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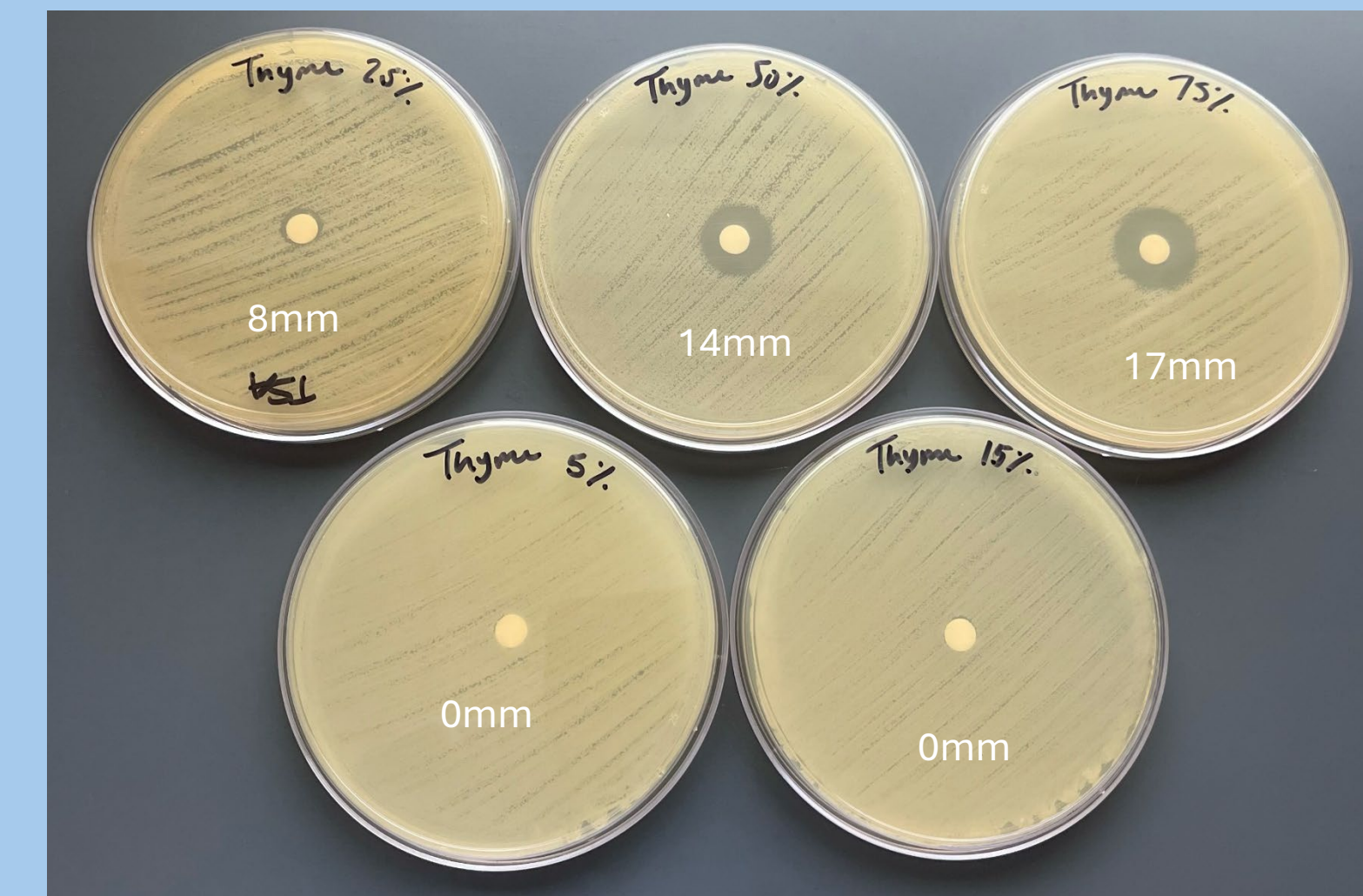
Introduction

Antibiotics have been the primary source of treatment for bacterial infections at this time. However, alternative treatment methods are needed due to the misuse of antibiotics. This misuse lead to the evolution of bacteria to become resistant to treatments. This problem is readily increasing and is causing concern for the future.

