CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Dave C. Andersen

Project Number
J0801

Project Title
Non-Chemical Methods of Sterilizing Water

Abstract

Objectives/Goals
My experiment tested the effectiveness of non-chemical water sterilization processes.I believed that non-chemical methods could be just as effective as the standard methods (chlorine).

Methods/Materials
I sterilized samples of lake water using the various non-chemical methods; then I streaked them into petri dishes.

Results
I discovered that most of the methods were sucsessful in killing bacteria

Conclusions/Discussion
My hypothesis was correct becuase several of the methods were sucsessful in killing bacteria. If i did this experiment again I would also test chlorine.

Summary Statement
My project tested the effectiveness of non-chemical methods of water sterilization

Help Received
Used vacuum chamber and pressure shamber at Northrop Grumman

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Matthew J. Bauer

Project Number
J0802

Project Title
Critical Variables of an Effective Solar Box Cooker

Abstract

Objectives/Goals
These experiments were conducted to find the most critical parts of a solar box cooker. The variables of insulation, conduction/conversion, transparency and reflection were tested to determine their effects on heating a liter of water. Using the best combination of these variables it is possible to build an efficient solar box cooker.

Methods/Materials
Two identical solar box cookers were built out of plywood. This allowed one to be used as a control and the other to be tested with a new variable. In each experiment the #winner# was the solar cooker that reached the highest plateau temperature. The #winner# was used as the control in the next experiment. Each experiment also contained a #clear jar# control that contained one liter of water. This control allowed for a comparison between each experiment.

Results
These experiments demonstrate that insulation is important in maintaining the heat inside of the solar cooker. The use of a black jar to adsorb sunlight and to convert it into heat (conduction) was also important. Increasing the total amount of light to enter the inner box through the use of reflectors or transparent surfaces were extremely critical variables.

Conclusions/Discussion
In these experiments the critical variables of a solar box cooker were determined. These included insulation, the ability to keep heat from escaping; conduction/conversion, the ability to convert light into heat; transparency the ability to pass light through a solid surface; and reflection the ability to cast light at an angle. Using the #winner# from each experiment allowed the best selection of variables.

The highest plateau temperature reached was 197oF. Although this is a high enough temperature to cook food, it took all day to reach this temperature. To be practical, a solar cooker should heat up to cooking temperature in less than 3 hours. Future experiments will include building better reflectors and testing solar cookers in different locations (the desert, for instance). Also, the solar cookers will be tested in the summer when the sun is closer, to see if the current solar cooker will obtain even higher temperatures.

Summary Statement
Determining the critical variables of an effective solar box cooker.

Help Received
My father helped with cutting the wood and glass for the solar box cookers and with making the graphs. My mother proof read my paper made suggestions for improvement.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Elis A. Baynham

Project Number
J0803

Project Title
Melting Mountains: The Process of Erosion

Abstract

Objectives/Goals
My project was to determine if hillside vineyards covered with a layer of mulch will have less erosion than soil covered with straw, seeded with erosion control mix or left unprotected during the winter rainy season.

Methods/Materials
Four plastic planting trays were filled with the same amount of top soil and placed on a 3:1 grade. The trays were exposed to natural rainfall and buckets collected the runoff from each tray. The trays represented the 3 different types of erosion control methods used in vineyards in Mendocino County. One soil sample was left bare. At the end of the test period the sediment was collected, dried and weighted. The total erosion from each of the soil planting trays was compared based on grams per tray and top soil loss in tons/acre/year.

Results
The soil protected by the mulch had less erosion than the trays protected by other methods. The tray covered with mulch had a sediment loss of 0.994 grams; the control tray of bare soil had a sediment loss of 5.73 grams. Based on the rainfall from 7/1/01 to 3/30/02 for Boonville, CA, the estimated top soil loss would have been: 0.34 ton/acre/year for soil protected with mulch and 1.94 tons/acre/year for bare soil.

Conclusions/Discussion
My conclusion is that soil protected by mulch has significantly less erosion when compared to other erosion control methods or to soil left bare and unprotected over the winter rainy season.

Summary Statement
My project is about the best erosion control method for use on hillside vineyards.

Help Received
The Mendocino County Farm Supply donated the cover crop seed mix. Myers Apothecary weighted my sediment on their gram scale. My mother taught me how to build a 3:1 frame and buying the materials for my project. My mother helped me refine my question, type and edit my report.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Risha R. Bera

Project Number
J0804

Project Title
Pollutant Reductions of Directed Motor Vehicles in Commerical Parking Lots

Abstract

Objectives/Goals
The objective was to determine whether directed parking could reduce emissions of pollutants from motor vehicles and, if so, to identify strategies that shopping malls and other large attractions could implement to reduce idling time and emissions.

Methods/Materials
A 1999 Toyota Sienna van was driven in a regional shopping mall parking lot under a variety of simulated congestion and management conditions. Engine RPM (revolutions per minute) and vehicle velocities were monitored continuously using a video recorder and global positioning unit. The vehicle's emissions as a function of RPM were measured at a Smog Check station. Emissions from different driving patterns were calculated by compiling second-by-second emission factors based on the observed RPM. The emission rates were then applied to the observed population of vehicles searching for parking spaces at the mall.

