

*Mister Trouble never hangs around
When he hears this Mighty sound.
"Here I come to save the day!"
That means that Mighty Mouse is on his way.*
- Mighty Mouse theme song

Varroa mites came to the USA in the late 1980s, right on the heels of the tracheal mite which showed up a couple of years earlier. Between the two of them, they quickly wiped out most feral honey bee colonies and forever changed the way that honey bee management is done. Gone are the days when "hands-off" beekeeping could be successful.

This historical/biological fact doesn't seem to be widely understood. There is a small but vocal cadre of bee hobbyists who dismiss the threat of varroa mites but are militant about hypothetical, often nonsensical "threats" from everything from GMO crops and Round-Up to world trade and government agencies. Typically their concerns are fueled by poorly-researched articles in the popular press that are designed to evoke anti-corporate, anti-government or anti-modernist hysteria (remember when cell phones were identified as the cause of CCD?).

By its nature, this activism cannot blame a small arachnid as the fundamental cause of all our troubles, because we can't raise money, hold rallies and pass laws against arachnids. In a strange twist, the activists frequently embrace "treatment-free beekeeping", which, in a nutshell, seems to mean that the beekeeper allows his/her bees to die from mites and the diseases they carry. The trick to making the "treatment-free" rhetoric fall on receptive ears is to blame the death of their hives on something other than their own neglect in the form of failure to control mite loads. So their hives die due to something else (pick something... one excuse is as good as another, but one tied to greedy corporations, idiot government lackeys or mad scientists is best).

But if you are like me (a Triangle-area hobby beekeeper), once a hive has become strong and established, there are only three basic reasons that will lead to its death, all of which I have experienced:



1. Varroa-related collapse (from the viruses associated with varroa mites)
2. Starvation
3. The hive wasn't able to recover from the loss of a queen

Maybe we could also add "bad luck" and "bad decisions", but usually they end in one of the three outcomes above.

If you genuinely believe your hive has died from some other reason then it is time to call in one of the State Bee Inspectors because something extremely unusual is going on.

Of these three causes of death, the last two have been around ever since the first keg of bees arrived at Jamestown. Starvation is easy to predict and prevent. Queen loss is random but if noticed in time, it is often easy to save the colony. It is varroa mites that have us crying out, "Mighty Mouse, where are you when we need you?"

Here is what you should do while we wait for him to arrive.

Step 1: Assess the Situation

Every knowledgeable beekeeper knows that we should assess mite loads (the percentage of mites per bee in the hive) before applying a miticidal treatment. This doesn't tell us whether our bees have mites (they do have them, even if the assessment doesn't show any). What the assessment does is allow us to judge how well our treatment of choice works, because we will

conduct the assessment before and after treating.

There are many ways to do mite counts. Simply looking at bees to see if they are carrying mites is not one of them! Genuine methods include:

1. Drone sampling: Drone pupae are removed with an uncapping fork. Mature reddish-brown mites are quite obvious on white pupae. The average number of mites and mites per drone cell are counted. This method can give a quick indication of whether mite loads have gotten way out of hand but isn't precise enough to be truly useful. Also note that immature mites are translucent so aren't as easily seen as their mom and mature sisters.
2. Sticky board test: A board with a sticky coating is slid under the hive, separated from the bees by #8 screen. Mites that fall off the bees stick to the board. After a fixed period of time (one day, three days, etc.) the board is removed and the number of mites is counted. The number is divided by the number of days that the board was in place. This gives us the daily mite drop, an indirect indication of the number of mites in the hive. It doesn't account for colony strength and the boards collect a lot of trash, making accurate counting a challenge.
3. Alcohol wash: A bunch of bees are collected in a jar. Alcohol is added to kill the bees and wash off the mites. The alcohol is passed through #8 screen to separate the mites from the bees. The wash is repeated on the same bees several times to ensure that all mites are collected. Both the number of mites and the number of dead bees are counted to yield an accurate ratio of mites to bees.
4. Sugar shake: A measured volume of bees (typically 100 mL, equal to about 300 bees) is collected in a jar fitted with a #8 wire lid. Several tablespoons of powdered sugar are dumped on the bees. They are swirled and shaken until covered with sugar. The sugar dust hampers the mites' ability to hold onto

the bee. The upturned jar is shaken over a white surface, causing sugar and mites to fall out. A bit of water is used to melt the sugar so the mites can easily be counted.

