

PROJECT

Continuous-Release Mist Diffusion of Thymol-Based Essential Oils for Varroa Control: The Field Study



INTRODUCTION

- The greatest single contributor to the decline of honey bee health is the *Varroa destructor* mite.
- Use of synthetic miticides has resulted in the development of resistance and contamination of hive products.
- Essential oils are cheaper, environmentally-friendly, and pose fewer risks and *Varroa* have not developed resistance.
- Current thymol miticide systems are gel-based and highly dependent upon the ambient temperature and relative humidity.



METHODS

Part I: In-Vitro / Laboratory Study (2020)

https://youtu.be/WnGJr_0JL0I



Part II: The Field Study (2021)

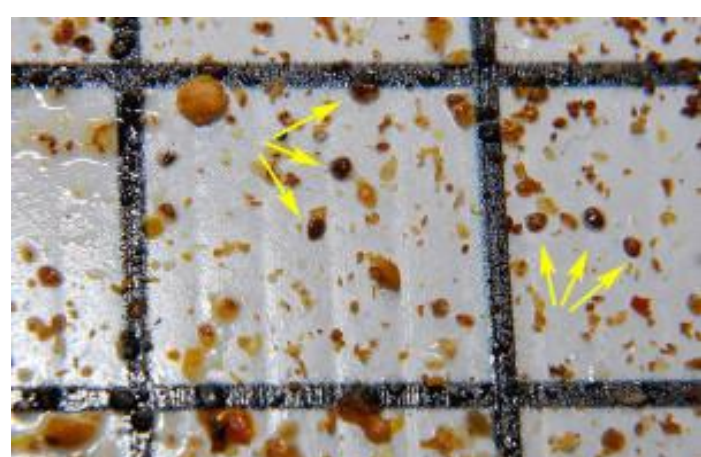
- Evaluated three food-grade (highest grade) thymol-based essential oils: oregano, thyme, rosemary and a control of vegetable glycerin.
- Battery-operated Airwick Mist Diffusers provided continuous-release of essential oils (2 per hive for 24/7 release) monitored with the Airwick mobile app.
- Broodminders were utilized for monitoring temperature and relative humidity.
- To evaluate efficacy of treatments, sticky paper was used with screened bottom boards in each hive to capture falling mites.
- Sticky paper was collected and replaced twice a week (at days 3 and 7), mites counted, and the average daily mite fall calculated.
- Todd Bee Traps utilized to assess bee mortality
- Apivar strips utilized as a finisher treatment.



Apiary in Cherry Hill, NJ



Broodminders : Temperature & Humidity



Fallen Mites on Sticky Paper



Todd Dead Bee Entrance Trap to Capture Fallen Bees



Essential Oils/Mist Diffusers Set-Up in Hive Super



A NOVEL, PESTICIDE-FREE, SAFE, EFFECTIVE, AND ECONOMICAL WAY TO COMBAT THE DEADLY VARROA MITE AND SAVE THE HONEY BEES!



