

UBeeO™ is a novel tool that Vermont queen producers can use to improve the pest and disease-resistant qualities of their honey bee stock. UBeeO enables producers to identify hygienic colonies in their apiaries that may be better equipped to combat *Varroa* mites and other diseases. Since 2022, the Vermont Bee Lab has been partnering with four queen producers in the state to test UBeeO. We have introduced UBeeO technology to their selection programs in hopes of improving the quality of Vermont honey bee stock.

How does it work?

UBeeO is a liquid formula that mimics the natural pheromones emitted from unhealthy brood within the hive (so called, 'unhealthy brood odor', or UBO). UBeeO can predict a colony's ability to resist *Varroa* mites and other diseases through hygienic behavior. By applying UBeeO to a section of capped brood, a beekeeper can test the bees' sensitivity to these pheromones, and thus their ability to detect and remove unhealthy brood. To perform the test, UBeeO is sprayed on to an isolated section of capped brood and the frame is returned to the colony for two hours. UBeeO scores are calculated by counting the number of UBeeO-treated wax caps that are manipulated (e.g. chewed open) by the bees during the two-hour test period. Colonies that manipulate 60% or more of the cells are considered "high-scoring" (Figure 1).

Why does it matter?

Colonies with high UBeeO scores have demonstrated lower mite and disease loads than colonies with low scores. Similar to previously published research, our trials in Vermont have demonstrated that high-scoring UBeeO colonies have lower *Varroa* prevalence and loads throughout the season (Figure 2). Preliminary data also suggests that high-scoring colonies have lower virus loads and may reduce *Nosema* spp. loads more rapidly by late season.

Are UBeeO-linked traits heritable?

Research suggests that UBeeO-linked traits can be inherited by daughter colonies. However, it is not guaranteed that all daughter colonies will inherit high UBeeO scores from their mother. One factor affecting the likelihood of inheritance is the breeding strategy used to produce queens. Through our preliminary data, the greatest level of inheritance has been achieved by controlling both the matriline (egg source) and the patriline (sperm source) through instrumental insemination.



Figure 1. The UBeeO test area after 2 hours. More than 60% of cells are manipulated, making this a high-scoring colony. Worker bees detect the UBeeO scent and uncap the cells to inspect developing brood.

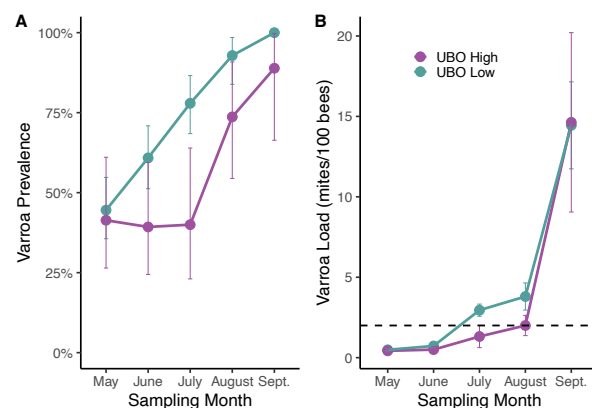


Figure 2 Average *Varroa* prevalence (A) and *Varroa* loads (B) from May-September for low-scoring UBeeO colonies (green) and high-scoring UBeeO colonies (purple). Prevalence refers to the percentage of colonies with *Varroa* loads > 0. Load refers to the number of mites per 100 bees. The hatched line represents mite treatment threshold. Any colonies treated for high mite loads were removed from subsequent time points. High-scoring colonies showed lower *Varroa* prevalence throughout the season and lower *Varroa* loads in May-August. On average, mite loads of high-scoring colonies remained below the treatment threshold (hatched line) for most of the season while low-scoring colonies had to be treated as early as July.



VERMONT
BEE LAB

UBeeO™ For Hobbyists

Are UBeeO-linked traits heritable? (continued)

Open-mated systems can be used successfully, especially when new queens mate in areas that are saturated with drones from high UBeeO stock. Ask your queen producer about their breeding strategies and whether they have tested daughter colonies before purchasing 'High-scoring UBeeO Queens'.

Who raises UBeeO selected bees in Vermont?

Several queen producers in Vermont are currently using UBeeO tests to inform their selection programs. Contact your nearest queen producer for more information on their selection and breeding strategies. If you would like to test your own colonies using UBeeO, visit opterabees.com to learn how you can obtain a UBeeO™ testing kit.

Vermont Queen Producers Using UBeeO

French Hill Apiaries

Mike Palmer
St Albans, VT
mpalmer@together.net
www.frenchhillapiaries.com

Selects for low pest and disease, overwintering success, honey production, mite grooming behavior and UBeeO traits through open mating. Nucleus colonies and queens available for purchase.
Pre-order by: January-March (nucs)
January-May (queens)

Hundred Acre Wood

Jack Rath
West Pawlet, VT
rath.jack@gmail.com
www.betterbee.com

Selects for low pest and disease, overwintering success, honey production, mite grooming behavior and UBeeO traits through open mating and targeted instrumental insemination. Nucleus colonies and queens available for purchase through Betterbee in Greenwich, NY.
Pre-order by: December 15 (nucs)
January 15 - August 15 (queens)

Lemon Fair HoneyWorks

Andrew Munkres
Cornwall, VT
andrew@lemonfairhoneyworks.com
www.lemonfairhoneyworks.com

Selects for treatment-free, low pest and disease, overwintering success, honey production, mite grooming behavior, and UBeeO traits through open mating. Nucleus colonies and queens available for purchase.
Pre-order by: January 1 (nucs)
June-August (queens)

Vermont Bees LLC

Bianca Braman and Adam Collins
Milton, VT
vermontbeesllc@gmail.com
www.vermontbees.com

Selects for low pest and disease, overwintering success, honey production, mite grooming behavior, UBeeO traits, and hyper-diversity through instrumental insemination. Nucleus colonies and queens available for purchase.
Pre-order by: February (nucs); rolling (queens)

Questions?

Contact the Vermont Bee Lab at vbl@uvm.edu to learn more about our ongoing efforts to support queen producers in Vermont. Find us on social media for updates on all of our projects and how you can participate. Visit our website for information on other Vermont queen producers in your area.

To order UBeeO, or learn more about the science behind the technology, visit Optera's website:
www.opterbees.com

Prepared in collaboration with Optera and Betterbee



Project supported by SARE