Results
I concluded that a simple parking management strategy could reduce hydrocarbon emissions by 61%, carbon monoxide by 88%, carbon dioxide by 58%, and nitrogen oxides by 7%.

Conclusions/Discussion
Major destinations such as shopping malls can employ parking attendants or automated systems or other cost efficient strategies to direct visitors to the first available parking space. Doing so would significantly reduce mobile-source emissions in urban areas.

Summary Statement
The objective was to determine if directed parking could reduce emissions from motor vehicles and, if so, identify strategies that shopping malls and other large attractions could implement to reduce idling time and emissions.

Help Received
Used laboratory equipment at the University of California, Riverside College of Engineering-Center for Environmental Research and Technology (CE-CERT) under the supervision of Mr. Mitch Boretz and Ms. Nicole Davis; Father drove during field study; and emissions data gathered at Hall's Expert Auto Repair.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Nick Blount; Nathaniel Sekula

Project Number
J0805

Project Title
How Biodegradable Is Our Garbage?

Abstract

Objectives/Goals
The objective is to determine if paper, plastic, and organic material in household garbage is biodegradable.

Methods/Materials
We collected household garbage from our homes. One bag we sorted and categorized into three groups: paper, plastic, and organic, and compared these ratios to the average household garbage collected by our city's waste company. We buried different combinations of garbage: food-only, paper-only, plastic-only, a whole bag of garbage sealed in a plastic bag and a whole bag of garbage enclosed in a paper bag; and buried them in seven different holes. We buried two duplicate combinations of food-only, but at different depths. We dug up the garbage nine months later and observed what remained.

Results
The ratios of paper (50%), plastic (17%), and food (33%), by weight, from our household garbage was nearly the same when we compared it to the city of Lodi's: paper (60%), plastic (8%), and food (32%). All food biodegraded within nine months except for eggshells. This did not vary with different depths. Nothing biodegraded in the hole with plastic except a 6-pack holder. All the paper/cardboard biodegraded except for bits of a cardboard light bulb box. All the food had biodegraded and the paper was paritally biodegraded in the sealed plastic garbage bag and everything in the bag was covered with soil nematodes. The remains of the paper bag of unsealed garbage contained only plastic, tin foil, and rubber.

Conclusions/Discussion
Food and paper products are highly biodegradable, even in sealed plastic garbage bags. Plastic is not biodegradable but some plastic-like products are being made out of biodegradable materials like corn (why we believe the 6-pack holder biodegraded). Although things biodegraded in our experiment we learned that landfills do not have the right conditions for biodegradation. Paper makes up the largest component of landfills and is also the fastest growing component of landfills. Recycling only puts off the day something will be thrown away. It will become increasingly important to use post-consumer products and reduce waste at the source.

Summary Statement
This project examines how biodegradable our household garbage is.

Help Received
Nathaniel's Mom did most of our typing, Nathaniel's Dad did the computer graphics, our school science advisor, Mr. Wyrick, identified the soil nematodes, we used land at Nathaniel's Dad's business to bury our garbage, Christine Wied conducted our tour of Lodi's Waste Treatment Operations (Central Valley Waste)

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Brigitte D. Buehler

Project Number
J0806

Project Title
Hawthorne's Bag-It and Tag-It vs. Westchester's Curbside Recycling System

Abstract

Objectives/Goals
My project was to see which recycling works best at reducing trash that ends up at a landfill in two different cities.

Methods/Materials
I picked 10 households in Hawthorne and Westchester. I explained a little about my project and gave them each a letter. The letter told them what they had to do. They had to measure the height of the trash and recycling with a measuring tape (cm) (that I gave them) before trash day and record it on the data sheet. I also gave them a questionnaire and main items page. The main items page is what they mainly threw away. I measured each curbside trash can to find the volume.

Results
My results were measured in cubic meters of trash of three types of trash: household recycling, yard waste recycling, and other trash (which goes to the landfill). Westchester residents recycled 0.26 cu. m. of household items and 0.13 cu. m. of yard waste weekly; they threw away 0.17 cu. m. of trash which went to the landfill. Hawthorne residents recycled 0.13 cu. m. of household items and 0.21 cu. m. of yard waste weekly; they threw away 0.24 cu. m. of trash which went to the landfill. My results showed that Westchester recycled more household items and threw away a lot less trash to the landfill.

Conclusions/Discussion
The house hold recycling was an extremely significant difference according to my two-sample t-test, showing people recycle more in Westchester. For yard waste, there was no significant difference at all. My conclusion is that Westchester#s curbside recycling system works better than Hawthorne#s #bag-it and tag-it# system at reducing trash that ends up at a landfill. People don#t seem to recycle as much when they have to make an effort to find a bag and tag it.

Summary Statement
My project is to see which recycling system works best at reducing trash that ends up at a landfill, and Westchester 's curbsideside recycling system worked better than Hawthorne's "Bag-It and Tag-It" system.

