



VARROA COUNTING MADE EASIER

~ William Hesbach

Accurate estimation of a colony's population of varroa is key to assessing its health and determining the need for treatment. Sticky boards, inserted under colonies to capture falling mites,¹ are one way of estimating the total population of Varroa. They are widely used by both beekeepers,² and in research³ but even with a long history of use, the interpretation of the data they provide is still a subject of discussion among both beekeepers⁴ and researchers⁵.

Sticky boards are unlike other methods used to evaluate a colony's infestation level. In other methods, like sugar rolls or alcohol washes, a sample of the phoretic mites²⁰ are collected and counted. In those methods, we assume the phoretic mite counts relate to the total population, and the numbers obtained are discussed as if they are. For instance, if we did an alcohol wash on 300 bees and three mites were counted we would say the mite "level" was 1%. It gives us a standard measurement system that works well under almost all conditions.

With sticky boards, the mites collected include those that are groomed off bees, mites that die naturally, and mites that exit from brood cells and fall before they can attach to a bee. Our assumption about sticky boards is that those different mite sources fall to the board at a rate commensurate with the total population influenced by factors like the seasonal brood cycle and the hygienic behavior of the bees.

Because sticky boards are allowed to collect mites for an extended period, some researchers say that the natural drops represent a more accurate assessment of the total mite population. But unlike the other methods, sticky board counts have not been standardized into a single percentage that we can determine

just from counting the mites- there's more to it. Since a sticky board natural drop includes more information, an interpretation that accounts for all the factors is critical, and fortunately, the science and counting methodology exists.

What follows is a review of some of the science on sticky board natural mite drops and a few illustrations on how they can be used to calculate the total population of varroa. Also, I've provided figures and examples to simplify the process used to determine treatment thresholds. Hopefully, after reading, you will be able to interpret a sticky board with confidence and teach others to do the same.

Sticky Board Basics

Sticky boards are any thin flat material, usually white and waterproof, approximately the same width, and length of the colony being tested that are coated with a sticky substance like Vaseline or cooking spray (**Figure 1**). In the case of a colony with a screen bottom, the boards can be placed under the colony, or they can be slid in the front entrance of

a colony with a solid bottom board. The boards are allowed to remain in place for a specified time, and then the boards are removed, and the mites are counted.[2] In colonies with high mite counts, the counting can be tedious. In those cases, the counting can be simplified using techniques which allow a beekeeper to sample areas of the sticky board and then estimate the total amount of mites on the board.³ The next step is to interpret the count, but before that, a little background on the research will help establish a basic understanding of how it's done.

Background Research

Pivotal in an understanding of what natural mite drops can reveal is outlined in the original work of Steven Martin done in 1998.⁸ Martin's innovation was to build a model that could predict varroa populations using thoroughly researched mite reproduction cycles. Although mite reproduction is a continuing field of research,⁹ contemporary researchers still cite Martin's original work as an important baseline,¹⁰ which goes a long way in establishing its lasting credibility. Also, Martin's implied assumption that a model using individual reproductive behaviors can predict population growth has also been researched and supported, which further validates Martin's basic premise.¹¹

Martin used the modeling software ModelMaker® for his calculations.²⁴ If you refer to **Figure 3**, you can see the extent to which Martin considered the inputs. Martin included data on average brood reproduction cycles,¹¹ mortality data of phoretic mites,⁸ and mite cell invasion data.^{12,13} Martin weighed heavily on the percentage of fertile mites in a colony using 42 studies conducted by various researchers. He also in-

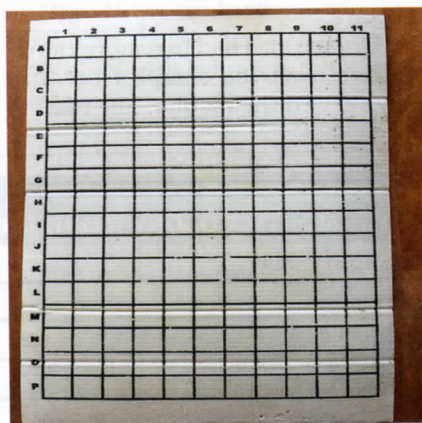


Figure 1. This sticky board is typical of ones purchased from suppliers with grid lines to make counting easier. I use a small paint roller that fits into a wide mouth Vaseline jar and then roll the surface to make it sticky. They can be cleaned and reused many times.