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PP-047 [Bee Health]

Utilization of No-Mite-Low-Mite-Queen Best Practices

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Introduction

Soon after the entry of the parasitic mite, *Varroa destructor,* into the United States in 1987, researchers and citizen scientists began exploring the viability of using selective queen stock to produce colonies of worker bees capable of managing mite populations, what I have termed "no-mite-low-mite-queen best practices" (NMLMQ). A mite resistant colony will have low mite loads, relative to unselected colonies, and treatments would be required less frequently. I use the term Varroa resistant bees ("VRBs") to refer to the mite resistant colony and its teamwork approach to decrease mite loads. This study focuses on determining the prevalence of queens bred to produce mite resistant honey bees and to achieve reduced Varroa mite loads in Maryland honey bee colonies.

At the American Beekeeping Federation's Annual Conference in January 2025, Marla Spivak, PhD posed an important question, **"Why do queen producers resist selecting for and using mite resistant bees?"** This prompted me to create the Varroa Management Survey to determine the percentage of Maryland beekeepers utilizing VRBs and beekeepers' rationale for or for not using them to reduce mite loads.

Methodology

The Varroa Management Survey was posted to the Maryland State Beekeepers Association's (MSBA) website on July 17, 2025. Data was collected via Google Forms. The survey closed August 15.

Acknowledgements

The author would like to thank Dr. Marla Spivak for reviewing the abstract and final poster prior to submission; Phil Frank, Jan Day, and Maureen Jais-Mick for assisting in the development and publishing of the survey on the MSBA website; and to the MSBA board for agreeing to host the survey and for their efforts to further beekeeping awareness and education across the State of Maryland.

References

Spivak, M, Reuter, G.S. Performance of Hygienic Honey Bee Colonies in a Commercial Apiary. Apidologie 29 (1998) 291-302.

Spivak, M, Reuter, G.S. A Sustainable Approach to Controlling Honey Bee Disease and Varroa Mites. SARE Outreach, 2021.

Oliver, Randy. Selective Breeding for Mite Resistance, Part 1. American Bee Journal, August 2025, pp. 887-891. ScientificBeekeeping.com.

Figure 1: Use Queens Bred to Overcome Varroa

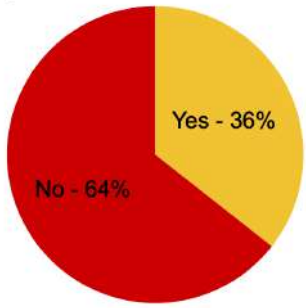


Figure 2. Control Colonies' Genetics to Reduce Varroa's Impact

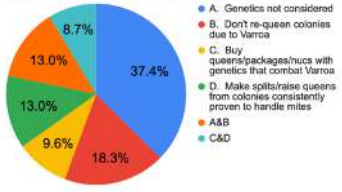


Figure 3. Zero Mite Count in at Least One Colony Last Time Tested

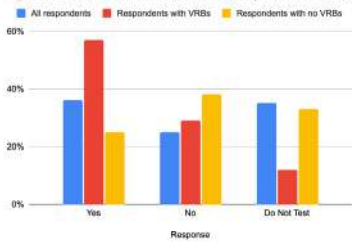


Figure 4. Treatment Threshold

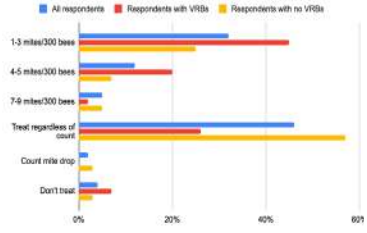
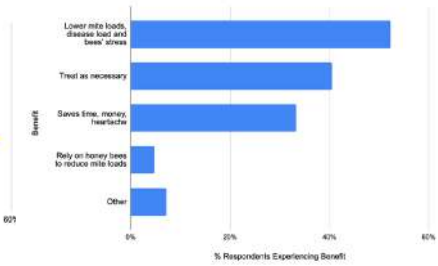


Figure 5. Benefits Practicing NMLMQ



Results

Of the 785 MBSA members, 118 unique members responded to the survey (15% response rate). Twenty of 24 Maryland counties were represented in the survey. Survey respondents included the following:

- Hobbyists (1-39 colonies): 79%
- Sideliners (40-500 colonies, incl. 3 queen breeders): 20%
- Commercial (500 or more colonies): 1%

The total number of bee colonies the respondents managed is 2,747 and ranged from 1-625 colonies for each beekeeper.

Twenty-two percent of respondents having been beekeeping up to 3 years, 47% more than 3 years and less than 10 years, and 31% 10 or more years.

Thirty-six percent of respondents have incorporated NMLMQs into their apiaries maintaining at least some VRBs (Figure 1)**.** These beekeepers actively control the genetics of their colonies taking one of two approaches, or both (Figure 2).

