CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alesia L. Atherley

Project Number
J0901

Project Title
Solar Radiation to Distill Water

Abstract

Objectives/Goals
The objective of my project is to determine if I can extract distilled water from muddy water or salt water; also, how much distilled water I will be able to extract in one day.

Methods/Materials
I plan to make distilled water from muddy water, and salt water using a solar radiation distiller that I will make myself. I will do this by using the rays from the sun. Solar radiation will be transmitted through a glass cover that will be absorbed by the sun. As the heat comes in contact with the impure water, the vapors will rise to the top of the cellophane wrap and run down the cellophane into an empty glass. I plan to make my distiller using a large bowl, masking tape, clear cellophane, rocks, muddy water, salt water, and a drinking glass.

Results
I was able to produce distilled water from muddy water and also produce distilled water from salt water.

Conclusions/Discussion
Since solar radiation was used in this experiment, the results will differ depending on the amount of sunshine.

Summary Statement
I will attempt to make unclean water pure enough to drink using a solar radiation distiller.

Help Received
Grandmother helped cut paper for board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Khajag Bornazyan

Project Number
J0902

Project Title
Energy Trap

Abstract

Objectives/Goals
Can I collect and store solar energy for our future needs? I hypothesized that if I create a vertical salinity gradient layer in a body of water in a solar-pond like environment, isolated with fresh water from the top, the density increasing with the depth and expose to the lamplight, then, as the surface exposure time progresses, the temperature of the bottom high density layer will increase and exceed the temperature of the top layer by collecting and storing thermal energy.

Methods/Materials
I studied two cases, a vertical salinity gradient and no salinity gradient (the control), both created in a 15 cm tall container. Each case was tested in three different trials. In both cases the container was exposed to halogen lamplight. In each case the temperatures of the bottom and top layers were measured as a function of the light exposure time. The average differences in temperature between the bottom and top were calculated and the results were compared between the two cases.

Results
Based on my experiments, I observed that in the salinity gradient case, after about 30 hours of exposure to the lamplight, the temperature of the bottom layer exceeded the top by about 6 °C. In the no salinity gradient case, during the same time period, the bottom did not exceed the top.

Conclusions/Discussion
I concluded that in the vertical salinity gradient case the thermal energy was trapped in the bottom high-density layer, since there was no convection in the middle, the isolating gradient layer. In the no salinity gradient case, the bottom layer could not trap the energy, because the entire environment was convective. The data fully supported my hypothesis. My findings agreed with the information found in the literature. I have learned that the solar renewable energy source can be effectively collected and stored in the solar pond-like conditions, and used for our future daily needs.

Summary Statement
By creating salinity gradient layer in a body of water in a solar pond-like environment, I have shown that a renewable energy, such as solar, could be collected and stored in the bottom high-density layer for our future needs.

Help Received
Father helped me to choose the topic and with transportation to obtain necessary materials and literature. Mother helped me with the display board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Abrar Choudhury

Project Number
J0903

Project Title
Cleaning Up Oil Spills

Abstract

Objectives/Goals
The purpose of this experiment is to find out which sorbent is the most effective in cleaning ocean oil spills. I became interested in doing this project when I read about a recent oil spill its devastating impact on the environment. I wanted to know about the methods being used and how effective they were. Sorbents are materials that soak up liquids through the mechanism of absorption, adsorption, or both. To be useful in oil spill cleanup, sorbents need to be both oleophilic and hydrophobic. Sorbents can be divided into three basic classes, natural organic materials, natural inorganic materials, and synthetic substances. The materials that I tested, polyester, gauze, polypropylene, and cheese cloth, all belong to the last category. I hypothesize that the polypropylene will be the most efficient since both polypropylene and oil are composed of hydrocarbon molecules and are attracted to each other.

Methods/Materials
I tested the effectiveness of polyester, polypropylene, gauze, and cheese cloth in absorbing oil from ocean water in 3 steps. First, I tested the amount oil a 2 in. by 2 in. piece of each material absorbed and converted it into a percentage. Next, I repeated this with sea water alone. Finally, I tested the effectiveness in absorbing oil in a mock oil spill by counting the number of pieces needed to clean up a mock oil spill with 5 mL of vegetable oil in 500 mL of sea water.

Results
The results I got were that the gauze absorbed the most oil and the most water in the individual absorbency tests. However, in the actual mock oil spill, the polypropylene was the most efficient, needing only 4 pieces to clean up the spill compared to 10 for the gauze.

Conclusions/Discussion
The polypropylene is the most efficient in cleaning up the mock oil spill even though it was third in individual absorbency of oil. However, it was last in water absorption. Therefore, as the other materials absorbed both water and oil when cleaning up the mock oil spill, the polypropylene absorbed very little water and mostly oil, making it the most effective. Polypropylene is made up of nonpolar molecules like oil. In contrast, gauze is made up of cellulose, which in turn is made up of polar molecules like water. The polypropylene#s nonpolar molecules repel the water#s polar molecules. This gives the polypropylene its oleophilic and hydrophobic properties, which are needed for cleaning up ocean oil spills.

Summary Statement
My project tested the absorbency of various synthetic sorbents in water and in oil and then determined which sorbent was the most efficient in cleaning up a mock oil spill.

Help Received
Mother helped gather materials

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Zareen Choudhury

Project Number
J0904

Project Title
Phytoextraction: An Organic Decontaminator

Abstract

Objectives/Goals
Soil contaminants form negative impacts on our ecosystem: ruining groundwater supplies, killing organisms, and posing a threat to our health. Certain plants can decontaminate soil through the process of phytoextraction; my project was to find out which plant (Euphorbia, Blue Fescue, Umbrella Plant, or Kale) would decontaminate the most amount of zinc contamination from the soil. I hypothesized that the Blue Fescue would, because of its high toxicity-resistance levels and long roots.

Methods/Materials
I had 3 of each type of plant (12 plants in all), with 1 control and 2 variables for each type. The variable plants all received a dosage of zinc chloride; within each plant type, 1 variable plant would get zinc at a ratio of 776.4 mg of Zn/kg of soil and the other variable plant got a ratio of 100 mg of Zn/kg of soil. After 3 weeks, the control plants and the plants with a concentration of 776.4 mg of Zn/kg of soil were sent to a lab, to see how much zinc they extracted by then. After an additional 5 weeks, all variable plants were sent to the lab, and the final data were taken.