Methods

1. *A. baumannii* was cultivated in tryptic soy broth at 37 °C
2. 0.4 ml of the inoculated broth transferred to sterile tryptic soy broth
3. TSA plates were streaked using Puritan cotton swabs ensuring to cover plates
4. Test discs with varying essential oils Antibiotic disks tested susceptibility using Kirby-Bauer Disk Diffusion Susceptibility test
5. Plates were incubated at 37 °C until zones of inhibition were measured

Thyme Dilutions



Limitations

- Inconsistent chemical compounds due to varying quality of different essential oils
- Limited clinical evidence of their significance as there's limited standardized testing
- Potential for bacteria to develop resistance against the essential oils as well since they have similar mechanisms of action

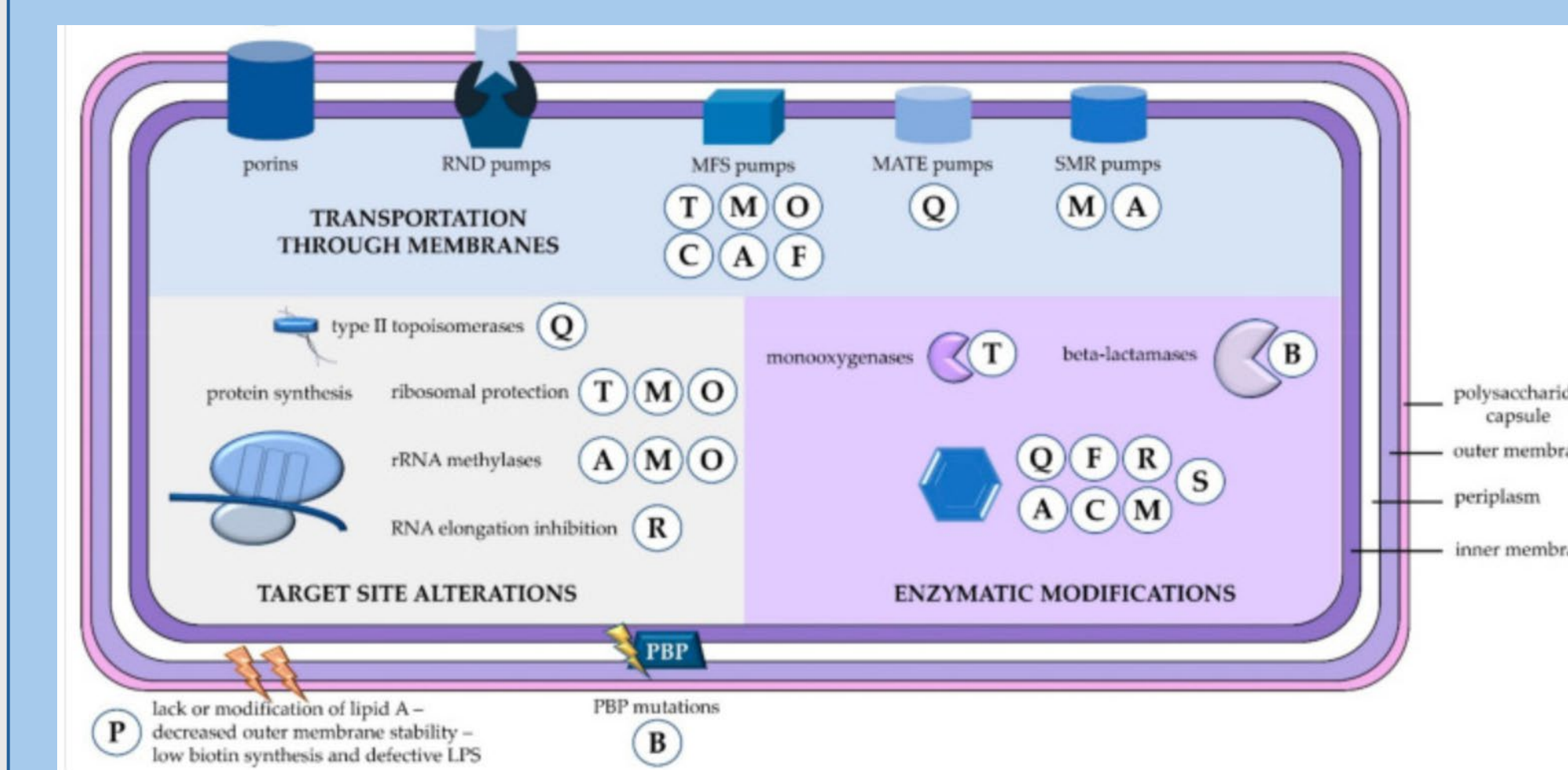
Background

- According to the CDC, 2.8 million antimicrobial-resistant infections occur each year
- AR is an urgent global public health threat, killing at least 1.27 million people worldwide (CDC 2024)
- The target bacteria of choice *Acinetobacter baumannii* is multi-drug resistant typically hospital-acquired with high risk factors