Help Received
My mom helped glue the papers on my board and my next door neighbor let me use her computer.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Jarod A. Corey

Project Number
J0807

Project Title
Water: Going, Going, Going, Gone

Abstract

Objectives/Goals
My objective was to find out which of following substances would reduce or prevent water evaporation: Mazola Canola Oil, Downey Fabric Softener, Heinz Vinegar, HUMCO Glycerin, or Tropical Fish.

Methods/Materials
Six identical glass jars of the same size, shape, brand, but having five different types of substances added to the water. One jar was left with plain Mojave tap water. In the remaining five jars, a certain amount of substance was added using identical medicine eyedroppers. The jars were placed outdoors undisturbed for 14 days to simulate the natural weather, and tested in five separate tests.

Results
In four out of five tests, Mazola Canola Oil had the least amount of water evaporation. Followed by the Tropical Fish, Downey Fabric Softener, HUMCO Glycerin, and the Heinz Vinegar had the most amount of evaporation.

Conclusions/Discussion
By conducting five separate tests and testing five different substances, I conclude all the substances that I chose will reduce the speed of water evaporation, some more than others. The Mazola Canola Oil had the least amount of water evaporation, followed by the Tropical Fish, Downey Fabric Softener, HUMCO Glycerin, and the Heinz Vinegar had the most amount of evaporation. However, the challenge is to find a substance that is safe for humans through filtering, safe for the environment, wildlife and/or sea life. Therefore, my hypothesis is correct.

It appears from initial testing and research, that Tropical Fish could be the answer for the reduction of water evaporation. Tropical Fish is flammable, however once the isopropyl alcohol is absorbed by the water, the remaining ingredients are biodegradable, environmentally safe and very harmless. It is also tasteless and odorless. The mixtures of ingredients are lighter than water so they automatically float to the surface, creating a barrier on the surface if not disturbed. It works best when there is little or no movement on the surface of the water.

Through my research and experiments, I discovered the weather plays a big part on water evaporation. Ideas for future testing: try different substances, testing larger amounts of water, and test during different seasons of the year in and out of the shade to get an overall average of which substance would yield the least amount of water evaporation.

Summary Statement
To find a substance that is safe for humans through filtering, safe for the environment, wildlife and/or sea life that will reduce or prevent water evaporation.

Help Received
My mother helped me with the charts, graphs, graphics, taking the pictures, the display board, and measuring when I was unavailable. My father purchased the supplies and measured when I was unavailable.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Marco Fabrizio; Isaac Selinger

Project Number
J0808

Project Title
Oil Spill: Microbes vs. Synthetic Sorbents: Which Removes Oil from Water More Efficiently?

Abstract

Objectives/Goals
The objective of test was to determine whether a synthetic sorbent was faster and more efficient in removing oil from salt water than an organic microbe sorbent product.

Methods/Materials
First, construct a shallow container (4'by 2' by 4") that holds water. Add salt water solution to tap water to recreate ocean water. Add motor oil to water. Test Seafit synthetic sorbent, West Marine Premium Bilge Cleaner (a mircrobial sorbent) and several homemade products: shredded plastic bags, wood chips, bubble gum and peat moss.

Results
The homemade products did not work and were extremely messy, the mircobes worked very slowly and appeared not to work at all in the first test (2 days)and after the second test (five days) only removed 50% of the oil. The synthetic sorbent worked very fast and efficiently removing 95% of the oil. Unfortunately the synthetic sorbent itself become a waste product which had to then be disposed of whereas the microbes did not add more pollution.

Conclusions/Discussion
In conclusion we found the man made product removed the oil from the water almost immediately and with great efficiency. However, the microbes did not have to be removed from the water and did not create a further clean up problem. Removing the oil from the water using a synthetic sorbent only moved the pollution from one area to another, it did not solve the ultimate problem of cleaning the environment.

Summary Statement
Our project evaluated the efficacy of various types of oil removal products (sorbents).

Help Received
Isaac's father did all of the driving and Isaac's mother helped with the typing.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Matthew P. Gassmann; Amanda M. Marsh

Project Number
J0809

Project Title
Water, Filtration, and Microorganisms

Abstract

Objectives/Goals
Our project sought to determine if water samples filtered with a two-stage filtration system would exhibit less of an enteric bacteria colony count when compared to unfiltered water samples from the same site.

Methods/Materials
Water samples were collected from three different water sites. These samples were labeled and filtered with a two-stage filtration system, cultured onto MacConkie agar plates, and incubated at 35° C. After 48 hours, the agar plates were analyzed to establish colony counts. They were examined and photographed under black light, and observed for plate characteristics and the presence of E. coli. The cultures were refrigerated in a double sealed container until review of the photographs. The cultures were then disposed of as biohazard.

Results
The filtration process did not completely remove bacterial contamination from the irrigation canal water or the Madera River water samples, but the colony counts were approximately 45-64% less in the filtered samples.

The cultures were grown on a selective agar conducive to enteric organisms. The cultures used lactose for fermentation and fluoresced under black light, thus indicating the presence of E. coli in both the filtered and unfiltered samples.

Conclusions/Discussion
We concluded that our hypothesis was correct because the two stage filtration system produced water samples that had almost half the total number of colonies per plate than the unfiltered samples.

