Spill

Abstract

Objectives/Goals
The purpose of my project was to discover how several different materials remove oil from salt water in a small scale oil spill. I hypothesized that hair would prove to be the most effective variable.

Methods/Materials
To create my own sea water, I mixed 1 cup of salt pellets with one gallon of water. I then obtained my four independent variables, which were hay, human hair, peat moss, and iodized salt.

I poured eight cups of homemade salt water and one cup of 50w motor oil into a clear jug. I measured the height of the oil. Then I poured the water and oil into a tub, and recorded the temperature of the mixture. Next, I applied my variable, and allow it to absorb the oil for 12 minutes. I recorded my observations. Then the oil-covered material was extracted. After that, I poured the remaining oil and water back into the clear jug and re-measured the oil height. I subtracted this measurement from the original to determine the amount of oil removed, and formulated results. This process was repeated for each of the independent variables. Four trials were conducted for each.

Results
My final results matched my hypothesis. Human hair removed the most oil, with an average of 75% of oil removed. The next best variable was the hay, which averaged 48% of oil removed. Third was the iodized salt, averaging 25% of oil removed. Finally the peat moss was left undetermined because the moss had clouded the water and oil, and accurately measuring the oil was impossible.

Conclusions/Discussion
I concluded that human hair removes oil from salt water more effectively than the other independent variables tested. I believe hair was more successful because it has a natural fiber, keratin, that has high absorption properties.

Summary Statement
My project is about learning how to clean up a terrible, man-made disaster - an oil spill - with inexpensive, yet efficient materials.

Help Received
Ms. Reichelt, my teacher, checked my written report; My parents supervised my experiments.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Avni Singhal

Project Number
J1024

Project Title
Greener Cleaner Cars Using Exhaust Filtering

Abstract

Objectives/Goals
The purpose of my project is to reduce carbon dioxide emissions from gasoline cars by capturing and consuming it, using my apparatus.

Methods/Materials
My apparatus makes use of lime water (calcium hydroxide and water) and bubbles the exhaust air from the car through it consuming the CO2 in the following reaction: Ca(OH)2 (aq)+CO2(g) becomes CaCO3(s)+H2O(l). The byproducts are calcium carbonate and water. Other than the lime water consumable, the materials to construct my final apparatus include a plastic container, pipes of various types, and diameters and everyday tools.

Results
My first model captured 2.5gm, while my second model captured 66gm of CO2 in 5 minutes. The reason for the dramatic increase was that there was significantly more surface area (due to the 36 instead of 1 locations from where the gas was released), that allowed more reaction to happen. The compartments added in the third and fourth designs ensured that the lime water was positionally-stable to react at all times, while the car moved. An unexpected but beneficial result was that I also captured particulate matter, which is a major cause for respiratory health concerns. In the third model, these particles were getting trapped and accumulating into the pipes at the bottom of the chamber. It had the potential of causing serious car safety problems if the pipes eventually became clogged and blocked the car exhaust. Therefore, in the fourth model, I addressed this safety concern by driving the exhaust air top-down instead of bottom-up.

Conclusions/Discussion
There were many learnings during the project that need further exploration. Exhaust gas emitted from cars can get up to hundreds of degrees, and a lot of water can be lost to evaporation alone. To stop this, a radiator can be used in future models. The main byproduct of my reaction is calcium carbonate which, once filtered for particulate matter, can be used for medicine, classroom chalk, and to neutralize soil. How the byproduct would make it to those uses needs to be explored. Finally, effectiveness of capturing particulate matter needs to be explored and improved.

Summary Statement
The project is about reducing carbon dioxide emissions from gasoline cars.

Help Received
Uncle helped with calculations; Dad helped with models; Mom helped with editing

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Adam Stanford-Moore

Project Number
J1025

Project Title
A Stove for a Better Tomorrow

Abstract

Objectives/Goals
It is very important in poor countries for people to have an efficient way to cook because of the scarcity of fire wood. One way to save fire wood is to invent new kinds of stoves that use local materials. The goal of this science fair project is to compare the time it takes to boil two cups of water on five different stove designs. Before the experiment it was predicted that the mud-brick rocket stove would boil water the fastest because of its insulation and concentration of the flame.

Methods/Materials
Five different stoves were made with different designs and materials. They included a modern house stove, a mud-brick rocket stove, a red-brick rocket stove, a 3-stone stove, and a 3-sided stove. The five different stoves boiled water with the same pot and 2 cups of water for each trial. During each trial the stove#s fire was fed with the same amount and kind of wood (excluding the modern house stove which is gas powered).

