OP-227 [Beekeeping Technology and Quality]
Evaluating Precision Varroa destructor Treatments with the HiveMaster applicator: Field Trials in the USA and Israel

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The control of Varroa destructor remains a critical challenge in modern beekeeping, with conventional treatments facing issues such as uneven distribution, resistance development, and labor-intensive application. This study evaluates an automated precision treatment system using gas micropulse technology at the University of Florida. Our experiment in Florida involved 96 colonies divided into three treatment groups (32 colonies per group): an automated system (ToBe LTD HiveMaster), Apivar®, and an untreated control. Colonies were equalized prior to treatment application to ensure they were of similar size and strength. Alcohol washes were used to determine V. destructor populations prior to treatment application and two weeks after application. We observed a significant difference in treatment efficacy, with the automated HiveMaster device achieving 95% mite reduction, Apivar® 41%, and the control group 11%. Additionally, separate field trials conducted in Israel tested the automated application of Oxalic acid in over 20 hives. After two weeks, this method resulted in more than 90% mite reduction measured by alcohol washes and fallen mites on sticky bottom board, without observing any bee mortality nor queen loss. These results further highlight the potential for effective V. destructor control with additional compounds and in different environmental conditions. Beyond efficacy of V. destructor treatments, the integration of Internet of Things (IoT) sensors in hive management presents new possibilities for precision beekeeping. By continuous monitoring of colony conditions and comparing results to a standard hive assessment of counting occupied frames and number of bees, the HiveMaster can assess colony strength while enabling tailored treatment strategies (e.g, 5frame hives will receive lower dosage in comparison to a 10frame hive). This approach has the potential to optimize V. destructor treatment application, reducing chemical exposure while improving colony resilience.

These findings suggest that automated and sensor-driven treatment methods may offer a more effective and sustainable approach to V. destructor management, addressing key challenges associated with traditional chemical treatments. Further research will explore long-term colony health outcomes and the broader applicability of precision treatments in diverse beekeeping operations.

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ToBe

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The Global Bee Crisis

Viral infections caused by Varroa mite is the top threat killing bees

News!

Forbes

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The Beekeeping Industry Is In Panic As A Shocking Number Of Bees Die

Amy Feldman Forbes Staff

Senior editor covering healthcare

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Feb 6, 2025, 05:23pm EST

Updated Feb 6, 2025, 06:49pm EST

Commercial beekeepers saw well over 50% losses this winter. As California prepares for almond season, and for fruits like blueberries and cherries after that, not enough bees could mean higher prices at the grocery store.

Existing Solutions Fail and May Harm Bees

Less than 50% efficacy

Fail to evenly spread the compounds; Narrow therapeutic window

Excessive Pesticide Usage

Harm bees; High residue in honey

Complex & Expensive Operation

High manpower inputs; Costly transportation requirements

HiveMaster

In-Hive Automated Treatment & Precise Sensing Device

- Releases precise treatment compounds in a **gas phase**
- **Consumable cartridge** providing one year of hive treatments
- Uses **90% less** pesticide
- Monitors bee health, hive conditions & environment
- Plug & Play; Compatible with all hive types
- Self-Sufficient & IoT connectivity