In addition, the unfiltered agricultural run-off did yield a higher colony count than the other sample areas, as predicted by our hypothesis. The agricultural run-off 1ml sample yielded almost two and one-half times (2 ½ x) the total colony plate count as the unfiltered Madera River 1 ml sample.

The claim of the two stage filtration unit that it filters almost 100% of microorganisms may be exaggerated. Our findings indicated a filtration level of about 50%. The filter was more effective in filtering the clean water samples than the more contaminated samples.

Summary Statement
Our project sought to determine whether or not a two-stage filtration system filtered enteric organisms from three independent water sample sites.

Help Received
Dad helped type report. Moms drove to sample sites, to lab, and to obtain materials; also helped to review research and mount data onto board. The Microbiology dept. at lab supervised incubation of agar plates. Science dept.at intermediate school provided magnifying lenses for colony counting.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Molly E. Havard

Project Number
J0810

Project Title
Alcohol as a Fuel: Recycling Wastes into Energy

Abstract

Objectives/Goals
I wanted to find out if a family could produce an alcohol fuel from their kitchen wastes that a household could consume on a regular basis. Also, I wanted to find out if the alcohol would burn cleanly and efficiently.

Methods/Materials
First, I made the apple mash, and allowed it to ferment for 6 days. Then I distilled it in a still that i made from a pressure cooker, 6 feet of copper tubing which i coiled, a coffee can with the top and bottom removed, and a tray full of ice. I used a burner to boil the alcohol in the pressure cooker, and the vapors went up through the copper tubing, then condensed in the ice, and the distilled alcohol came out into a beaker. I used beakers and oil-burning lamps to burn the alcohol to test the burning efficiency of it.

Results
The alcohol produced was a very clean-burning alcohol, but it did not have a very long burning time. The longest time that I was able to get from 100 mls. of the alcohol was 5 minutes and 30 seconds in the oil burning lamp. It didn't burn very well in the lamp, so my science teacher (my project advisor)threw a lit match into a beaker of the alcohol, and the vapors lit very well.

Conclusions/Discussion
I don't think that a family could really run on this alcohol on a daily basis if it is not mixed with something that will give it a longer burning time. It is a very clean fuel, so it would be good for our valley and the areas around us with bad air pollution problems. We should investigate using a fuel like ethyl alcohol, because it is a much cleaner fuel and is not a limited resource.

Summary Statement
My project is about using kitchen wastes to produce an alternative fuel.

Help Received
mom helped peel the apples, dad helped coil the copper tubing, my science teacher helped set up the still, Eva Picci and Todd Moon helped get my lisence

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Cameron A. Huntley

Project Number
J0811

Project Title
World Wide Shortage of Fresh Water

Abstract

Objectives/Goals
A Seventh grader discovers through research that drinking water is not cheap and is also in short supply, potentially a problem for our society, particularly here in San Diego.

Methods/Materials
The student explored the nature of salt water and researched ways it can be used, particularly to find methods of desalination that are inexpensive. The student designed and used three methods The student found that making fresh water from sea water can be done economically.

Results
Throughout history there have been ways to obtain fresh water from Salt Water. Most people know from stories about shipwrecked sailors afloat in a raft on the ocean say that if you drink salt water you will get sick and eventually die, because our body#s cells would dehydrate. But that doesn#t mean you can#t make sea water drinkable. The two main methods of changing salt water to fresh are desalination and the freezing method.

Conclusions/Discussion
In the last thirty years, the cost of pumping fresh water to San Diego from Sacramento and the Colorado River has gone from cheap to expensive. In 2001 when there was a big increase in energy costs, the State of California publicized that the Department of Water & Power was the largest user of energy in the State of California. They spent Over a billion dollars of electricity to pump water from Northern California to Southern California in one year! In addition, worldwide demand for drinking water doubles every 20 years. Now is the time to plan alternative for are water supply.

Summary Statement
Creating fresh water using solar desalination.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Casey L. Karlquist

Project Number
J0812

Project Title
Surviving Oil Spills

Abstract

Objectives/Goals
The objective of this project is to determine which filtering material works the best when filtering a mixture of oil and water to aid in oil spill clean-up.

Methods/Materials
I made 29 filter systems using plastic cups, nylon hose, suspension sticks and 7 different filter materials (Perilite, soil, nylon, peat moss, Vermiculite, cotton, and a mixture of all the above). I then mixed 50ml of oil with 50ml of water. Next, I poured the oil/water mixture through the filter systems and let each drain for 15 minutes before removing. Then I let the filtered mixture separate for 7 days. Finally, I recorded the amount of oil recovered and the amount of the water lost. I was looking for the filter that removed the most oil and left the most water.

Results
The nylon filter worked the most efficiently. It removed 59% of the oil and left 61% of the water. The cotton filter was very close. It removed 58% of the oil and left 63% of the water. The least efficient filter system was soil. It removed only 15% of the oil. The other filter materials fell in the middle.

Conclusions/Discussion
The nylon filter and cotton filter seem to be the best at removing the oil and leaving the water in the system. My hypothesis was wrong. If an oil spill occurs, nylon and cotton appear to be the most efficient at cleaning the oil from the water.