Results
After 3 weeks (for 776.4 mg/kg plants): The Kale had the most percent increase in zinc, followed by the Blue Fescue, then Euphorbia, and last the Umbrella plant.
After 8 weeks (for 776.4 mg/kg plants): The Kale had the highest percent increase, then Euphorbia, third Blue Fescue, and last Umbrella plant.
After 8 weeks (for 100 mg/kg plants): Kale had the highest increase in zinc, then Euphorbia, followed by Blue Fescue, and fourth Umbrella plant.

Conclusions/Discussion
The amount of phytoextraction by each plant depends on a few features in the plant: its root length; tolerance levels to drought, disease, and climate; and growth rate. Because the Kale was extremely tolerant to disease and had a medium-sized root length, it extracted the most zinc. Even though the Kale extracted the most zinc, it looked the most unhealthy at the end, as though it would soon die. So the Kale would not be good for practical applications, which extend over many years, for it would die early. Hence, the Blue Fescue, which came second in absorption level and remained healthy, would be the best option for cleaning zinc-contaminated soil.

Summary Statement
My project intended to conclude which of my four plants is the best option for decontaminating zinc from soil, to help in real-life applications.

Help Received
Mother bought materials; Leo Garbini (Mom's colleague) helped make zinc chloride solution.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Brian A. Clark

Project Number
J0905

Project Title
Conserve Water, Nourish Plants: Can Gray Water Grow Great Gardens?

Abstract

Objectives/Goals
For my project, I experimented with gray water, which is household wastewater from showers, sinks, and laundry. My primary testable question was "Can you sustain a garden using gray water in an environmentally safe manner?" If we can use gray water to water plants then we can reduce our consumption of fresh water.

Methods/Materials
I watered four types of plants for eight weeks using two experimental types of water (gray water, and gray water filtered by activated carbon), and two control types of water (reverse osmosis water, and reverse osmosis water filtered by activated carbon). I also sent these four water samples to a water quality lab to test for bacteria and nitrates to see how dangerous the gray water really is and if filtering removed any of the harmful components. I measured the plant growth to determine the health of these plants.

Results
I found that plants grew best with unfiltered reverse osmosis water, which was my control. Compared to the control, the plants watered with gray unfiltered water grew 80.7% as well; with filtered gray water grew 95.74% as well; with filtered reverse osmosis water grew 96.52% as well. The plants grown with gray filtered water had more leaves, on average, than all other types of water. The lab report showed that gray filtered water had >2419.2 coliforms and 122.3 E.coli; the gray water had 686.7 coliforms and <1 E.coli; the filtered reverse osmosis water had 5.2 coliforms and <1 E.coli; the reverse osmosis water had <1 coliforms and <1 E.coli. None of the gray water had any nitrates, while the reverse osmosis water had 3 ppm. The gray water was slightly alkaline.

Conclusions/Discussion
My hypothesis is correct because the plants watered with gray water grew on average 80.7% as well as control water. Therefore, by using no additional fresh water, I successfully grew a variety of common garden plants. However, the results depended on the type of plants, probably because some plants like acidic water and gray water is slightly alkaline. Filtering made gray water grow larger plants. From the lab results, I learned that gray water contains harmful bacteria and that my filter was contaminated. Even though it saves water, you must handle gray water with caution and not allow it to return to the environment. State laws regulate the use of gray water and before starting on a gray water reuse project, you must first comply with the state regulations.

Summary Statement
I tested if plants can grow successfully when watered with gray water, and whether or not filtering the gray water with a simple activated carbon filter had any effect on plant growth and bacteria count

Help Received
Monterey County Health Department (Mr. Guibert and Mr. LeWarne) gave me interviews and helped with laboratory tests.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Mary R. Data

Project Number
J0906

Project Title
Break It Down to Save Our Planet: The Breakdown of CO(2) Emissions

Abstract

Objectives/Goals
The objective of my experiment was to determine whether CO(2) emissions could be reduce by exposing CO(2) gas to microwaves

Methods/Materials
Fifty (50) empty water bottles with identical size and shape were used in the experiments. I filled each bottle by exhaling into the bottles to simulate carbon dioxide gas emissions. I then used a CO(2) sensor and software program to measure and analyze the CO(2) concentration in parts per million (ppm) for each bottle to establish a base line. The next step was to expose ten (10) bottles to microwaves at a give length of exposure time. Each group of ten (10) bottles was exposed for a different amount of time from 1 to 5 minutes. After each bottle was exposed to the microwaves for their assigned time, I then re-measured the CO(2) concentration of the bottle. I repeated my experiment ten (10) times for each exposure time to insure accurate results. I documented each experiment and analyzed my results.

Results
I found that the microwave exposure time applied to the CO(2) gas has a significant effect on the breakdown of the CO(2) molecules. In experiments #41 through #50 (five minutes exposure time) there was consistently a 54% reduction in CO(2) concentration (ppm) as compared to experiments #1 through #10 (one minute exposure time) which consistently resulted in a 13% CO(2) concentration reduction.

Conclusions/Discussion
Carbon dioxide CO(2) emissions are responsible for 86% percent of the global warming pollution in the United States. The Majority of the CO(2) gas is generated by burning of fossil fuels. Microwaves can break the chemical bonds of the CO(2) molecule reducing the concentration (ppm) in a controlled environment. The length of time CO(2) gas is exposed to microwaves has a significant effect on the reduction of CO(2) concentration.

Just imagine a microwave machine with higher wattage reducing the CO(2) emissions content of a car. I can envision having a magnetron in the trunk of a car and the engine exhaust gas passes through this machine to break the CO(2) molecule into carbon and oxygen. We would really live in a healthy world.

Summary Statement
My project is about the effects of microwaves on the breakdown of the chemical bonds of carbon dioxide gas molecules, which are responsible for global warming.

Help Received
My brother helped me with one of my spreadsheets. My dad helped in the safety of my experiment to make sure I was not injured. He also helped me with the electrical and cutting the wood for my display. I enjoyed nailing, painting and learning how to read electrical diagram and soldering the wires to the LED.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Natalya B. Dreszer

Project Number
J0907

Project Title
Algae to the Rescue! Bioremediation of Greenhouse Gasses with Algae

Abstract

Objectives/Goals
Global Warming is one of the biggest problems in the world. In my experiment, I wanted to prove that algae would grow better with exhaust pumped in and the algae would clean up the CO2 from the exhaust. My hypothesis was #Pumping exhaust into water will make it more acidic. If algae grows in the same water, then it will make the water more basic. Algae will grow more in the conditions which get CO2.#

Methods/Materials
I pumped natural gas heater exhaust into glasses filled with water and conditions. I compared pH between algae and no algae, and exhaust and no exhaust conditions. I ran the experiment for three weeks while measuring pH daily: before pumping in exhaust, after pumping in exhaust, and after a day of growth.