HiveMaster™

Precise Pest Control via automated miniscule Gas pulses

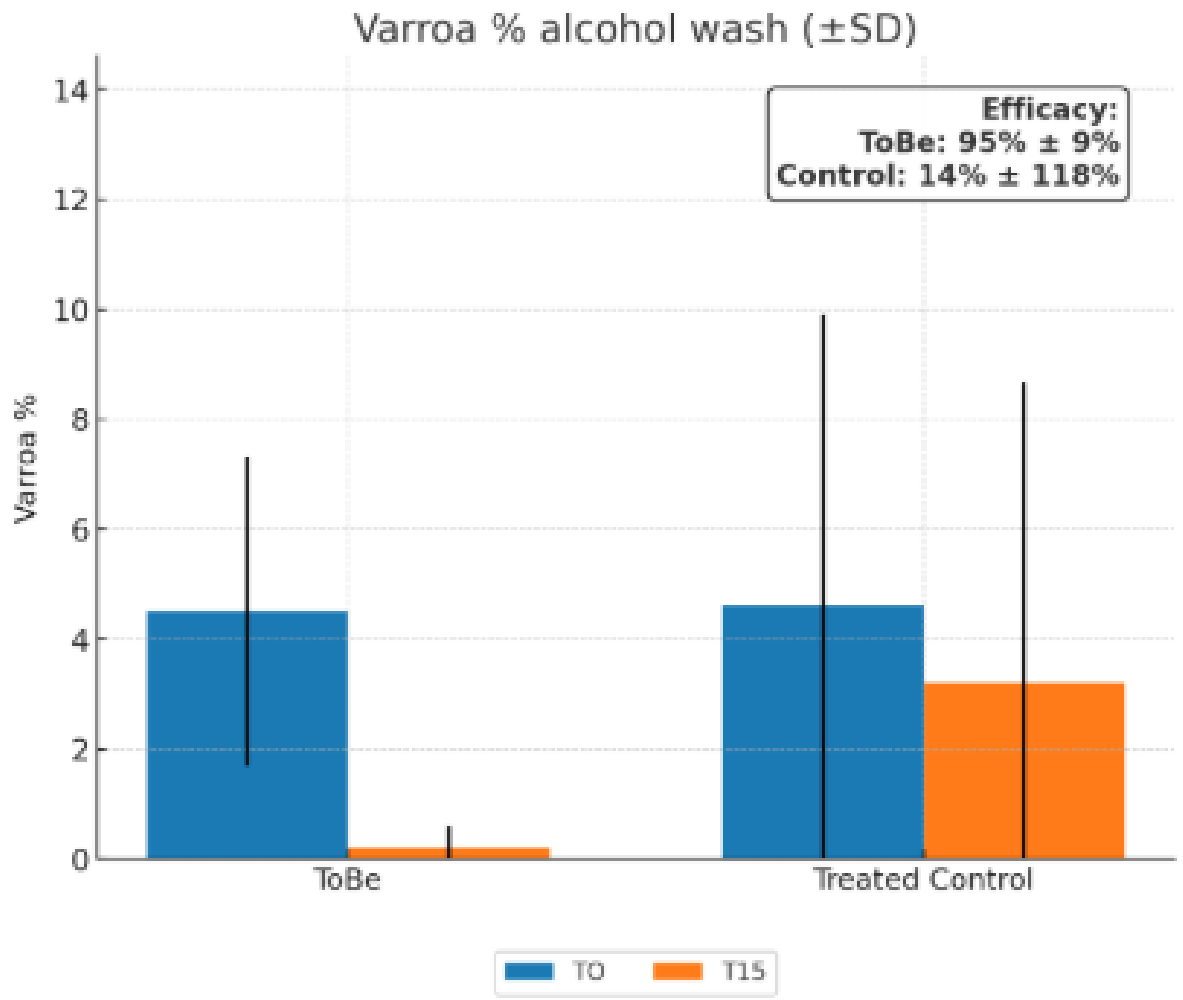
HiveMaster

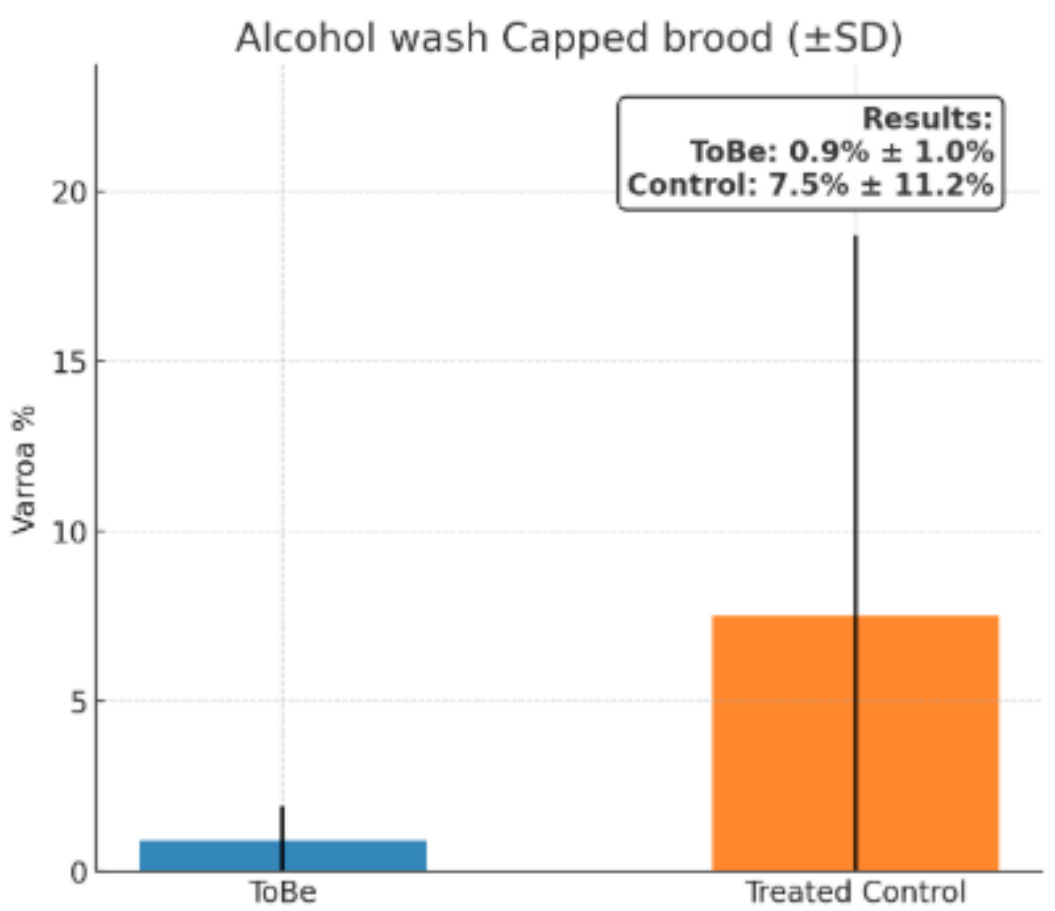
AI-based Data Analysis and Decision Support System

- Analyzes hive conditions and trends
- Detects patterns to recognize hive events & recommend treatments
- Adjust/design health treatment protocols
- Generates valuable insights for all market shareholders

