CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

J1706

Project Title

Backyard Antibiotics: Differential Antibiotic Potential of Sierra Nevada Plants against Gram Pos. and Gram Neg. Bacteria

Abstract

Objectives/Goals

The objective of this study is to determine if antibiotics found in Sierra Nevada foothill plants are broad spectrum acting agents. In other words, are Sierra Nevada foothill plants effective in killing or stopping the growth of many different bacteria?

Methods/Materials

Agar plates, mortar and pestle, syringes, paper discs, antibacterial solution, buffer, bacteria (Bacillus megaterium, Staphylococcus epidermidis, Aquaspirillum itersonii, and Escherichia coli), and native plants. The materials were purchased through Odin as a part of a kit to isolate antibiotics. Bacteria was put on the plates. Plant samples were made into an extract. Paper discs were dipped into the extract and placed as 5 replications on the plate along with 3 controls (paper disc, antibacterial, and buffer). Pictures were taken at the beginning, at 12, 24, 36, 48, 60, and 72 hours. At each time period measurements were taken in mm of the area cleared by the antibacterial control and/or the plant extracts.

Results

All the plants we tested had some antibiotic qualities against Gram-positive bacteria, Staphylococcus epidermidis and Bacillus megaterium. Bush Lupine and Theodore Payne Buckwheat had some effectiveness against Bacillus megaterium, clearing an area of 24mm squared-96mm squared, but compared to the antibacterial control, clearing an area of 103.62mm squared-1551.95mm squared, there was little effectiveness. All plant specimens had some effectiveness against Staphylococcus epidermidis. White Sage and St. Catherine#s Lace were most effective, clearing an area of 12mm squared-288.64mm squared, but compared to the antibacterial control, clearing an area of 923.63mm squared-1551.95mm squared, there was little effectiveness. Both Gram negative bacteria were not affected by the plants and would not be considered effective antibiotic agents.

Conclusions/Discussion

We found that the antibiotics in Sierra Nevada foothill plants were not broad spectrum acting agents. Some plants have the potential to be narrow spectrum acting agents. This is important because many bacteria today are antibiotic resistant, and to discover an alternative type of antibiotic could be a medical breakthrough. The study also interests us to find other plant specimens, and use fungi and other bacteria as antibiotics. We could use bacteria that causes bacterial infections in humans because we would know how these plants would help cure the infection.

Summary Statement

We showed that antibiotics found in Sierra Nevada foothill plants can be narrow spectrum acting agents and can be used to kill gram positive bacteria.

Help Received

We conducted all the steps of our experiment on our own under adult supervision. Our teacher, Mrs. Garcia, helped us determine how to measure our findings so we could properly record our data. We also received help from a college student, Andy Garcia, to input the data into a statistical program.