Results
My results clearly showed that after pumping exhaust into half of the conditions, their pH went down. The pH of the conditions without exhaust stayed the same. After each day of growth the pH went dramatically up, in the algae conditions that got exhaust. The pH of the algae conditions without exhaust went slowly up. The condition with exhaust but no algae barely rose after the day was out. These results were consistent throughout three weeks of measurements, but there were some interesting exceptions. My observations of algae growth between the conditions were unclear.

Conclusions/Discussion
My results supported my hypothesis. Algae can be used to clean up the CO2 made from burning fossil fuels. If algae can also be used to make bio-fuel, then algae can rescue us from global warming!

Summary Statement
My project is about using algae to decrease the amount of CO2 in exhaust from burning fossil fuels.

Help Received
My dad, Tim Dreszer, helped with graphs, set up, and taking data. He also distracted me and broke my pH meter. My science teacher, Bob Biegert, discussed and gave helpful suggestions. He also set deadlines that were helpful.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Anoop R. Galivanche

Project Number
J0908

Project Title
A Comparison of Different Water Purification Methods

Abstract

Objectives/Goals
The purpose of this study is to compare the efficiencies of ancient water purification methods against the efficiencies of modern water purification methods. It was hypothesized that modern water purification methods would be more effective in removing bacteria, dissolved solids, salts, and turbidity.

Methods/Materials
The ancient methods that were tested were: the Hippocrates Sleeve (straining water through a conical fabric bag before boiling it); Susruta Samhita (coarse gravel and sand filtration before boiling the water); simply boiling the water; the Scottish Water Treatment (charcoal and sand filtration); and the Lucas Antonius Portius method (sand filtration). The modern purification methods were Reverse Osmosis (membrane purification), and UV light purification (agitating the water with a UV Light bulb). A large water sample was collected from a local river to be purified. After the methods were performed on the river water, the water was collected and frozen in individual, sterilized containers. Then, five tests (Conductivity, TDS, pH, Optical Density, and APC) were run on each of the samples to determine the presence and concentrations of salts, dissolved solids, pH, turbidity, and bacteria.

Results
The experiment refuted the notion that Reverse Osmosis can remove all impurities from the water sample as it removed relatively little bacteria from the river water. The hypothesis that modern purification methods were more effective than ancient methods was not entirely correct because UV light was second to boiling in reducing the most bacteria. Reverse Osmosis however did remove the most salts, dissolved solids, and reduced turbidity. The Susruta Samhita method and the Hippocrates Sleeve method performed relatively well in all areas.

Conclusions/Discussion
The results indicated that many of these methods such as boiling, the Hippocrates Sleeve, and the Susruta Samhita method are very plausible choices for inexpensive water purification in the modern day. In areas that have poor infrastructure, the use of these methods is ideal.

Summary Statement
This project studied how ancient water purification methods compare to modern ones.

Help Received
Father helped collect water. Mother helped with display board. Dr. Hoobler of Purfresh advised and provided guidance during project. Used lab equipment at Purfresh Inc. under the supervision of Dr. Hoobler.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Marshall T. Gifford

Project Number
J0909

Project Title
Catching the Rays

Abstract

Objectives/Goals
The initial impetus for this project was to see if a solar furnace could generate temperatures hot enough to make glass, and to determine how different factors affect the maximum temperature.
In the Jamestown Colony in Virginia the early colonists made a business of glassmaking because the materials were available to make it, including vast quantities of firewood needed to generate the necessary heat. I was wondering whether 400 years ago the colonists could have used sunlight to generate enough heat to make glass, thereby saving the Virginia forests.

Methods/Materials
1. A parabolic mirror was made using a satalite dish with mirrored mylar.
2. This was used to focus sunlight and artificial light on a target under a series of different conditions.
3. Multiple tests were performed to see the effect of the angle of the sun, insulation, and the size of the mirror.

Results
Due to cloudy weather over several weeks, only a small number of tests could be made using sunlight, and an #artificial sun# was created using spotlights indoors. Despite this difficulty, the testing showed that increasing the area of the parabolic reflector increased the temperature of the target. Maximum temperatures were achieved when the sun was closest to directly overhead, near noon. Insulating the target increased the maximum temperature which was achieved. Even in winter, and without insulating the target, temperatures hot enough to melt aluminum (600°C) and steel (1000°C) were achieved.

Conclusions/Discussion
This experiment suggests that on a summer day with much more insulation of the target, it should be possible to melt glass (1,500°C) with a solar furnace like this, even using the materials available 400 years ago.

Summary Statement
This project tested whether a solar furnace could generate the temperatures needed to make glass

Help Received
My father helped with mirroring the parabola, and my mother helped with the layout of my board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Sean S. Haas

Project Number
J0910

Project Title
Pure Water Produced by Solar Distillation

Abstract

Objectives/Goals
The objective of my project is to see if it is possible to find a simple and inexpensive way to purify water. I feel this would best be achieved with a solar still that has a reflective back and a dark inner tray to hold the water. I think that it would be possible for people in areas that need clean drinking water and do not have the luxury of expensive complicated materials to be capable of constructing this device out of simple, readily accessible, possibly recycled materials.

Methods/Materials
Using recycled materials I constructed a solar still with a sheet of plastic shaped around two wooden disks used as end caps. This was taped together and a clear tray filled with two cups of colored water that represents polluted water was put in the cylinder. A drain tube was inserted in one end for draining the collected water. The still was put under a heat lamp for twelve-hours to replicate the sun. Then after a twelve-hour cooling period, the water from the condensation was measured. This process was repeated with a foil-backed still, a black-backed still and a clear-backed still as my control. The entire process was then repeated with a black tray inside the cylinder.

Results
I found that a foil backed still with black tray would yield .75 ounces more than the clear backed still. I believe that this occurs because the foil reflects the light and heat onto the black tray, which then absorbs the heat causing the water, which is at a higher temperature to evaporate with a higher yield. I believe this shows that it is not only possible to create pure water in a very simple manner, but to optimize production using reflective material.