- With one million cases a year globally and a mortality rate of around 35% (Pierre 2024)

Results

Antibiotics had varying effects to the bacteria determined by the zones of inhibition. The same was found with the use of essential oils which had varying zones of inhibition. The most effective essential oil at full concentration was thyme. Dilutions of Thyme with the carrier oil found significant decreases in its effectiveness as the concentration decreased.

Mechanisms of Action



Future Research

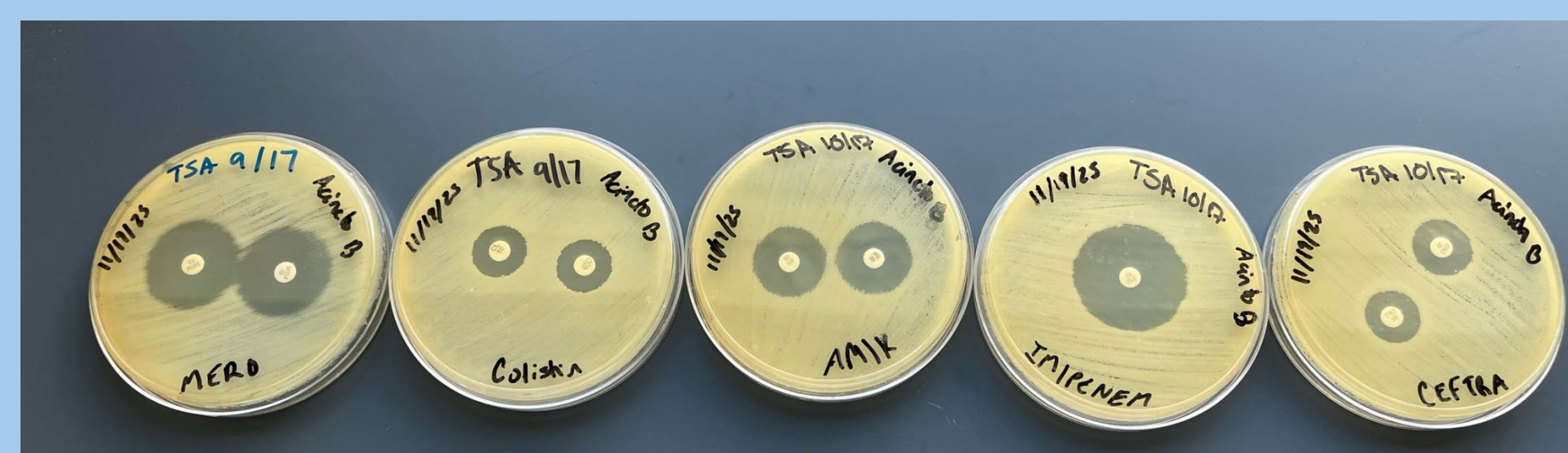
- How to utilize EOs as a primary source of treatment to reduce the antibiotic resistant effects is the main goal
- What causes variation in different essential oils and how to standardize them in practice
- Mechanism of the active principles
- Clinical trials with standardized methods

Essential Oils (E's)

Essential oils are natural concentrated forms of plants that retain the same smell and flavor from the source. Each essential oil has a unique composition of chemicals, and this variation affects the smell, absorption, and effects on the body (Dalal 2022). They are used in many practices with holistic approaches.