Summary Statement
This experiment tests different filtration choices to aid in oil spill clean-up.

Help Received
Mom helped with some of the typing; Dad supervised some of the graphing.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Elsa P. Kholdi

Project Number
J0813

Project Title
Water Wizardry

Abstract

Objectives/Goals
If you apply two thermal desalination methods to a sample of water each from a creek, lagoon, sound, ocean, and river, which method produces the most mineral-free water?

Methods/Materials
Large samples of water from Beith Creek, Big Lagoon, Puget Sound, Clam Beach (Pacific Ocean), and Mad River were collected. I used thermal desalination methods of distillation and freezing, and then tested the results for salinity, carbonate hardness (KH), general hardness (GH), and acidity (pH).

Results
· When I tested the salinity of my processed water, the distillation method produced the most drinkable water for 3 out of 5 samples.
· When I tested the acidity, again distillation was most effective. It improved the samples 5 out of 5 times, making every sample acidic, 6.0, if it wasn#t already. Freezing only made 2 out of 5 samples acidic.
· When I tested for the carbonate hardness, the distillation method was at least as effective or more so than the freezing method. Distillation was more effective for 2 out of 5 samples, and as effective as freezing for 2 out of the 5 samples. Freezing was more effective than distilling for only one.
· When I tested for the general hardness, distillation worked best overall. 2 out of 5 times it was more effective than freezing, twice it tied with freezing, and for 1 sample out of 5 freezing was more effective.

Conclusions/Discussion
The distillation method overall was the most effective method of purifying water.

Summary Statement
Using two desalination methods, distillation and freezing, which method will produce the most mineral-free water when applied to water from five different water sources?

Help Received
Mother helped me get my materials and provided transportation; my school loaned me a graduated cylinder.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Colleen A. Lopez

Project Number
J0814

Project Title
Growing Crops Using Recycled Water and Biological Filtration

Abstract

Objectives/Goals

According to a report released by the United Nations Population Fund, the world's population is approaching the point where there will not be enough fresh water to go around for basic human needs and to irrigate crops. Unfortunately, when irrigating crops, large amounts of water are lost through the soil. As the water flows downward, it also dissolves nutrients in the soil (especially the nitrogen compounds) leaving it depleted and dry.

The experimenter hypothesizes that a crop growing system can be designed where the only water loss occurs through evaporation and where fertilizers are added to the soil naturally. Such a system would allow even those areas with limited amounts of water to become fertile farmlands. The objective of this project was to dertermine if such a system could be built and if it would work as expected.

Methods/Materials

To prove that such a system can be built and that it will work as expected, the experimenter designed what she calls a #bio-channel#. The bio-channel recaptures all unused water and, through biological filtration, adds nitrates to the water providing fertilization.

The experimenter built a small-scale model of the bio-channel. She planted Red Apple in the bio-channel and observed the growth and health of the plants. The ammonia, nitrite, and nitrate levels were measured regularly to determine the effectiveness of the biological filter and all water loss was recorded.

Results

Over a 10-week period the bio-channel worked as expected; the plants grew and flourished. The biological filter created more than enough nitrates (indicating additional plants could be supported) and less than one gallon of water was lost per week.

Conclusions/Discussion

The experimenter#s hypothesis was supported by the experimental results. The bio-channel worked as expected allowing the Red Apple to grow and flourish. The water loss was minimal and the biological filter created more than enough nitrates indicating that a larger soil bed containing additional plants could be supported. Using this system on a larger scale will hopefully produce similar results.

Summary Statement

My project tried to determine if it was possible to create a crop growing system which would recycle it's water and would create its own fertilizers.

Help Received

Parents helped create model and took pictures. Parents & teachers help proofread report.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Rebecca H. Marcus

Project Number
J0815

Project Title
Does Temperature Affect Oil Spill Cleanup?

Abstract

Objectives/Goals
Oil spills occur in rivers and oceans in a variety of locations around the world. The purpose of these tests is to find out if the same procedures should be used in cold and warm temperatures of water.

Methods/Materials
The sorbents tested were: Sea Sweep, Enviro-Bond 403, Spill Magic, Sawdust and Peat Moss.
Each test started with 200 ml of salt water placed in an ice bath for the tests at 6.6ºC (44ºF) and in a water bath for the tests at 21ºC (70ºF). 50 ml of crude oil was added. When the correct temperature was reached, 50 ml of sorbent was weighed and added. After ten minutes the sorbent was strained from the mixture. The oil and water left was measured. To establish a control, a test was performed at each temperature with no sorbent.

Results
Temperature did have an effect on the performances of the sorbents. Most sorbents worked better at the colder temperature when compared by volume and weight. When compared by volume of sorbent, Enviro-Bond worked best at both temperatures. When compared by weight of sorbent, peat moss worked best at 21ºC and Enviro-Bond worked the best at 6.6ºC.

Conclusions/Discussion
The sorbents chosen are those used in oil spill cleanups. Sea Sweep and Spill Magic are absorbents. Enviro-Bond is a polymer which chemically bonds to a hydrocarbon. Sawdust and peat moss are adsorbents. The adsorbents were expected to work better in the colder temperature. The absorbents were expected to work better in the warmer temperature.