Varroa Mite on Fat Body Tissue of Adult Worker Bee



Varroa Mites on Bee Pupae



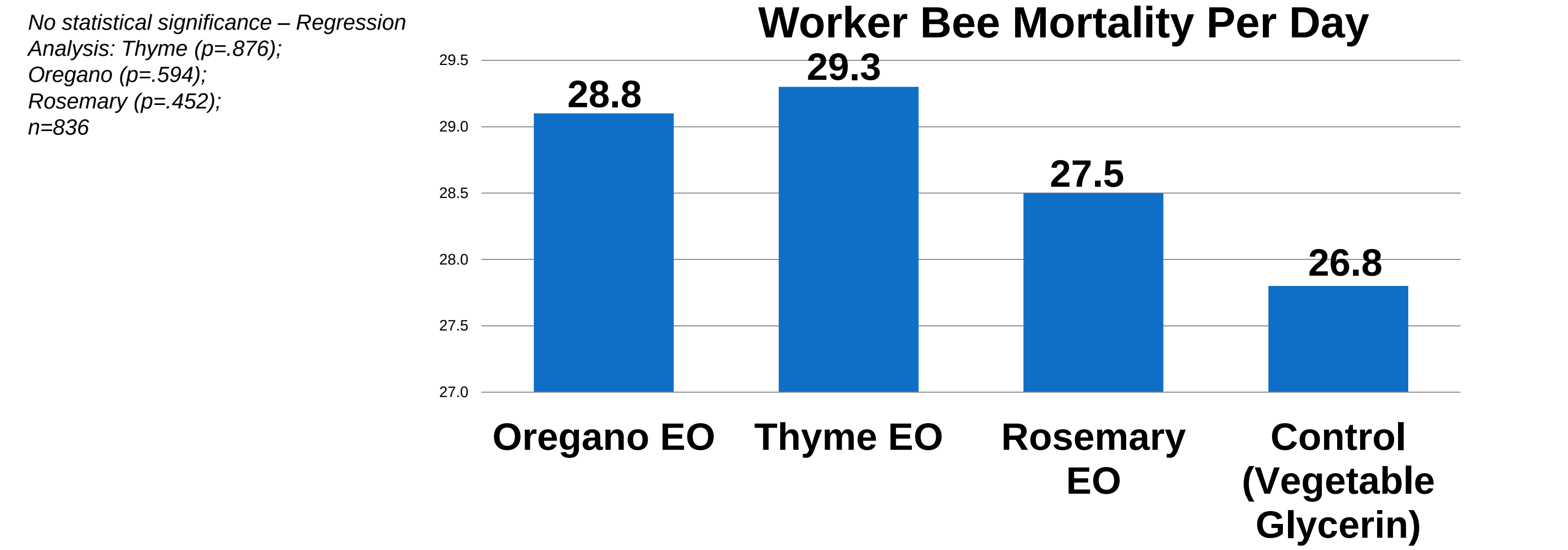
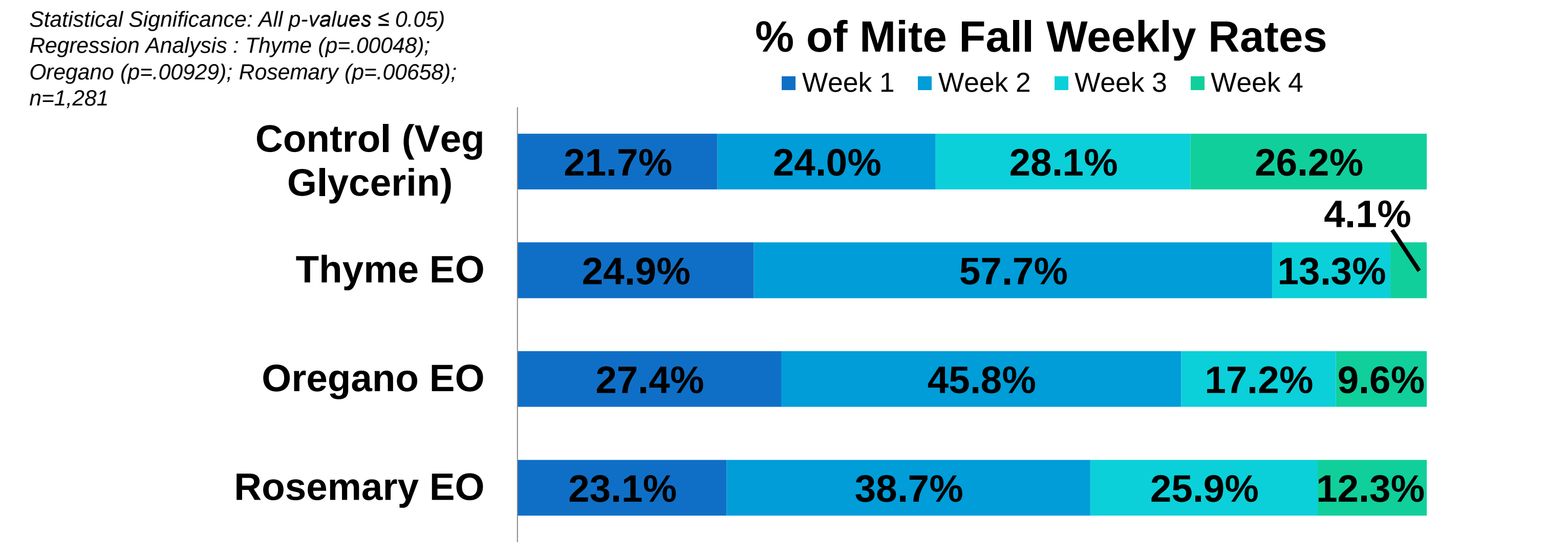
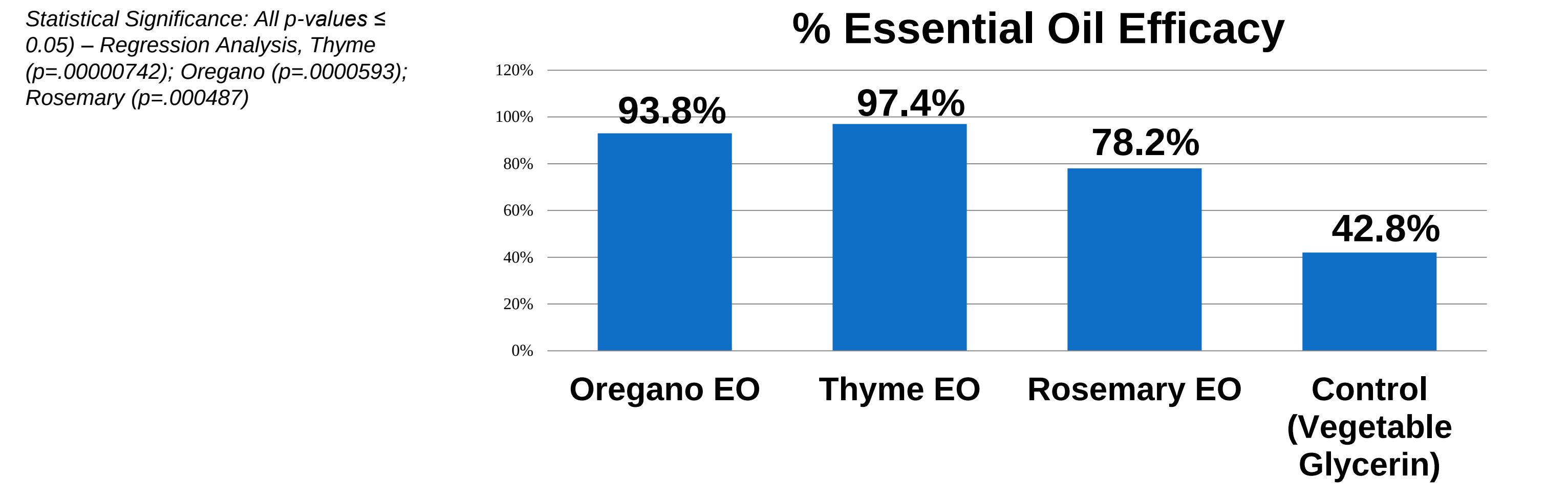
Close -Up of Varroa Mite



Key References
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RESULTS



DISCUSSION

- Most effective miticide control came from thyme, followed by oregano then rosemary
- Worker bee mortality comparable to the control.
- Provided a continuous-release regardless of temperature and humidity conditions.
- Large proportion of mites to be killed in the first 2 weeks of treatment – mites killed as they emerged from brood cells.
- Very cost effective: US\$3.20 per hive per application vs. commercially available thymol-based products at US\$15-\$18 per hive per application.



SIGNIFICANCE & CONCLUSIONS

- In light of the current crisis surrounding honey bees and the *Varroa* mite, new solutions are desperately needed.
- The use of thymol-based essential oil mist diffusion can be incorporated as part of a natural miticide control plan to enhance the chance of colony survival.