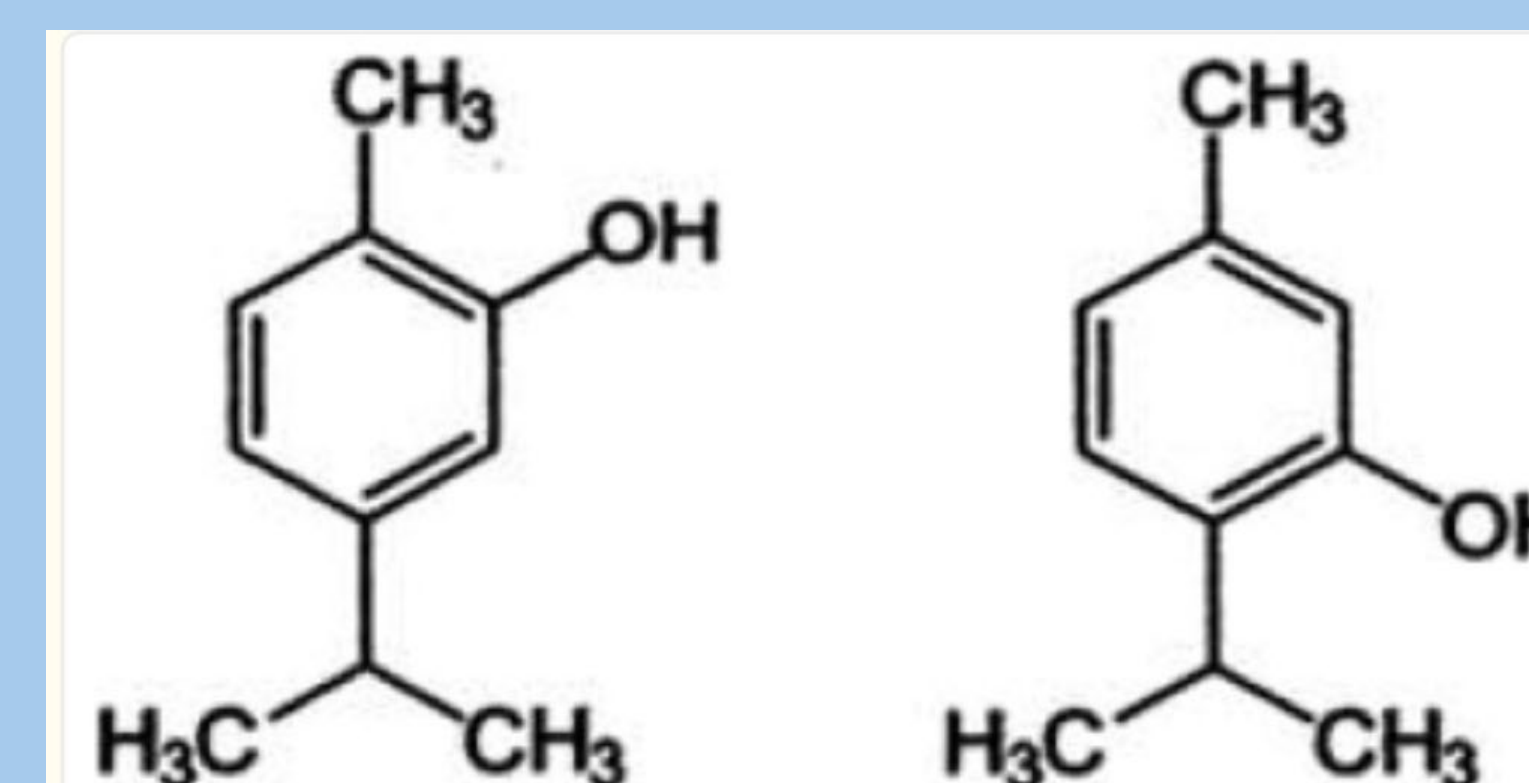


Antibiotic Controls



Active Principles

Thymol Carvacrol



References

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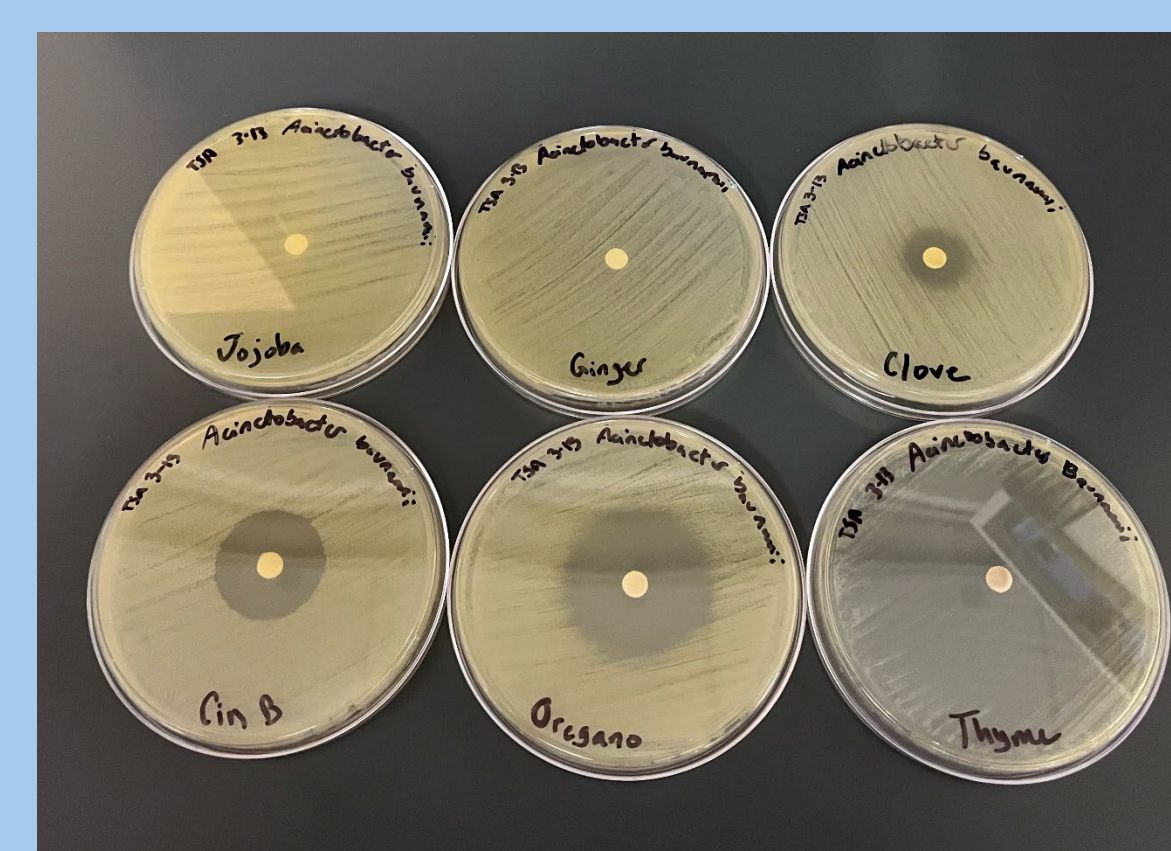
Materials

- doTerra Eos: Thyme, Oregano, Cinnamon Bark, & Ginger
- Carrier oil: Jojoba Oil
- Bacteria: *Acinetobacter baumannii* (ATCC 19606)
- Antibiotics: Meropenem, Colistin, Amikacin, Imipenem, Ceftriaxone
- Media: Tryptic Soy Agar and Tryptic Soy Broth
- Other materials: 6mm paper test discs, micropipettes, micro centrifuges tubes, puritan cotton swabs

EO Plates

Measurements:

- Jojoba: Neg ctr
- Ginger: 0mm
- Clove: 12mm
- Cin B: 27mm
- Ore: 35mm
- Thyme: 86mm



Discussion

Mechanisms of action for the active principles include cell membrane depolarization, cytoplasmic membrane, induces reactive oxygen species, reduce metabolic activity, and reduce biomass. These properties can be effective working with the use of antibiotic at smaller dosages to eliminate bacterial infections.

Acknowledgements

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