The number of mites is divided by 3 to give an estimate of mites per 100 bees.

The alcohol wash is clearly the most precise way to sample, but comparative research has shown that results from the sugar shake test are fairly accurate too. It is much easier to conduct the sugar shake test and it doesn't kill bees, so all things considered, it is the recommended tool for beekeepers. It is better than the sticky board test because sugar shake results aren't biased by the strength of a colony.

To do the sugar shake test, I like to use the ["University of Minnesota Method"](#). Measure 100 mL of water and use that to mark a bee scoop (e.g. a plastic cup). Shake nurse bees (not the queen!) off of several brood frames into a bucket. Using your marked cup, scoop up 100 mL of bees. Pour them into a mason jar. Close the jar with a #8 screen lid. Dump in some powdered sugar, shake and sift as described above.

There is no magic number for the acceptable number of mites. Keep good notes, get competent advice and judge for yourself. The lowest numbers are expected in spring; the highest are in late summer and fall. Inadequately treated hives commonly die in mid/late summer as the percentage of mites explodes. Others limp into winter with sick bees that aren't able to survive normal seasonal stress.

Step 2: Treat

Once you have a good estimate of a hive's mite load, it is time to use an effective treatment. Powdered sugar dusting, small-cell foundation, drone harvesting and other trendy too-good-to-be-true methods don't work. Because they delude beekeepers into thinking they are managing mites when they actually are not, these techniques can be extremely harmful (deadly to bees) in the long run.

The same warning applies to VSH (Varroa Sensitive Hygiene) and Russian bee stock.

Novices often think that if they install bee strains that are advertised as being varroa resistant, the beekeeper doesn't have to do anything else to control varroa. That's simply not true. VSH and Russian bees may (or may not) survive a bit better on average, but they will die if untreated. The sales brochure may have promised something different to get you to spend \$25 for a bug, but your backyard hive is very different from the apiary and its management practices where the queen came from. Yes, I encourage you to use varroa-resistant stock, but you can't stop there. "Varroa resistant" does NOT mean "varroa proof"!

What treatment should we use? My criteria are that any treatment must be:

1. Effective
2. Less harmful to the bees than the mites, all things considered
3. Practical (easy enough to apply, cheap enough to afford)
4. Doesn't build up to bee-toxic levels in the wax over time
5. Did I mention "effective"?

Regardless of which treatment we choose, carefully read the label directions and apply the treatment exactly as indicated. Failure to do so can harm our bees, or worse, harm us, or cause us to waste our money. Some treatments (the ones that vaporize) are heat-sensitive and must only be used when temperatures are within the thresholds for that treatment.

Never apply a treatment to a hive while honey supers are on, even if the directions suggest that we can do so safely. A honey label that says, "*Tastes funny but not harmful!*" won't generate many sales.

I have had good results with:

1. ApiGuard: thymol gel, two applications two weeks apart
2. Mite-Away Quick Strips: formic acid in a controlled-release gel strip, one application, 8-day total treatment period
3. ApiLife Var: thymol wafer, three applications 7 to 10 days apart

There are a couple of fairly new treatments, notably ApiVar (not to be confused with ApiLife

Var) and HopGuard II, that I have not yet used but I would like to hear from those who have.

Step 3: Assess the Situation

We finish where we began. After treatment, do the sugar shake test again to see whether the mites have been decimated. The counts don't have to be zero but they should be very close to it. If the treatment didn't work as hoped, you may need to re-treat after giving the bees a bit of a rest.

Check to ensure the queen is alive and well. It's possible for some mite treatments to interfere with the hive's pheromones and cause the colony to replace the queen. This doesn't always happen but it isn't unheard of.

When is the best time to treat?

The best time to reduce varroa mite levels is "before you need to." Conventional wisdom used to be that beekeepers could allow mite levels to rise to a high percentage and then knock them back down to a reasonable level with miticides. However as we have gained experience with varroa mites and the pathogens they transmit, it has become obvious that this strategy is only effective against the mites themselves. When we let mites get out of hand and then knock them back down, the virus levels in the hive are still high even though the mite counts are now low. The hive will still sicken and die. The lesson is that beekeepers must be vigilant and not let varroa levels get out of control to begin with.

I prefer to treat in late August, in time to allow the colony to raise healthy mite-free bees who will in turn raise the bees that will overwinter. If mite levels are high before or after the spring honey flow, treat again. But whatever strategy you implement, test and re-test to ensure it is effective!

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