Florida results-collaboration with Wonderful Bees

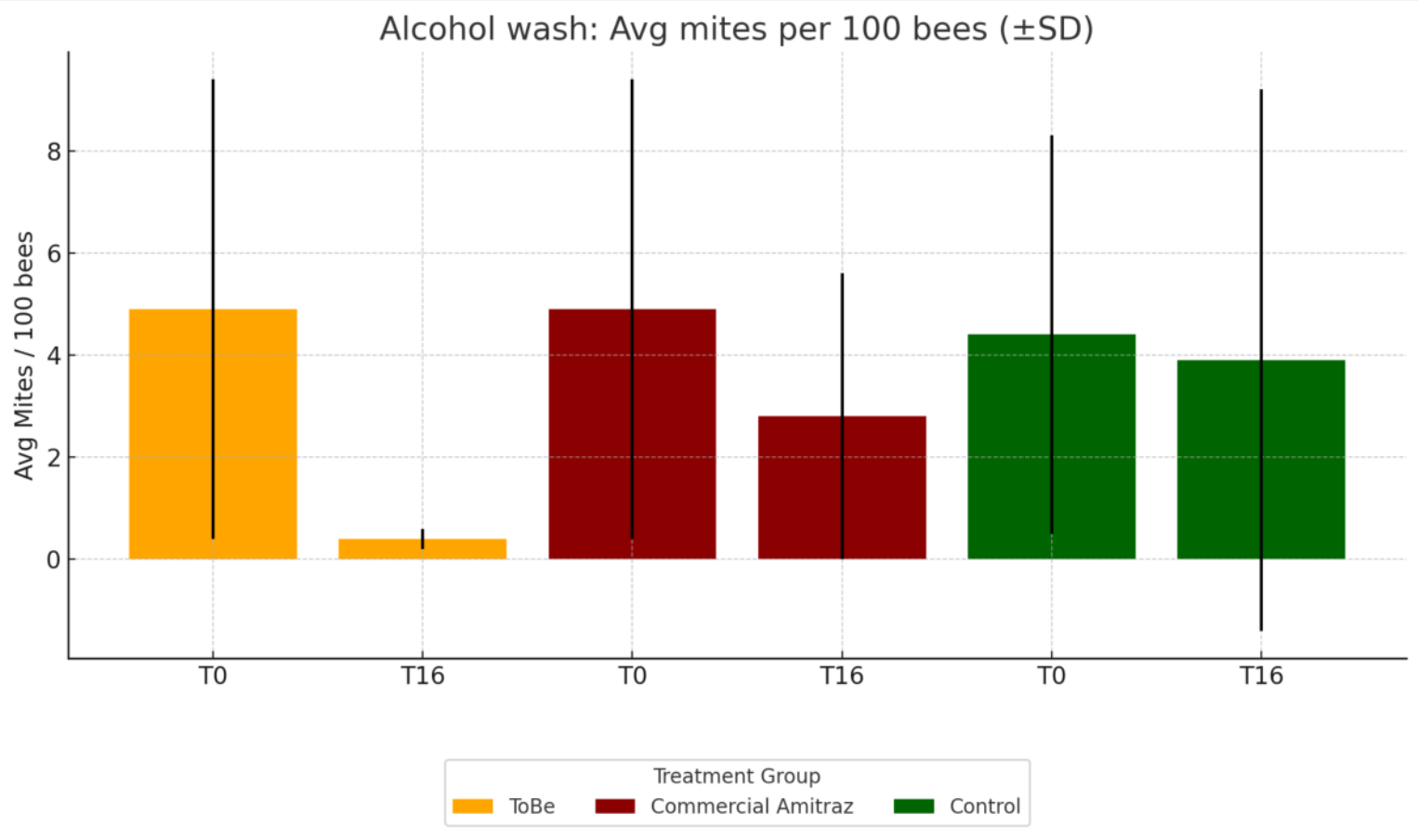
Successfully tested in three different sites in commercial apiaries





University of Florida results- May 2024

Testing ToBe's HiveMaster on 96 colonies (32 colonies/treatment)



Efficacy (±SD)

