CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
Layla G. Stefanacci

Project Number
S1518

Project Title
The Synergistic Effects of Antibiotics and Essential Oils

Abstract

Objectives/Goals
The objective is to compare the individual/synergistic effects of antibiotics and essential oils.

Methods/Materials
A broth dilution technique was used to count colonies after antibacterial treatment. After taking .1 mL (and .01 mL oils as well during synergistic trials) of the antibacterial agent 10 mL of contaminated nutrient broth was mixed with the . After agitating it, 1 mL of that solution and was mixed it with 9 mL of sterile/chilled nutrient broth. This cycle continued on until a 1:1,000,000 dilution. After plating these test tubes, the agar plates incubated for 24 hrs. The dilution number with a minimum colony count of 30 and a maximum count of 300 colonies was chosen. This colony count was multiplied by the dilution number to find the bacteria left after treatment.

Results
Thyme oil had the greatest effect after treatment with a range of 310,000-1,000,000 colonies. The average amount of colonies was 439,000. The oil that had the least effect was lavender with a range of 2,000,000-4,000,000. The average colony count of 3,450,000. The vancomycin had a greater lytic effect on the bacteria with a range of 180,000-250,000 colonies with an average number of 217,454. Ciprofloxacin had the lesser lytic effect with an average number of 403,636 and a range of 300,000-470,000. Thyme oil and vancomycin were the most effective antibiotic/essential oil combination.

Conclusions/Discussion
Thyme oil was the most effective oil probably because of its potency and overall antimicrobial strength. Lavender is more known for its aromatic properties and had the least lytic effect on the bacteria. The antibiotics are commercially sold as antibacterial agents which may be a reason they were more effective than the oils. Although thyme/vancomycin were the best oil/antibiotic pair, they did not have a synergistic effect. Because their lytic effect was so close to the antibiotics alone, the oils did not potentiate their overall performance. If I did this project again, I would focus more on the synergistic aspect of this experiment and would work with different concentrations of the oil to see if that potentiated the antibiotics

Summary Statement
I compared the individual and synergistic effects of antibiotics and essential oils.

Help Received
Mother, Mrs. Royce, Mr. Whittington proofread report, Mrs. Royce supervised me at the school lab, Mr. Whittington advised on procedures and methods