Conclusions/Discussion
My hypothesis was proven correct; the foil backed still yielded 1.75 ounces of clean, distilled water from the two cups I started with, making this the greatest water yield in my experiments. This expands upon our knowledge of ecological engineering by showing an example of an inexpensive solar distillation method that could be used to help millions of people the world over. This method is also possible to use for desalinization process.

Summary Statement
I wanted to see if I could purify water using an inexpensive solar still made out of simple recycled materials,which could possibly be built and used by people the world over.

Help Received
My mother helped as inspiration and in gathering materials; my father helped with ideas for shapes of still; Bart Orlando showed me alterative ways for creating energy.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Mikayla R. Jundt

Project Number
J0911

Project Title
Water Purification with Solar Energy

Abstract

Objectives/Goals
The purpose of my project was to improve the efficiency of my solar still from 2007 by testing modifications to improve evaporation and condensation. The 2007 solar still was based on the El Paso Solar Project model and used to purify saline water.

Methods/Materials
The El Paso Solar Still from my 2007 project itself was an improvement using aluminum backed rigid insulation for the box. My research revealed two areas of possible improvement; evaporation and condensation. My 2007 solar still (0.372m2) was tested using my 2007 model recording 2008 temperatures and humidity, inside and outside my solar still. Production differences were also recorded. I then added a solar pump and spray nozzles inside my solar still to test evaporation production increases. I then changed the condensing cover from plastic to glass and reran the test. Finally, I changed the single glass cover to a dual glass cover and repeated the testing. Each test was compared to the 2007 solar still project without modifications.

Results
The unmodified 2007 solar still results were recorded as the baseline to compare the results of each test. The 2007 results were 2.0 liters/ meter square/ day. The solar pump increased results 40% to 2.8 liters/ meter square/ day. The glass cover increased results 90% to 3.8 liters/ meter square/ day. The dual glass cover caused my solar still to reach more than 180° F inside the box and increased production 185% to 5.7 liters/ meter square/ day

Conclusions/Discussion
My experiment proved that the efficiency of the solar still could be improved by making modifications to increase evaporation and condensation. The solar pump production increase was disappointing for the cost and additional work required to keep the pump operating properly during testing. The other improvements seemed the best because I did not have to repeatedly check my solar still during testing.

Summary Statement
The purpose 2008 of my science project is to my 2007 solar still test modifications to improve the production of my solar still.

Help Received
City of Fresno Waste Water Treatment Plant adn Mr. Steve Hogg, Plant Manager, and Mr. David Trauger, Senior Lab Tech., provided advise. The local hardware store and father helped me construct my solar still modifications. School advisor made presentation and project experiment suggestions.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Nicholas A. Kinsman

Project Number
J0912

Project Title
Catching Rays: The Importance of Focus

Abstract

Objectives/Goals
Objective: Determine whether magnifying (convex) mirrors (MM) intensify more solar radiation than regular (planar) mirrors (RM). Manipulated variable is type of mirrors (RM or MM). Responding variable is temperature(C). Controlled variables are size of can, thermometers, and focal point.
Prediction: MM intensify more solar radiation than RM, because MM focus the energy of the sun.

Methods/Materials
Materials: 3 Thermometers (C), 3 Empty soft drink cans, 1 Can black spray paint, 1 Stopwatch, 3 Sticks modeling clay, 3 MM, 3 RM, 6 Mirror supports, 1 Data sheet, Sun
Methods: (A) Calibrate thermometers. (B) Paint 3 empty soft drink cans black. (C) Insert thermometer 5 cm into each can and seal in place with modeling clay. (D) Place all 3 cans in full Sun and record time and temperatures. (E) Aim reflection of Sun from a RM at 1 can, and the reflection from a MM at another. The third can is a control. (F) Every 5 minutes, record the temperatures. (G) If the temperature has not increased, add another mirror. (H) Continue until no more mirrors will fit around the cans. (I) Cool cans to room temperature, randomize cans and mirrors, and repeat for a total of 3 trials. (J) Enter data into Excel, obtain means and standard errors, and plot graphs.

Results
The average maximum temperature reached with RM was 1.3C greater than with RM, and 4.3C greater than the control, demonstrating that RM intensify more solar radiation than MM.

Conclusions/Discussion
I want to be an inventor using solar energy to reduce dependence on other energy sources. From this and my previous experiments, I have developed an emergency home desalination/purification unit that people can build from household items. People can use this in case of an emergency when no drinking water is available. This project proved that RM increased heat inside the cans more than did MM, and did not support my hypothesis. Fortunately, RM cost less than MM and people will already have them in the house when disaster strikes. Surrounding a solar water purification device with mirrors makes it more efficient because the mirrors reflect off each other and concentrate energy rather than reflecting energy back into space. Using commonly available materials, such as soft drink cans and plastic water bottles, it is possible to produce drinking water from ocean water or contaminated water for less than a penny a liter, and save lives in a disaster.

Summary Statement
Using common recyclable materials, such as soft drink cans and plastic water bottles, it is possible to produce drinking water from ocean water or contaminated water for less than a penny a liter, and save lives in a disaster.

Help Received
My Aunt purchased materials and took pictures.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Austin J. Kluth

Project Number
J0913

Project Title
Using Water as a Coolant to Increase Solar Panel Efficiency

Abstract

Objectives/Goals

Fossil fuels are burning out at a rapid rate. An alternative, abundant resource needs to be found for human usage. Heating homes is a large energy consumer. Recently solar panels have become a resource to meet such needs. However, solar panels have had their share of problems. Particularly, overheating when exposed to too much sunlight. In addition, when the temperature becomes too hot, solar panels generate a lot less energy than when they are cool.

Statement of the Problem: Solar panels often overheat, and thus become less efficient. Cooling solar panels down seems to be a necessary function. This experiment was conducted to determine if water could be used as a coolant to keep solar panels from overheating. Does water help the efficiency of solar panels?

Hypothesis: Flowing water over the surface of a solar panel will cool down the panel enough to make it generate more energy and allow it to work more efficiently.

Methods/Materials

Using two, small, model solar panels, one as a control and the other as a test for water as a coolant, several readings were taken at scheduled times of the day measuring the difference in energy efficiency of each panel. Both solar panels were placed on Styrofoam bases and set into a water filled tub. The angle, height, and direction of both panels were identical. However, Solar Panel A, the water coolant experiment model, had rubber tubing attached to it. Using a fish tank pump, water was pumped from the tub through the rubber tubing so that a fan of water sprayed continuously over the panel surface throughout the day.