Results
The red-brick rocket stove consistently boiled the water more quickly than all of the other stoves. The 3-sided stove consistently boiled water more slowly than all of the other stoves.

Conclusions/Discussion
The design of a stove has an important role in the amount of time required to boil water. Designs with good insulation and good flame concentration boil water the fastest. It was also noted that red-clay bricks allowed for better insulation than mud bricks.

Summary Statement
This project investigates the affect of traditional village stove design on the time it takes to boil water.

Help Received
Parents helped me gather materials and supervised me building the stoves' fires in our driveway.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Tanay Tandon

Project Number
J1026

Project Title
A Cost and Energy Efficient Water Purification System Utilizing Novel Methods of Electrolysis Based Techniques

Abstract

Objectives/Goals
Through this chemical engineering project I plan to experiment the effect of the Electrolysis Mediated Fenton Reaction on water borne microbial organisms. The research I conduct will show the effectiveness of this novel electrical based approach to water treatment, and will be used to engineer a Crank Shaft Generator powered Water Purification system for use in disease and disaster stricken areas.

Methods/Materials
In order to test and engineer the experimental portion of my project, I used Non Pathogenic concentrations of E. coli as inoculated impurities in water. I then performed the Electrolysis based reaction onto the water sample and recorded the effect of the reaction on the bacterial colony count in the water. The data and research conducted in these experimentations were then applied into the construction of the Crank Shaft Powered system for disease and disaster devastated areas.

Results
The experiment resulted in several sets of data that showed the rate of purification and the effectiveness of the reaction. All 15 data groups showed strong trends that supported the reactions effectiveness of elimination on bacterial populations. Most groups showed between 70-100% elimination of E. coli populations, and several data groups brought the E. coli levels within EPA standards. These results were used in the engineering of the Crank Shaft Powered system which can apply the novel approach of the reaction into real life disaster scenarios.

Conclusions/Discussion
The data received through this project supports the ability of the explored reaction in its ability to remove microbial impurities from water. Through this experiment it can be determined that the Electrolysis Mediated Fenton Reaction has potential to be applied in small scale water treatment situations, and should be further explored as a cheap alternative method of water purification. The research that I have conducted, and the system that I constructed has the ability to be of great benefit to developing countries in need of cheap and efficient water purification solutions, and can also serve as a quick way to keep water clean in areas susceptible to the spread of water borne diseases.

Summary Statement
My project is about the experimentation and construction of a water purification system that implements the novel method of the Electrolysis mediated Fenton Reaction.

Help Received
My teacher, Dr. Fohner, supervised my experimentation in the school Labratory, and my mother helped me glue my project board.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
William J. Theaker

Project Number
J1027

Project Title
Can Pet Hair Get BP Out of the Doghouse?

Abstract

Objectives/Goals
In my experiment I wanted to see if booms made of hair and other materials could do as well or better than normal oil absorbing booms to clean up oil spills. I believe that human hair will pick up the most oil because it adsorbs oil and is finer than the coarse dog hair, allowing more oil to cling to the increased surface area.

Methods/Materials
To test my experiment I stuffed hay, human hair, dog hair, and some oil absorbent sheets (control) into separate booms, and filled four tubs with 3 gallons of water and 2 quarts of oil in each. I then pushed the booms up and down and side to side in their separate bins until they could not soak up anything else.

Results
Human hair was the most efficient material at soaking up oil (13 millimeters), supporting my hypothesis. The second best method was the dog hair, soaking up 12mm of oil. The oil absorbent sheets were third, soaking up 11mm of oil. The hay was last; absorbing too much water in the tub, then sinking and making the water turbid with the rest of the oil. This suggests hay would soak up anything in which it comes into contact, proving not to be a solution to the oil problem.

Conclusions/Discussion
In my experiment I found that the best boom for cleaning up oil was the one with human hair. My hypothesis was correct because the human hair was finer than the coarser dog hair (which came in second), allowing more oil to cling to the increased surface area. The human and dog hair were efficient at collecting oil because hair adsorbs the oil, or clings to microscopic scales on the hair shafts (cuticle). The oil absorbent sheets and the hay were the least efficient. When the hay was used it absorbed too much water. Although it had the most weight, a lot of that was water. The hay boom then sank, making the water turbid with oil. I would not recommend hay to be used on a real oil spill because it would just soak up the first liquid it came into contact with. Also, hay placed in a nylon stocking would make the material harder to pick up.
If I could do this experiment over I would change two things. I would use a PVC pipe to help stuff the materials in the pantyhose, and would use motor oil so I would be able to see it better.

