CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36058

Project Title

Disinfectants: Environmentally Safe Homemade vs. Toxic Brand-Name Products

Abstract

Objectives/Goals

My objective was to compare household disinfectants: Brand Name products and Homemade (HM) to see which killed the most bacteria. My goal - to see if environmentally safe ingredients can kill bacteria just as well as the store bought brands, and which was more cost effective.

Methods/Materials

My experiment included 5 disinfectants: Lysol (Sodium Hypochlorite (bleach)), Clorox (Dimethyl/Ethylbenzyl Ammonium Chloride), and 3 Homemade (HM) solutions (combinations of white vinegar, water, tea tree oil, lemon juice, Borax, dish soap). Each disinfectant was applied first to a surface contaminated with raw chicken juice/blood, then inoculated onto 20 agar petri dishes (4 per disinfectant, and 5 for controls) and incubated at 87ºF over 72 hours. Bacteria were counted and compared every few hours. With this data I did further experimentation using the most effective Brand Name product and HM* solution (*varying the concentration), by performing the same test, plus testing them on contaminated toilet water.

Results

My initial experiment showed Lysol worked significantly better than the others, killing nearly all the bacteria. Second was HM+Lemon Juice, then Clorox, HM Regular, and lastly HM+Borax, barely killing any bacteria. My further experimentation showed again Lysol worked far better than HM+Lemon Juice on bacteria from the chicken juice/blood, and the toilet water. My objective was met by clearly showing which disinfectant was most effective in killing bacteria, however this was not the safest nor cheapest product.

Conclusions/Discussion

The data from my experiment proved that Lysol killed more bacteria than Clorox and my 3 HM solutions. The HM+Lemon Juice came 2nd, but with far more bacteria surviving compared to Lysol. The toxicity of bleach is potentially harmful to the environment and our health, whereas vinegar proves to have very little harmful effects. Hospitals and areas with many dangerous bacteria, germs and viruses can clearly benefit by using a bleach based disinfectant, but in most household situations a simple vinegar + lemon solution is perfectly adequate, plus at a fraction of the cost (23%) of a Brand Name product purchased from the store. We also have to remember that not all bacteria are harmful, and some are beneficial to our bodies and the environment.

Summary Statement

My project tested the disinfecting power of Brand Name household cleaners, and Homemade solutions to see which one kills the most bacteria.

Help Received

Dr. Cooper (UCSB Life Science) and Mr. Evans (DPHS Biology) gave feedback on testing ideas. Mrs. Farris (retired Micro-biologist) showed me how to analyze and count the bacterial colonies. My sister and mom reviewed and checked that my data was accurately calculated.

Preliminary