CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
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Project Number
J2019

Project Title
Bacteria Be Gone! Do Non-Toxic Disinfectants Really Work?

Abstract

Objectives/Goals
The objective of my experiment was to determine if non-toxic disinfectants work as well as those which contain toxic materials in eliminating bacteria from a wooden cutting board.

Methods/Materials
I chose 5 household disinfectants that were developed to kill bacteria, three that contained toxic materials: bleach (10% Clorox), ammonia and petroleum based (409), and sodium hydroxide (Mr. Clean), and two that contained less toxic ingredients: thymol from thyme oil, (7th Generation) and a homemade combination of white vinegar and hydrogen peroxide. I divided a wooden cutting board into six sections, one for each of the 5 different disinfectants, and one for a control. I contaminated the cutting board with raw chicken, then applied a different disinfectant to each of the 5 squares. I waited 10 minutes, wiped each surface with a sterilized sponge, and swabbed each square. I rubbed each swab on a labeled Petri dish, and allowed the bacteria to grow for 5 days at 62 degrees F. I measured the bacterial growth in each Petri dish to determine antimicrobial effectiveness. I conducted my experiment three times.

Results
Averaging the results from my three trials, the non-toxic mixture of hydrogen peroxide and vinegar eliminated the most bacteria from the cutting board. The other non-toxic disinfectant, 7th Generation, tied for 3rd place with Chlorox Bleach. The more toxic 409 came in 2nd, while Mr. Clean consistently failed to eliminate bacteria.

Conclusions/Discussion
The results of my experiment supported my hypothesis that the hydrogen peroxide and vinegar combination would eliminate more bacteria from a wooden cutting board than more toxic disinfectants. I believe vinegar and hydrogen peroxide, sprayed one right after the other, worked the best because, from my research, I learned that this combination oxidizes the surface of bacteria, causing their cell walls to split open, killing the bacteria. This method of killing bacteria seems to work better than more more toxic disinfectants which poison bacteria. This is important because it shows that people can use relatively non-toxic disinfectants to effectively clean cutting boards while avoiding the environmental and health problems that more toxic disinfectants can cause.

Summary Statement
My science fair experiment proved that non-toxic disinfectants can work as well as, and even better than, toxic disinfectants in eliminating bacteria from a wooden cutting board.

Help Received
My mother proofread my writing, took photographs of my experiment, and helped me with my display board. My science teacher suggested that I repeat my experiment a third time, which increased the validity of my results because I incorporated lessons learned from my first two trials.