Results

As a result, data readings showed higher energy efficiency from Model A, the water cooled, experimental model, indicating that water may act as a viable coolant for solar panels. Using water as a coolant to run over the surface of solar panels, increases the energy output.

Conclusions/Discussion

Using water as a coolant on a solar panel cools it down enough to cause it to generate more energy than one without water. While the sun was not covered by any clouds and was directly overhead, the solar panel with water cooling it generated more energy than the one without water. A water coolant system for solar panels may help the solar panels to cool and increase energy output during clear, sunny days and when the sun is at more of a direct angle above the solar panels.

Summary Statement

Flowing water over the surface of a solar panel will cool down the panel enough to make it generate more energy and allow it to work more efficiently.

Help Received

Thank you to my science teacher, Mrs. Sniffen, for the opportunity to do this science fair project, to be part of the science fair program, and for her help with input and materials. Also, I would like to thank Mr. Sniffen for his solar panel knowledge, as well as, my brother and my mother for help with assembly.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Zeke M. Lemann

Project Number
J0914

Project Title
Parabola Solar Ovens

Abstract

Objectives/Goals
My project was to determine what kind of mirrored parabola produces the most heat.

Methods/Materials
Three solar ovens were constructed each using a different parabola. One parabola was deep, one parabola was shallow, and one was in between deep and shallow. They all had the same amount of mylar surface area.

Results
The solar oven that was in between deep and shallow produced higher temperatures more quickly.

Conclusions/Discussion
My conclusion is that the middle oven did better because it had a focus that was more sheltered than that of the shallow oven and it had more solar collecting area than the deep oven.

Summary Statement
My project is about comparing different parabolic solar reflectors for heating efficiency.

Help Received
My mother typed parts of my log. My father helped me build the ovens. My classmates helped me take temperature readings. Got advice from Humboldt State University professor about validity.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kristin O. Lopez

Project Number
J0915

Project Title
Garbage Blues

Abstract

Objectives/Goals
My experiment was to find out which everyday products biodegrade the most and the quickest. I was very interested in discovering which products were harmful to the environment and this led me to conduct my experiment.

Methods/Materials
I used eleven different household items including: a cotton rag, polyester cloth, Huggies diaper, LUVS diaper, Pampers diaper, Ziploc bag, Biobag, paper cup, newspaper, banana peel, and a lemon peel. I would weigh these items in grams before I buried them in the ground. For the next 5 months I would dig them up and record them on a 1-10 scale determining their biodegradation level.

Results
The results of my experiment were varied, but some of the results surprised me. The two items that never biodegraded were the polyester and Ziploc bag. All of the diapers went to a 2 but only because of the high levels of rainfall. The most surprising results were the Biobag, 8, newspaper, 9, and the cotton rag, 9, but these results might have been changed because of rain. The best items were the lemon peel and banana peel.

Conclusions/Discussion
My conclusion to the experiment is that certain products like diapers, plastic, and paper are extremely bad for the environment. My experiment really opened my eyes to the problems of dumping and to our huge trash problem. I would make a few changes but I had fun doing this project and learning new things.

Summary Statement
My project was to find out which products were most biodegradable in the soil and to learn about the environment.

Help Received
Mother helped digging.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Monica R. Luna

Project Number
J0916

Project Title
Comparing Different Filtration Materials in Cleaning Contaminated Water

Abstract

Objectives/Goals
I was trying different filteration materials to determine which filter will clean up pond water the best. If there was a natural disaster, is there household materials you can use for a filteration system?

Methods/Materials
I first made filters by placing a strainer on top of cups. i then placed different materials into the strainer. The materials I used were cotton, carbon, and sand. I filled the strainer completely with the materials. The control group had no materials in the strainer.
I then used a cooking baster to pour pond water through filters. I then collected the water that went through the filter and placed into petri dishes. 10 dishes for each material. Put dishes at room temperature and grew bacterial colonies. I then counted bacterial growth and compared results.

Results
Carbon reduced the bacterial growth the most with an average 232 colonies. Then sand with 235, Cotton had an average of 253, and the control group was at 274.

Conclusions/Discussion
I learned that if you are in a situation where you needed to get clean water. Boiling the water definitley works better. But if you needed to use a filter system. Carbon proved to be the best in keeping bacterial colonies lower than the control group.

Summary Statement
I filtered pond water with different materials to see if I you could have safe water to drink..

Help Received
Dad helped obtain materials. Petri dishes were obtained from Sanger High School. Teacher helped with scientific method.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Ian J. Martinez

Project Number
J0917

Project Title
Pine Needles and Oak Leaves as a Source of Renewable Energy

Abstract

Objectives/Goals
The project objective was to determine if pine needles or oak leaves in forest floor leaf litter have diferent a caloric content when burned.

Methods/Materials
Three forest locations were selected for random sampling. A 100 square yard grid was laid out at each location. Using a random number generator, three square yards of leaf litter was collected from each location, for a total of nine representative samples.

From each of these 9 larger samples, three smaller samples, approximately 6 grams each, were burned in a calorimeter to determine caloric output. 500 grams of distilled water in the calorimeter had initial and final temperatures recorded. Three temperature change data points were produced for each original sample collected.

Results
Results showed that pine needles had a higher heat output, in Kilocalories per gram than did oak leaves. The highest calculated weight of pine needles per acre in my experiment could produce 2,646,764 Kcal/acre using a boiler.

Conclusions/Discussion
I discovered that pine needles had the greatest caloric output compared to oak leaves. Pine needles burned longer and hotter which raised the temperature of water in the calorimeter more per gram than the oak leaves did. The oak leaves just smoked a lot and the flames died.

Pine needles make up the bulk of Nevada County leaf fall, meaning that this resource is abundant. The idea of employing rotational leaf farming techniques and using pine needles to generate heat to make electricity is an excellent one, because tree litter is a constantly renewing resource.

One Kcal of heat energy is approximately equal to 0.001 kilowatt-hour (KWh) of electrical power. Approximately 2,600 KWh of electrical energy could be produced from one acre of pine needles. Therefore, pine needles could be put to good use as a source of renewable energy.

Summary Statement
The project investigated if forest leaf litter could be used as a renewable energy source to generate electricity.

Help Received
Father helped with gathering equipment , driving to sample locations, and helped put display board together; teacher helped with thermometers and reviewed project.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Cameron E. Merten

Project Number
J0918

Project Title
Going Green: The Battle of Two Solar Water Heaters

Abstract

Objectives/Goals
I want to make the planet a better place to live in and keep it healthy. As well I want future generations to be safe and have the same habitat as the generation before them. I figured that I could really help by doing a science fair project on solar energy.

