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Essential Oils as Bacterial Disinfectants

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Essential Oils as Bacterial Disinfectants

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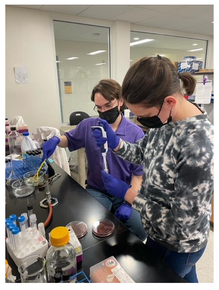
Background

- Conducted an experiment to see how well essential oil disinfectant recipes worked.
- Found that 6 out of 8 were successful at bacterial inhibition in preliminary study.

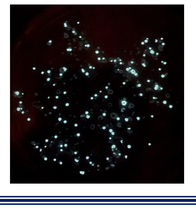
Objectives

- Wanted to know if the essential oils killed bacteria or just inhibited growth.
- Wanted to determine how essential oils performed compared to bleach.



Methods

- 10uL of *E.coli* (K12) spread as a lawn on each agar plate.
- Dropped 10uL of essential oils and other treatments on bacterial lawn and then marked where the solution spread with sharpie.
- To examine growth inhibition versus death, *E. coli* (MM294) was genetically transformed with pVIB containing lux genes to glow-in-the-dark during growth phase.
- Glow-in-the-dark plates were incubated at 30ºC. K12 bacteria was incubated at 37ºC.



Results

Component:	Inhibits Bacteria:
Water	No
Bleach	Yes
Abode	Yes
Arborvitae	Yes
Cinnamon Bark	Yes
Citronella	Inconclusive
Lemon	No
Marjoram	Yes
Peppermint	Inconclusive
Thyme	Yes

Fig 1: Table of results for the controls and essential oils that were tested. All oils are from doTERRA. Abode is a blend of Lime, Litsea, Cassia, Lemon Eucalyptus, Tea Tree, Arborvitae, Kochii Eucalyptus, Cilantro, Lavandin, and Lemon Myrtle essential oils

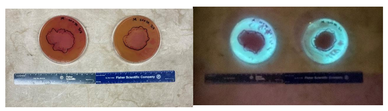
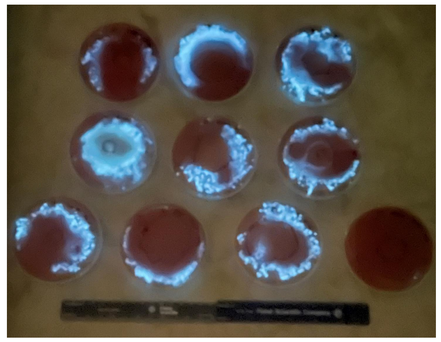


Fig 2 and 3: Same configuration of petri dishes. The top picture was taken in the dark using a dark mode camera and the bottom picture was taken in the light. Each plate has 10ul of *E.coli* and has 10ul of treatment. The sharpie indicates where the treatment that was applied dried. Plates from the trial testing individual oils' ability to inhibit bacteria. Top left to right: Arborvitae, Thyme, Abode blend. Middle left to right: Water, Marjoram, Cinnamon Bark. Bottom left to right: Bleach, Lemon, Peppermint, and Citronella.



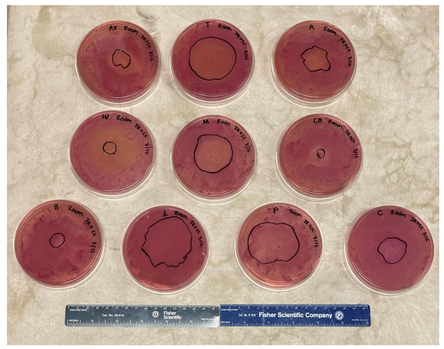
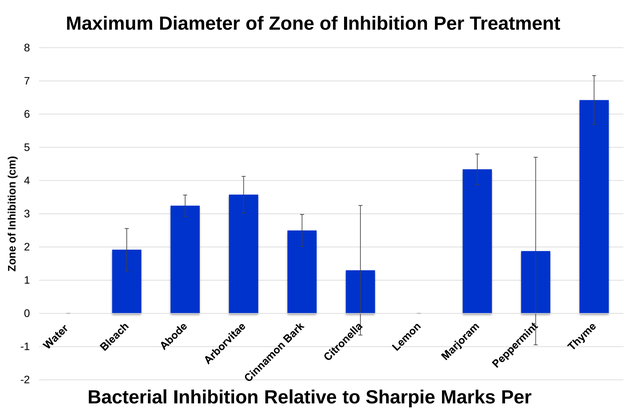
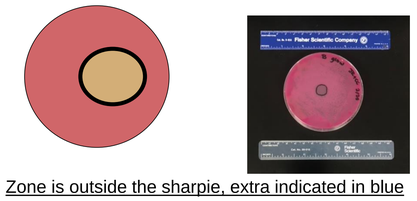


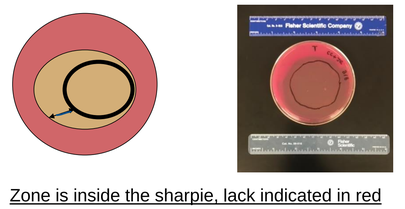
Fig 4 and 5:The top graph shows the inhibition zones diameters in cm for each oil. The bottom graph shows the difference in length from the sharpie outline, blue shows a positive number (outside the circle) and red shows a negative number (inside the circle). Bleach and water served as positive and negative controls.



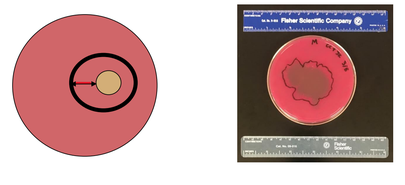
Zone is the same as the sharpie



Zone is outside the sharpie, extra indicated in blue



Zone is inside the sharpie, lack indicated in red



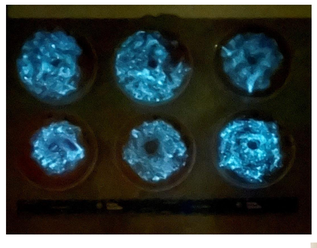


Fig 6: Bacteria was spread as a lawn and then treated with 10ul in the middle. Top, left to right: Recipe 1, Recipe 2, Thyme. Bottom, left to right: Water, Bleach, Marjoram.

Fig 7: Bleach (denoted with B, tubes 5-8) and thyme oil (denoted with E, tubes 1-4) were diluted (0.5%-0.2%) to determine the minimum inhibitory concentration (MIC).

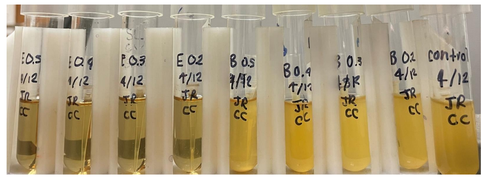
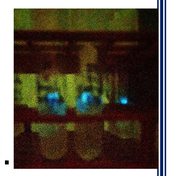


Fig 8: Visual representation of zones of inhibition. Diagrams on the left and photo examples on the right. The first shows a baseline inhibition zone, the second shows a larger inhibition zone, and the third shows a smaller inhibition zone.

Conclusions

- The minimum inhibition concentration is 0.3% for Thyme essential oil.
- Essential oils act as a bactericidal.
- Essential oils are just as good, if not better than bleach for disinfection.
- More than one way to determine inhibition potential.



Future Directions

- Comparing essential oil brands disinfection potentials.
- Examine efficacy on other bacteria.
- Human skin cell potency tests.

Acknowledgements

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