Summary Statement
The purpose of this experiment is to find out if the same cleanup methods can be used in different temperatures of water.

Help Received
Parents helped handle crude oil (hazardous materials). Mother generated graphs.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Dane L. McFadden

Project Number
J0816

Project Title
Removing Water Pollution with Plants

Abstract

Objectives/Goals
The purpose of my project was to find out which of three water plants absorbs the most nitrates and phosphates in water. The three plants I used were: Ceratophyllum demersum (Hornwort), Elodea canadensis (Elodea), and Cabomba aquatica (Purple Cabomba). I thought that Elodea will absorb the most pollutants, Hornwort the second most, and Purple Cabomba the least.

Methods/Materials
I purchased 36 bundles of Hornwort, Elodea, Purple Cabomba, and 12 38-liter aquariums. I filled each of the aquariums with 30 liters of water, 4 bunches of each plant, and a different mixture of nitrates or phosphates (10 ppm 20 ppm or 40 ppm) and placed them in a greenhouse where I controlled the temperature and lights. Before I put the plants in with the pollutants I had a tissue analysis taken at Fruit Growers Laboratories of each species of plant from each aquarium. I kept the water plants in the greenhouse for three weeks. Then I had a second tissue analasis made for each species in each aquarium and compared the results of both tests.

Results
I found out that Hornwort absorbed the most nitrates, Elodea absorbed the most phosphates, and Purple Cabomba consistently absorbed the least of the 3 plants.

Conclusions/Discussion
My conclusion is that water plants could help remove of some types of water pollution problems. Hornwort and Elodea could help reduce phosphates and nitrates.

Summary Statement
My project is about removing water pollution using water plants.

Help Received
Darrell Nelson, President of Fruit Growers Laboratory, advised me on my project; Fruit Growers Laboratory did plant tissue analysis; my mother purchased materials; my father purchased materials and gave me building advice and help build the greenhouse.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Anastasia V. Mizina

Project Number
J0817

Project Title
Pure Water-Safe Earth: The Effect of Different Filters on Time It Takes to Filter the Water and on Quality of the Water

Abstract

Objectives/Goals
In my experiment I wanted to find out how different filters(coal, charcoal, kelp and sand)effected the time it took the water to filter and on quality of the water.

Methods/Materials
I used granulated coal, charcoal, kelp and sand. I put them into a paper filter which was in a funnel one at a time, and i put a 10cm long plastic tube at a 45 degree angle into the filter, and I poured 300ml of water with 7 drops of oil and some dirt through it. I timed how long it took the water to filer and i compared the water to my scale of cleanness. I did 13 and 14 trials.

Results
The fastest filter was sand with 21.7 seconds and the slowest filter was kelp with 27.5 seconds. The coal was the best quality filte with 4.69 and the worst quality filter was kelp with 4.

Conclusions/Discussion
My hypothesis was supported because sand was the quickest filter and coal was thre best quality filter. Knowing the data about the ability of natural filters we know can use them in our drainage system, so that the water that goes into the ocean is oil and dirt free.

Summary Statement
My project is about how different natural filters clean dirty oily water

Help Received
My parents bought my materials

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Samuel W. Mullin

Project Number
J0818

Project Title
Can Aquatic Plants Improve the Water Quality of Polliwog Pond?

Abstract

Objectives/Goals
My objective was to determine if water hyacinth, a common aquatic plant, could improve water quality in a local pond. The pond is polluted with nitrogenous compounds from urban runoff, which in high concentrations can become toxic. Through this experiment, I hoped to test a natural treatment system that could be applied on a large scale to solve a water pollution problem.

Methods/Materials
Using 2 large plastic tubs, 10 gallons of the pond water, an aquarium test kit for ammonia, nitrites, and nitrates, and 5 water hyacinth plants I was able to conduct an experiment to determine the plants# ability to remove ammonia, nitrites, and nitrates from the pond water. I did so by adding 5 gallons of pond water and the 5 water hyacinth plants to one of the tubs. The other tub was my control, which had only 5 gallons of pond water. I monitored the levels of the 3 nitrogen chemicals in the tubs on a 12-hour basis for 3 days.

Results
I found that the water hyacinth were very effective at removing the aforementioned nitrogen pollutants from the water. Most of the ammonia, nitrites, and nitrates significantly reduced in the experimental tub within 72 hours. Also, the water in the tub with the plants was clearer within 1 day. At the end of the experiment, I found an abundance of algae and insect larvae in the tub without the plants.

Conclusions/Discussion
The results supported my hypothesis. Aquatic plants can improve water quality with benefits that include clearer water and reduced pollutants such as ammonia, nitrites, and nitrates. I hope to present a proposal to the City of Manhattan Beach to grow water hyacinth in the pond. The plants will not only clean the water, but they will also provide additional habitat for the existing waterfowl. If the water becomes clean enough, the introduction of fish might be possible. It would be a great thing if I could make such a difference in my community. On a larger body of water, such plants could be used to improve water quality by removing ammonia, nitrites, and nitrates.