ToBe: 95% ± 8%

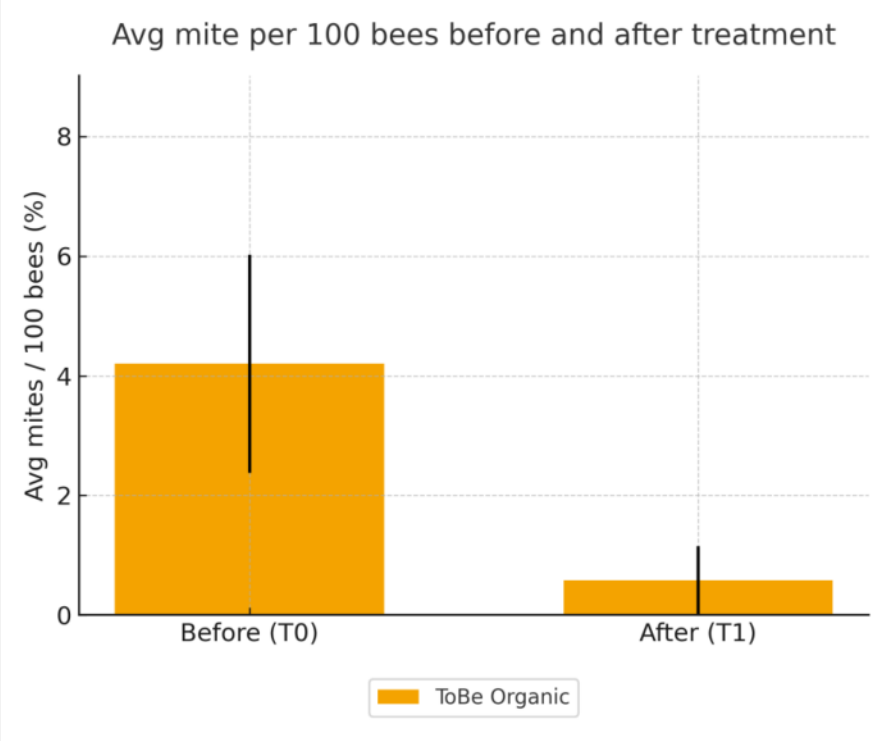
Registered Amitraz: 41% ± 50%

Control: 11% ± 77%

HiveMaster significantly reduced *Varroa* populations in three weeks

Successful POC with Organic Acid

Over 90% Efficacy With No Harm to The Bee Colony



- **90% efficacy** within 15 days in **brood right** colonies
- No damage to bees or queens regardless of the weather
- Over 95% efficacy in broodless conditions
- More research and data to come in the following months

New threat to the western honey bee

Reproduce 3× faster than *Varroa;*

May have worst effect on honey bees

Does not require phoretic phase;

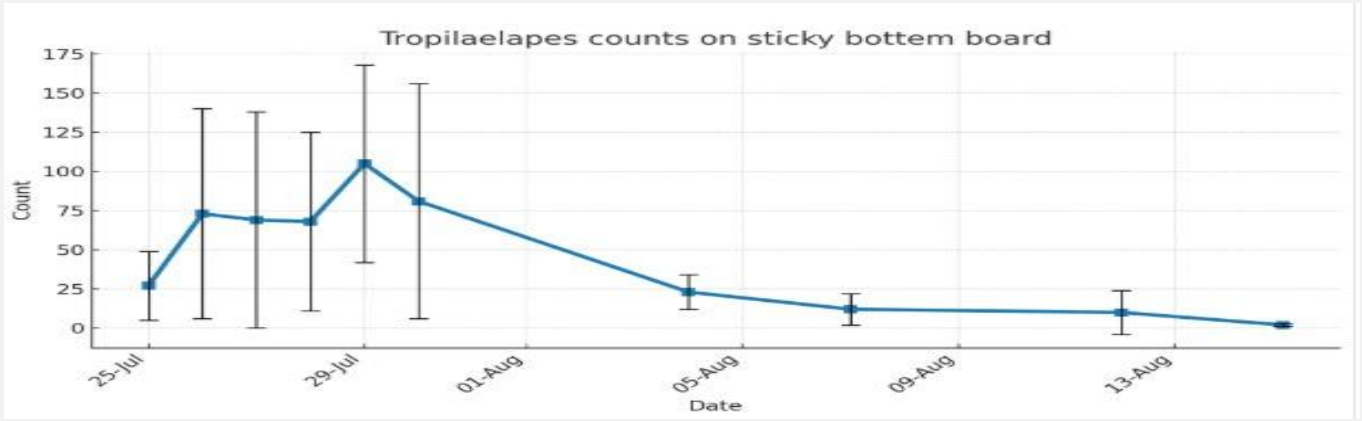
Contact strips are not effective

Continually dispersing;

May reach western Europe soon

Successful POC on Tropilaelaps Mite- BUU Thialnad

Tested by counting mites on sticky bottom board while active treatment



- Caused an increase of **3× mite fall** once treatment activated
- Reduced mite fall by **90% within 14 days**
- Works effectively with amitraz and fluvalinate

- Better estimation method needed!
  - Experienced PhD student takes ~2 h counting each sticky board

Thank you

- Steve Ricman-Wanderfull Bees
- Ray Latner-Dadant

Dr Guntima Suwannapong and the BUU Bee lab

Dr Bajaree Chuttong

- **Questions?**