Methods/Materials
The procedure that I used to conduct the experiment is to: build solar water heaters. Conduct experiment number one, which is asking the question: What heating method will heat a pool up to the highest temperature in two hours? Record results during the test and at the end of the test. Conduct experiment number two, which is asking the question What heating method will heat a pool up the quickest to seventy-five degrees Fahrenheit? Record results during the test and at the end. Conduct the second trial for each question. Record results for both tests during and after the test is completed. Add up all the costs of the different supplies used for each solar water heater separately. This will be answering the question: Which heating method is the most cost effective? Record results. The main materials that I needed were cooper, black vinyl, a board, black paint, water and buckets, there were many other materials needed for the making of the solar water heaters

Results
The results for tests one and two (both trials) did not match the hypothesis. However, for the question: Which solar water heater will be the most cost efficient? the results did match the hypothesis.

Conclusions/Discussion
When I looked back at my results I found out that the black vinyl had probably had the best results for questions one and two because the cold air in the sunroom had allowed the copper to absorb more of the cold and. Whereas the black vinyl did not. Therefore, in the morning when the experiments were conducted the copper and started out at a lower temperature that the black vinyl did. This gave the black vinyl an advantage in heating up to a higher temperature.

Summary Statement
I built to solar water heaters and then I tested them.

Help Received
Mother revised work; Father helped drill holes and supervise the building of the solar water heaters

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Lauren M. Miles

Project Number
J0919

Project Title
Can Fabrics Be Used for Water Filters?

Abstract

Objectives/Goals
The objective of my environmental engineering project is to determine which fabrics will do the best job of filtering the turbidity out of the water. My hypothesis is: If the cloth has a tight weave the water will come out clean, but slightly slower.

Methods/Materials
I prepared a control mixture of 2L of pure tap water and 0.1Kg of sandy loam soil in a 3L bottle. I shook the bottle, and then poured a sample into a 250mL beaker. I shook the beaker and extracted 26mL with a 2.5mL eyedropper and evenly divided it in 2 clean 13ml test tubes. Then, I took a 6#x 6# piece of fabric and placed it on top of a screen support lid and place the lid on top of another 250mL beaker. I gently push the fabric down into place with a deadbolt lock casing and secured the fabric with a rubber band. Then, I shook the 2 test tubes and poured them through the fabric, timing the gravity flow rate, measuring net mL, writing and photographing every observation. Then repeated the procedure on seven randomly selected fabrics. After testing the seven fabrics, I made a super filter using the three best filtering fabrics. The procedure was repeated.

Results
I found that I could clean water using combinations of fabrics or using one fabric alone such as silk. The silk fabric did the best job of filtering the water. It had the lowest visual turbidity at one percent. The silk had a tight weave, and I observed that it had an average of a ten minute gravity flow rate through the fabric and the net flow was twenty-two mL. I believe that the silk alone did better than my final super filter. Although the silk worked better, it was costly at $15.99 per yard.

Conclusions/Discussion
My hypothesis was partially proven; the tighter weave did improve the fabric#s ability to filter out turbidity, but it did not slow the flow rate in every instance. My environmental engineering project proved that certain cloths could filter turbid water better than others. I truly believe my project will lead to future studies of water filtration to end world water pollution. As demand for consuming water supplies increase, our planet will need other alternatives, possibly cheaper and faster. In Bangladesh, they are using sari cloth to filter out cholera bacteria that attaches to algae. My project#s continuing research could one day save lives.

Summary Statement
My project researched which fabrics or combination of fabrics filter out water turbidity most efficiently.

Help Received
Mom took me to the craft store and library. Dad set up Paul Lambert's interview. Dr. Rita Colwell lab e-mailed a copy of the Bangladesh research on sari filtering.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Diego R. Munoz-Cowan

Project Number
J0920

Project Title
The Biodiesel Tests

Abstract

Objectives/Goals

The objective is to determine which of three different plant based oils would produce the greatest quantity of biodiesel fuel. I used new (unused), slightly used and heavily used oils in equal quantities. The slightly and heavily used oils were obtained from restaurants. It is the the oil they discard. I hypothesized that the new (unused) oil would produce the greatest quantity of biodiesel because it contains the least amount of free fatty acids.

Methods/Materials

I started out with 500ml. of oil for each of the nine tests. I tested each of the three oils three times. The oil was titrated to determine the amount of free fatty acids present. This gave me the titration value that I used to determine how much KOH catalyst was needed to make the biodiesel.

Then, KOH was mixed with methanol to make methoxide. Oil was heated to 130 degrees F. Methoxide and oil were combined in a separatory funnel. The solution was mixed producing glycerine as a by-product.

Glycerine was drained off and 100 ml of cold water was added to the oil in a separatory funnel. Solution was mixed then allowed to settle. Water and emulsion were then drained, leaving biodiesel. The wash was repeated three more times to remove impurities from the biodiesel.

Results

The slightly used oil produced the greatest quantity of finished biodiesel-491.6 ml average. The new (unused) oil produced the second greatest amount of finished biodiesel-463.3 ml average. The heavily used oil produced the least amount of finished biodiesel-433.3 ml. average.`

Conclusions/Discussion

My hypothesis was incorrect. Having the least amount of free fatty acids the new (unused) oil did not produce the greatest quantity of finished biodiesel as I had thought it would. I think the slightly used oil produced the greatest quantity of biodiesel because I used the perfect amount of catalyst. I think I didn't get as much biodiesel with the new (unused) oil because the amount of catalyst used may have been a major factor (too much or too little catalyst). Another possibility is that I need to adjust the formula I used to make biodiesel, so it works better with the new (unused) oil. Based on my results, if you wanted to produce the highest yield of biodiesel that you could, using the formula I used, you should use slightly used oil.

Summary Statement

My project focus is to determine which of three plant based oils: unused, slightly used and heavily used oils would produce the greatest quantity of biodiesel fuel.

Help Received

My cousin, Dan Sharp provided some of the equipment and the initial guidance I needed to complete my project.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Andrew A. Palosaari

Project Number
J0921

Project Title
Save Money and Stop Pollution: Cost-effective Gardening While Maintaining an Earth Friendly Environment

Abstract

Objectives/Goals
The objective of this experiment is to determine the most cost-effective, least polluting fertilizer and soil combination for the backyard gardener to save money and minimize environmental impact.