Summary Statement
My project#s purpose was to see if aquatic plants could improve the water quality of a local pond.

Help Received
Mother provided transportation and aided with water collection and board design. Father aided with scientific method and data interpretation.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Dacia A. Nelson

Project Number
J0819

Project Title
The Ash Absorber

Abstract

Objectives/Goals
My objective was to see if adding wood ashes to soil would help the soil to retain moisture and herbicides better, and if so, which type of ashes worked better.

Methods/Materials
I burned 5 different types of wood then mixed the ashes with soil in plastic cups. I used 1 Tablespoon of ashes and 2 Tablespoons of soil per cup. I made 4 of each type of wood for a total of 20. For the moisture retention test I measured equal amounts of water into 1 soil/ashes mixture for each type of wood ash used and then weighed it daily to observe the changes. For the herbicide retention test I sprayed a herbicide onto the surface of the soil mixture in each cup and then planted some wildflower seeds. I watered the samples each day and looked for plant growth.

Results
Both the moisture test and the herbicide retention test results showed that there were differences in the final samples with the only variable being the type of wood ashes used. The plum wood ashes showed the best moisture retention. The orance wood ashes seemed to help retain the herbicide in the soil longer.

Conclusions/Discussion
It seems that the ashes from wood stoves and old orchards could be recycled for use as a soil additive with beneficial results. Not only would this reduce the amount of land fill but also reduce the amount of chemicals and water needed by farmers and gardeners to grow crops.

Summary Statement
The use of wood ashes as a soil additive to improve pesticide and water retention in the soil.

Help Received
My father helped to proof read and edit my papers; my mother helped put my board together; my science teacher helped review my papers and my District Science Director helped me get the idea for the project.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Mathew P. Patten

Project Number
J0820

Project Title
Landfills to Life

Abstract

Objectives/Goals
Our Planet is plagued by more and more landfills by the day. My objective was to help reduce the amount of waste that goes into our landfills by experimenting with common landfill materials for alternative soils.

Methods/Materials
The method I used was to select four different types of common landfill materials. They consisted of Shredded paper:(paper plates, junk mail, Newspaper, cereal boxes, paper towel rolls). Shredded plastic:(egg crate, six pack holders, bread wrapper, Styrophom, plastic wrap, tinsel). Shredded metal:(tinfoil, aluminum cans, tin cans, nails, steel wool, staples,paperclips). Non-composted shredded organic material:(potato peels, eggshells, stale bread, old banana with peel, tea grounds, orange peel). I planted seeds in the materials and placed them in a warm sunny place and watered them daily.

Results
The results were that only the shredded paper soil supported plant life.

Conclusions/Discussion
My conclusion is paper makes a better soil than metal, plastic, or non-composted organic material because the paper holds moisture to allow the seeds to sprout, and allows the plants to establish a root system.

Summary Statement
Finding alternative soils from common landfill materials.

Help Received
Parents helped with typing and computer work.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Nicole G. Schrager

Project Number
J0821

Project Title
Evaporation Experimentation

Abstract

Objectives/Goals
The objective was to find a way to reduce the loss of drinking water due to evaporation from Crystal Springs Reservoir.

Methods/Materials
Materials: 2 trays
water
7/8" styrofoam balls
dial caliper
thermometer
camera

Method: First I filled up each tray with 1" of water. One tray would be the control, and the other tray had styrofoam balls floating on the water's surface, which would be the variable. I placed the trays where they could get an equal amount of sunlight and shade. Every few days, I measured the amount of water in the trays with the dial caliper. I used a thermomether to keep track of the room temperature. A picture was taken each time this was done.

Results
The measurement in the control tray showed greater loss of water than in the variable tray.

Conclusions/Discussion
In conclusion, based upon my data from the trays and data supplied from the watershed caretaker, if you placed styrofoam balls on the entire surface of Crystal Springs Reservoir, you would save about 68 million gallons (68,000,000) of drinking water per year.

Summary Statement
It's possible to save 68,000,000 gallons of water yearly from Crystal Springs Reservior by covering the entire surface with styrofoam balls.

Help Received
None

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Jennifer C. So

Project Number
J0822

Project Title
How Do the Electrical Charge Plates Improve the Process of Separation of Dirt from Dirty Water?

Abstract

Objectives/Goals
The goal is to see if applying electrical charge plates helps in improving the process of dirt from dirty water.

Methods/Materials
2 glass jars,wires,12 volt battery,aluminum foil,tap water,filter water,pond water,rain water,salt water,tape,multi-teste,clock/timer,ruler,pencil/pen,data forms,labels

Results
The results indicated that electrical charged plates improved the process of separating dirt from dirty water.The water gets cleaner after each trial because the water samples#kU resistance was higher.In trials #1-4, the water resistance(after test)for test jars all increased after being tested with the electrical charged plates.