Summary Statement
Using dog hair, human hair, and hay to see if they would be a viable alternatives to synthetic booms for oil cleanup.

Help Received
Mother took pictures and helped get materials

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Aamna J. Abbasi

Project Number
J1098

Project Title
Let's Get Drastic With Plastic: Comparing Biodegradation in Traditional and Alternative Plastics

Abstract

Objectives/Goals
Last summer, I visited a landfill to explore ideas that I could address through an experiment. I was told that if I found a way to help get rid of the plastic coming into the landfills, I would be doing a great service to society! I then visited a local recycling center with the same objective...over there I was told that their biggest problem was not getting enough plastic in through the municipal recycling programs. So I began to look into plastics that are marketed as biodegradable. Are they really substantially different than traditional plastics?

Methods/Materials
My experiment consisted of measuring 1 gram of each plastic sample with ~5 mls of four substrates representing common environmental conditions. The samples were placed in mason jars, and an infrared gas analyzer was used to measure carbon dioxide over time. There was one sample of each of the four plastics in a mason jar, with each of the four substrates, along with a duplicate. Leading to a total of 32 jars where the carbon dioxide was measured over a period of two months.

Results
For the most part, the oxo biodegradable additive plastic was the front runner and clearly had higher carbon dioxide concentrations. However, I would say that due to the short duration of the experiment I can not rule out that the other biodegradable plastic samples may biodegrade faster than traditional plastic if more time was allowed for the experiment.

Conclusions/Discussion
Plastics continue to take up permanent space in our landfills. Recycling programs could be more effective, but significant social behavior changes are needed to increase plastic diversion from landfills. Although oxo-biodegradable plastics are petroleum based (0.5%-2% added to standard plastic pellets with no change in the manufacturing process), they are an effective transitional tool for an immediate solution to the eternal (literally) plastic problem. In fact in Abu Dhabi (UAE) all plastic manufactured after 2013 must contain an oxo-biodegradable alternative. If the US makes a similar regulation, the amount of persistent plastic in landfills could be drastically reduced. We could use the results of my project to change the world!

Summary Statement
Comparing biodegradation of traditional and biodegradable plastics using carbon dioxide measurements

Help Received
Used lab equipment at UCI; Dr. Czimczik Green was my project advisor

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Kevin C. Kelley

Project Number
J1099

Project Title
Sun Chip Bags: Compostable?

Abstract

Objectives/Goals
Certain Sun Chip bags have been advertised as being 100% compostable. I wondered if this was really true. I decided to put a compostable Sun Chip bag into our garden composter and check on its condition over time. I chose to compost the bag over fourteen weeks, the same amount of time that Frito Lay, the maker of Sun Chips, had run its experiment on its compostable bags.

Methods/Materials
In addition to the Sun Chip compostable bag, I also placed into the composter a regular (non-compostable) Sun Chip bag, a brown paper bag, a regular plastic bag, a bio-degradable green plastic bag, and a bio-degradable plastic cup.

I gathered up grass clippings, food and vegetable scraps from our kitchen, leaves, weeds, small twigs, soil and commercial compost. I placed these items into the composter and added water to start the composting process. I rotated the composter once a week to mix the ingredients well and to make sure the organic material came into contact with the various bags and containers.

Results
The brown paper bag composted after only three weeks and could not be found in the composter. The bio-degradable green plastic bag and the bio-degradable plastic cup began to compost after three weeks and ten weeks respectively. After fourteen weeks, the compostable Sun Chip bag, the regular Sun Chip bag and the regular plastic bag had not composted at all.

Conclusions/Discussion
Heat may play a factor in the composting process. Frito Lay claims that its compost pile maintained an internal temperature of 120 degrees Farenheit. I did not measure the temperature in our garden composter. I did notice that the compost pile seemed to give off less heat as the weather grew colder. If I were to run the experiment again, I would make a larger compost pile to help maintain a higher internal temperature or run the experiment during warmer months of the year.

Summary Statement
I wanted to determine what modern packaging materials would best compost in a land fill.

Help Received
My dad helped me paste the photographs on the board.