Methods/Materials
Plants were grown in premium potting soil, clay and sandy soil (with and without homemade compost) using liquid and solid fertilizers with optimal N-P-K(18-6-12) ratios to determine cost-effectiveness and pollution levels. Plant size and weight was collected from multiple pea and radish plant samples. Aquarium water test kits were used to detect pollution levels. Average test results were computed by eliminating outliers using standard deviation computations, as appropriate.

Results
The results of this experiment show that overtime, liquid and solid fertilizer will produce the same crop size, and in a typical yard you can save over $100 per year by using solid fertilizer. Test results also show that liquid fertilizer runoff has significantly higher phosphate levels and higher acidity levels than solid fertilizer. Nitrite and nitrate pollution levels were not detectable. Clay soil amended with homemade compost is the most cost-effective soil, producing plants that average up to eight times larger than those grown in other soils, and in a typical yard provides a savings of approximately $14 per year.

Conclusions/Discussion
By combining the results of this experiment as a value function of fertilizer and soil, it has been proven that using solid fertilizer and clay soil amended with homemade compost is the most cost-effective and environmentally friendly way to garden.

Summary Statement
The central focus of this project is to determine the most cost-effective combination of fertilizer and soil that minimizes runoff water pollution.

Help Received
Father helped proof-read report and identified data analysis tools; Mother bought supplies

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Tyler M. Paras

Project Number
J0922

Project Title
Cleaner Waterways: Reducing the Effects of Fertilizer Runoff

Abstract

Objectives/Goals
Blue green algae blooms are the cause of environmental, economic, and health problems world wide. In small quantities blue green algae is not a problem, but when it grows rapidly, called a bloom, it becomes a problem. Blue green algae blooms are caused by too much phosphate and nitrate from runoff of fertilizer from farms. This experiment's purpose is to try to reduce the amount of phosphate and nitrate in water in order to reduce the amount of blooms.

Methods/Materials
Using two different types of media (one targeting removal of phosphate and the other at the removal of nitrate) and two different methods of filtering (media bag and flow filter) the phosphate or nitrate contaminated solution were exposed to the media and the results were tested at various times/runs with a chemical indicator. If the phosphate or nitrate was removed by the media the indicator color would change when compared to the control solution.

Results
After 36 hours the phosphate media bag reduced the concentration of phosphate in the water by an average of 90% after all trials, which is a substantial change. The nitrate media bag also had remarkable results at the end of the test. After 34 hours the media bag reduced the concentration of nitrate in the water by an average of 98% after all trials.

The phosphate flow filter was also successful. After 1 run phosphate concentration went from 10ppm to an average of 6.5ppm and after 10 runs phosphate went to 1ppm. The nitrate flow filter was very successful. The nitrate flow filter reduced the nitrate from 125ppm to 4ppm on average, a 97% change.

Conclusions/Discussion
After finishing all of the tests, I found that there is a way to reduce the quantity of phosphate and nitrate in water by using media bags and/or filters. Both forms of filters greatly reduced the amount of phosphate and nitrate in water. The media bag for phosphate after 36 hours tested at 1ppm and after 10 runs the phosphate flow filter tested as 1ppm. Also after 36 hours the nitrate media bag tested at 5ppm and after 1 run the nitrate flow filter tested at 2.5ppm. Due to these phenomenal results, blue green algae levels could be significantly decreased by using these filters to reduce the concentration of nitrate and phosphate from water. These filters can help the environment, the economy, and save lives.

Summary Statement
Is there a filter system that would be able to significantly reduce the nitrate or phosphate (two main components of fertilizer that cause blue green algae blooms) concentrations from a solution?

Help Received
Father supervised experiment and explained proper lab technique.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Diego A. Ramirez

Project Number
J0923

Project Title
Solar Cooking in Humboldt County

Abstract

Objectives/Goals
My objective was to find out if it is possible to cook frozen veggies in a homemade solar oven in Humboldt County where the temp never gets very high. My hypothesis was that yes you can cook frozen veggies in a homemade solar oven in Humboldt County because I think the oven will heat up by the light that goes in and not by the temp outside of it.

Methods/Materials
I built a small solar oven out of a box, styrofoam, aluminum foil, glass and black paper. I used a glass container to cook the frozen veggies in and I put a thermometer inside the oven and another on the outside of the oven. I waited for a sunny day and placed the oven directly in the sun. I recorded the temps inside and outside of the oven every hour. I also adjusted the oven about every 15 minutes to make sure it was directly in the sunlight.

Results
I did 4 tests with my solar oven and highest temp reached was 168*F. I was able to cook frozen veggies and an egg. The 1st test I did for a total of 2 hrs. The temp inside the oven reached 100*F and the temp outside was only 76*F. The 2nd test I did for a total of 4 hrs and the temp inside the oven reached 168*F and the temp outside was only 78*F. The 3rd test was done for a total of 2 hrs and temp inside the oven reaced 130*F and the temp outside was only 66*F. The 3rd test was cut short because the sun started to go down and the temp of the oven was decreasing. The 4th test I did for a total of 4 hrs and the temp inside the oven reached 152*F and the temp outside was 80*F. I had better results with tests 2-4 than with test 1 because in test 1 I was using plastic wrap for the top of my oven. I was able to get a piece of glass for the top and my results were much better. I also found that the highest temps were reached 12 and 1pm.

Conclusions/Discussion
I found that you can cook frozen veggies in a homemade solar oven in Humboldt County. I found that it is important to have a glass top on the oven and to make sure it is directly in the sunlight. I found that it would be better to have the top of the oven slanted to catch the lower sun rays. I learned that the temp outside of the oven doesn't matter as long as there is sunlight going through the glass on the top. My project is a cheap, fun and environmentally friendly way to cook in the outdoors. Solar ovens can be very useful to people who enjoy the outdoors or for people who live in isolated areas where gas and electricity are not available.

Summary Statement
Solar cooking in Humboldt County where the temperature outside is not very warm.

Help Received
Mom helped type report, neighbor cut glass

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
David M. Tanksley

Project Number
J0924

Project Title
Helping Our School's Biodegradable Plates Decompose Faster using Environmental Factors

Abstract

Objectives/Goals
My question was, "How can we help our school's biodegradable plates decompose faster using environmental assistance?" I chose my topic because my sister studied biodegradable materials before and I thought it was interesting. I also have a concern about the environment and helping my community "go green". In research I learned using a compost pile helps conserve energy and helps the environment by reducing pollution and landfill dumps. Compost piles work with decomposers (worms) in the environment to enrich soil which is good for agricultural purposes and gardening.