Conclusions/Discussion
My hypothesis for my project was that using electrical charge plates would produce cleaner water than without using electrical charge plates. It is found to be 75% effective.The improvement of the average tap water resistance for the reference jar is 3.5kU. The improvement of tap water resistance for test jar is 2.7kU.The improvement of the average filter water resistance for the reference jar is 0.65kU.The improvement of the average filter water resistance for test jar is 3.65kU.The improvement of the average pond water resistance for the reference jar is 0.925kU.The improvement of the average pond water resistance for test jar is 1.05kU.The improvement of the average rain water resistance for reference jar is 3.6kU.The improvement of the average rain water resistance for test jar is 6KU.The improvement of the average salt water resistance for the reference jar is .65kU.The improvement of the average salt water resistance for test jar is .1kU.The process works better with dirty water(more impurity or non-water ions)because more impurity can be separated by the electrical charge plates.For the reference jar, the filter water has the highest resistance compared to rain water.The resistance of the pond water is higher than the tap water.The resistance of the tap water is higher than the pond water; and the resistance of the pond water is higher than the salt water.For the test jar, the filter water has the highest resistance compared to rain water.The resistance of the pond water is higher than the tap water.The resistance of the tap water is higher than the pond water, and the resistance of the pond water is higher than the salt water.Obviously, the filter water has less impurity than the rain water. It means the filter water is cleaner than the pond water.

Summary Statement
This project is about improving separation of impurity from impure water by applying electrical charge plates.

Help Received
First of all, I would like to acknowledge my dad for recommending me to this project. Secondly, I would acknowledge my sister for telling me where to find information.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Hayley E. Swantek

Project Number
J0823

Project Title
Oil Spill Clean-up: Moving or Removing Oil?

Abstract

Objectives/Goals
The purpose of my investigation into oil spill clean-up was to find the best method of clean-up. My definition of best method included: removal of the greatest percentage of oil from the water, the complete removal of the pollution as opposed to just moving it, allowing the oil to be salvaged, that it is environmentally benign, and works the fastest. I believe that using a clumping agent and then skimming will prove to be the best method.

Methods/Materials
The methods that were tested in this experiment were the ones most commonly used. They were: burning, flushing, chemical dispersants/ clumping agents, skimming, bioremediation, and joint methods. The materials used were: distilled water with sea salt added, low gravity crude petroleum, a clumping agent, pure alcohol, a large plastic container, a metal bucket, a metal skimmer, petroleum eating bacteria, a type of paint stripping pad manufactured by 3M, 4 one gallon glass jars, measuring beakers, measuring spoons, and syringes.

Results
The results overwhelming proved that skimming with a stripping pad material was by far the best method. It removed approximately 98% of the oil leaving behind a mere film on the top of the water. No water was taken out of the test area, only the oil, which was then transferred into a container where it could be used as it had originally been intended.

Conclusions/Discussion
Through this project I proved my hypothesis wrong but achieved my objective when I most unexpectedly came across my best method, skimming with a stripping pad. I believe if the major oil spill companies today would try this environmentally benign skimming material when responding to a spill, that the spill would be a much less tragic occurrence.

Summary Statement
My project is about finding the most effective and enviornmentally benign method to clean up an oil spill.

Help Received
Dad got a peteroleum sample for me and took me shopping for other supplies. Mom helped by proofreading my written materials.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Natalie D. Tieche

Project Number
J0824

Project Title
Ash Particulates as Air Pollutants

Abstract

Objectives/Goals
The purpose of my project is to determine how ashes pollute the air. I will also compare which type of commonly burned materials pollute the most. I theorize that ashes from the agricultural burn site will be the worst pollutants. The reason I am doing this investigation is because the Central Valley of California often struggles with poor air quality.

Methods/Materials
I used the following in my investigation: newspaper ashes, charcoal ashes from a barbeque, fireplace ashes and agricultural burn site ashes. I am using these types of ashes because these materials are often burned in the Valley. I put these materials into clear plastic containers with air tight lids. I then shook the ashes to simulate ashes in the air. After that, I put in contact paper; this was to see what amount of ashes would stay on the contact paper. I weighed the contact paper before and after the experiment. I did this 5 times to each type of ash. I calculated the average weight of the ashes that adhered to the contact paper.

Results
When I totaled my results I found that there was an average combined total of 0.211 grams of ashes that stuck to the contact paper. Of that total, 40% was from the charcoal ashes, 31% was from the newspaper ashes, 18% was from the agricultural burn site ashes, and 10% was from the fireplace ashes. I thought the ashes from the agricultural burn site would weigh the most, but they were so heavy they hardly stuck at all, and quickly settled to the bottom of the container.

Conclusions/Discussion
After completeing my project I found that my hypothesis was partly correct and partly incorrect. My hypothesis was correct when I theorized that ashes pollute the air. My hypothesis was incorrect when I theorized that agricultural burn site ashes would make up the greatest percentage of the total amount of ashes that would stick to the contact paper. I conclude that ashes do contribute to air pollution. I also conclude that charcoal ashes from a barbeque and ashes from burned newspaper were the variables that created the greatest amount of air pollution.

Summary Statement
My project is about how different types of ashes contribute to air pollution.

Help Received
My Mom helped type the report; Mr. Carl Gong, Mrs. Sandy Ensley, and Mr. Ed Case helped with ideas and suggestions; Mr. Whittington provided the scale and took pictures of my variables with an Electron Microscope.