CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
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Project Number
36776

Project Title
Solar Survival: Dyed Water in a Solar Still

Abstract

Objectives/Goals
Solar stills are systems in which contaminated water is evaporated and condensed to produce clean water. I created four cups of water (one containing regular water and the rest becoming more concentrated with black food dye)to add to four of the same solar stills. The still that produced the most clean water revealed which solution absorbed the most heat. Three of five trials proved that the evaporation rate of water increases as concentration of black dye increases. All five trials showed that the most concentrated black water produced significantly more clean water than the regular water, proving that black dyed water evaporates much more efficiently than plain water. I hope that one day, emergency solar still kits can come with black dye to provide those in need access to clean water.

Methods/Materials
(4)2 liter plastic bottles,(8)9oz. plastic cups, Lorac solid black food dye, scissors and hot glue. I made four solar stills and put 100mL of water in each, and in the last three stills I added black powder food dye, gradually adding more to each cup. I put all four stills outside for 24 hours. The most clean water produced in a still shows which water evaporated fastest.

Results
3 out of 5 trials of this experiment show that as more black dye is added to the water, evaporation rate increases. One of the trials showed that the second most concentrated water evaporated the fastest, and the other trial showed that the third most concentrated water evaporated fastest. In all of the trials, the water with no black dye produced less than or equal to the third most concentrated water. The average of results for the regular water was 2.33mL of clean water a day, while the average of the most concentrated was 8mL of clean water a day.

Conclusions/Discussion
Although a lot of the results were irregular, the data showed a clear pattern that adding black food dye to water increases its evaporation rate. The most evaporated water was produced by the water with the highest concentration of black dye(12.8mL). The solar still design I used was cheap, effective, and reusable. The importance of this project is to collect clean water faster. Many individuals that lack clean water can get access to emergency solar stills, and my project showed the importance of black dye while using a solar still. Black dyed water clearly evaporated faster than regular water, which would be important to those who need it fast.

Summary Statement
I used black food dye to increase the evaporation rate of water in solar stills.

Help Received
I designed and built the solar stills I used. My parents helped improve details in my project, and so did high school mentors.