Methods/Materials
I obtained new, biodegradable plates from our school cafeteria. With permission from the school, I took dirt from the school grounds to put in my bags with the plates for the experiment. I used dirt from the school because if the school chooses to use a compost pile in the future, information from my experiment could help.

I filled each bag with the same amount of dirt, a new plate and different variable. I had two test bags for each variable, and two for the control and labeled the bags. Each week I observed and weighed the plates and recorded the information.

Results
The control with just dirt worked the least. The tests with the torn plates were the second least. The test plates that were the third least to decompose were the test bags with the worms. The test bags with the organic material worked the third best. The next variable that was the second best in breaking down the plate was the water. The test plates in the bags with the combination of all of the other variables worked together to start decomposing the plates the best.

Conclusions/Discussion
All of the variables alone had some effect on the plate. The tests with the combination of variables decomposed the plate the most because the variables worked together. Worms can eat half their weight a day in ideal conditions and they were an important factor of the combination tests results. A longer experiment would better show decomposition of the plates. I hope that people that read about my project will want to use compost piles to help their environment.

Summary Statement
Helping our school's biodegradable plates decompose faster using environmental assistance.

Help Received
My mother helped me gather and organize my materials. She offered advice and helped me complete this application. My teacher helped with advice and editing.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Vivek G. Vishwanath

Project Number
J0925

Project Title
Miracle or Menace? Water Purification using Plant Potential

Abstract

Objectives/Goals
The objective of this experiment was to determine the contribution of water hyacinths in nutrient purification and to find the rate at which they reduced ammonium hydroxide (NH4OH) levels in water.

Methods/Materials
Three control groups and one experimental group were used. Each group consisted of a certain combination of hyacinths, water, and aqua ammonia. NH4OH concentrations in the range 80-100 ppm were used in all trials. The reduction in NH4OH levels was measured daily by titrating using 0.008N sulfuric acid and a pH indicator.

Results
On average, NH4OH levels decreased rapidly in the experimental group during the three trials, implying that water hyacinths do reduce NH4OH levels, by about 5-15%, and the remaining 25% could be attributed to evaporation. These reductions occurred only during the first few days, after which both groups settled down to a constant level.

Conclusions/Discussion
The results indicate that irrespective of the initial concentration, an equilibrium point is reached after 3-5 days. It can be concluded that water hyacinths do affect purification, but evaporation and other chemical reactions seem to contribute more to nutrient reduction. This purification technique was also verified during spring to avoid plant dormancy. In future experiments, a more controlled environment is recommended to minimize evaporation and temperature affects.

Summary Statement
The experiment tested the ability of water hyacinths to reduce overall ammonium hydroxide concentrations in a contaminated synthetic model of a water body.

Help Received
Father assisted during set up and experimentation; Dr. Chat Mohan and Dr. Ram Krishnamurthy explained chemical concepts; Received guidance from teachers, Mrs. Gross and Mrs. Gillum

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Hannah J. Washburn

Project Number
J0926

Project Title
Does Adding Polymers to Soil Prolong the Effects of Pesticide?

Abstract

Objectives/Goals
The purpose of my science project is to determine if adding super absorbent polymers to topsoil will help prolong the effects of pesticide.

Methods/Materials
For my experiment I filled 20 plastic storage containers with 2 cups of topsoil and sprayed each one with one full spray of pesticide. I mixed in 3/4 tsp. of polymers to 10 of the containers. This was my test group. The 10 containers without polymers were my control group. I punched 10 holes into the lids of each container for air circulation. Then I added cricket food and a cricket to all 20 containers. I labeled the containers and then checked them 3 times a day for 26 days. If a cricket died I charted it in my data book and then replaced the dead cricket for a live one.

Results
My test group was not successful in prolonging the effects of pesticide. The 10 test containers killed a total of 84 crickets in 26 days. My control group was more successful than my test group, killing 109 crickets in 26 days.

Conclusions/Discussion
After completing my project to determine if adding polymers to soil will prolong the effects of pesticide, I found out that my hypothesis was incorrect. My hypothesis stated that the test with the polymers will continue to kill the test crickets longer than the group without the polymers. Not only did the control group kill 25 more crickets then the test group, the average time to death for the crickets in the control group was 54.4 hrs, while the test groups time to death averaged 70.5 hrs. These results make me think the polymers absorbed some of the pesticide.

Summary Statement
This project is about understanding how polymers that are being added to soil for water conservation are affecting the effectiveness of pesticides.

Help Received
Mr. Carl Gong helped with my experimental flow chart. My mom helped to type some of my written work and photograph the experiment.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Ray Antonio Zuniga

Project Number
J0927

Project Title
If Solar Heaters Really Work They Could Contribute to Solving Earth's Global Warming Problem

Abstract

Objectives/Goals
The objective of my project is to determine if solar-heaters work efficiently for household use, eliminating the consumption of natural gas and reducing the green-house gases released into the atmosphere, therefore contributing to solving Global Warming.

Methods/Materials
I built a basic solar heater and connected it to cardboard box, which simulates a house, and tested its ability to heat-up air temperature in different weather conditions. My tests included weather conditions such as: cloudy, sunny, windy, hot and cool. I also tested the solar-heaters ability to heat-up air in different time increments.
The materials that I used to build my project were: a thermometer, wood & glue, paint, a conduit, glass, cardboard box, aluminum sheets, a mini-fan, black spray paint, coiled glass air-breathers, Styrofoam, silicone, screws & hinges.

Results
My results proved that solar heaters do efficiently work. As I tested my solar-heater, my data proves how the use of a solar heater intensely and efficiently heats-up air, warming-up the desired location and allowing us to refrain from using natural gas which releases carbon dioxide and methane into the atmosphere which is one of the main factors of Global Warming.

Conclusions/Discussion
Solar-heaters definitely work efficiently for household use and if they are implemented in homes instead of natural gas heaters we could eliminate large quantities of natural gas consumption, thus reducing the amount of green-house gases released into the atmosphere reducing Earth#s temperatures and contributing to solving Global Warming.

Summary Statement
My project is about how solar heaters, if they work effeciently, could contribute to solving Global Warming.

Help Received
Grandfather: helped cut glass for solar heater container while grandfather, father and I assembled it together. Father: helped me construct a model of our home to use for demonstration purposes. Mother: took pictures and encouraged me throughout of entire project process. She proof read my on-line