Ten percent of the beekeepers with VRBs **experienced zero mite loads across most of their colonies** the last time they tested (75% 3Q25, 25% 4Q24), vs. 1% of those who do not utilize VRBs (4Q24). **57% of the beekeepers with VRBs had at least one colony** with a zero Varroa mite load (Figure 3).

Seventy-two percent of respondents test for Varroa loads, whereas 28% do not test. Those beekeepers with VRBs test for Varroa loads more frequently than those who did not (83% vs. 66%); and they treat for Varroa slightly less than those who do not use VRBs (93% vs. 97%).

Sixty-seven percent of respondents with VRBs set thresholds to treat, whereas 37% of the respondents without VRBs set thresholds (and 57% treat regardless of threshold). The largest percentage (32%) of all respondents set **a treatment threshold of up to 3/300 or 1% mite load** (Figure 4).

Respondents with VRBs (36%) are three times more likely to treat only those colonies meeting Varroa thresholds (29%), than those respondents without mite resistant stock (7%); of the latter 91% treat all the colonies in their apiaries, vs. 64% of the beekeepers maintaining VRBs.

Respondents reported benefits from NMLMQ (Figure 5).

Discussion

Selective Breeding. More than one-third of MSBA members practice NMLMQ and use VRBs. To my knowledge, no survey has been completed to determine the number of beekeepers employing VRBs across the United States to compare; further study is needed.

Varroa Resistance. Beekeepers with VRBs are experiencing lower mite loads which should mean that their honey bee colonies will be exposed to lower disease load, possibly fewer diseases, and will be more productive than the colonies without VRBs. One-third of the beekeepers that do not have VRB do not test for Varroa, so they could not know the mite loads in their colonies. This could clearly skew the results.

Management Practices. Beekeepers who employ NMLMQ appear to manage their bees more closely than those who do not, perform more varroa tests, set thresholds for those tests in more cases and treat with greater frequency individual colonies, versus not all colonies in their apiaries. While a high number of Maryland beekeepers **test** for Varroa, a higher number **treat** for Varroa, indicating that about a quarter treat prophylactically (i.e., treat without testing).

Benefits. As more beekeepers across Maryland observe and/or experience the benefits of NMLMQ, it is anticipated more will try their hand at selectively breeding their own VRBs. An increase in beekeeper's demand may be the impetus needed to press queen breeders to offer Varroa resistant stock and the potential to reduce mite infestations on a more global scale.

Limitations

The Varroa Management Survey had a 15% response rate among MBSA members and only 2.7% of all Maryland beekeepers responded. Limitations of survey methodology include sampling errors, response biases, and the lack of depth. A broad-based, national survey with a larger sample size and higher response rate will be necessary to confirm these findings and to generalize the approach to other states and countries.

PP-047 [Bee Health]
Survey Research: Utilization of No-Mite-Low-Mite-Queen Best Practices (NMLMQ)

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BACKGROUND: The purpose of this study is to determine the percentage of Maryland beekeepers utilizing no-mite-low-mite-queen best practices (NMLMQ), and the beekeepers' rationale for or not participating in NMLMQ to reduce varroa mite loads. Problem Description: The Annual U.S. Beekeeping Survey, released December 5, 2024, indicates the highest colony losses since the 2010-11 beekeeping season, when colony loss rates were first determined. U.S. beekeepers lost an estimated 55.1% of their managed bee colonies in 2023-24 – 14.8% higher than the 13-year average annual loss rate of 40.3%. Two ongoing projects (Scientific Beekeeping, R. Oliver 2017-ongoing, Selective Breeding for Mite Resistance; University of Minnesota, M. Spivak, 2022-ongoing) have demonstrated that selective breeding of honey bee queens in colonies with no to low varroa mite growth over time enables the rearing of new colonies that maintain low mite counts over time. Why do some beekeepers choose not to pursue the NMLMQ to achieve higher percentages of mite resistant colonies in their operations, decrease annual colony losses and reduce treatment costs? METHODOLOGY: Two hundred members of the Maryland State Beekeepers Association will be e-mailed a link to a survey entitled "Utilization of Mite Resistant Bees" on June 7 to complete by July 7, 2025; based on their response to the first question, the survey divides the respondent pool into two arms – those that practice NMLMQ and those that do not. The survey will attempt to ascertain the beekeeper's rationale for or not participating in NMLMQ. Those who do not complete the survey by July 7 will be sent follow-up emails one month after the initial email. 30% response will be targeted. Results and CONCLUSION: The survey results will be presented at Apimondia 2025. Practical implications for beekeepers: After practicing NMLMQ, a beekeeper can potentially achieve no to low mite counts in their apiaries; NMLMQ also results in a greater percentage of colonies that overwinter successfully, resulting in decreased colony losses. A beekeeper could theoretically reduce miticide treatments and do so without harming neighboring colonies. An educational program may be developed to address the reasons why beekeepers are not engaging in such practices.