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Is Monitoring For Mite Levels Necessary?

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Abstract: For about two decades now, beekeepers have been advised to monitor Varroa population levels in their hives so that treatments can be applied when appropriate.

Full text: Headnote

We all have mites, should we just treat?

August: Now is a good time to treat for Varroa mites... but is monitoring mite levels really effective and necessary?

Varroa destructor is still one of the primary sources of stress that bee colonies and beekeepers have to deal with on a yearly basis. The mite feeds on the honey bee's blood (hemolymph) and since the feeding site doesn't heal, it creates an opening in the honey bee's cuticle that becomes an entry point for bacteria, viruses, and other pathogens. Thus, the mite seldom kills bees directly . . . but rather it weakens their immune systems making the bees, and thus the colony more susceptible to a wide variety of pathogens..

By now most folks are aware of the importance of reducing mite levels in hives early enough in the season that the bees have time to get healthy as they prepare for Winter. It takes healthy bees to raise Winter bees that are healthy enough to survive the Winter. The honey bees that are raised late in the season and live through the Winter do so because they are endowed with a protein laden/fat body called vitellogenin, that acts as an antioxidant and food source and enables the Winter worker bees to live longer than their Summer sisters. Nurse bees that are sick with viruses and other infections may feed developing bees brood food that is laced with pathogens, thereby infecting the upcoming generations with diseases. Sick Winter bees have a more difficult time surviving the stress of Winter than healthy Winter bees.

Mite Monitoring

For about two decades now, beekeepers have been advised to monitor Varroa population levels in their hives so that treatments can be applied when appropriate. Numerous techniques for monitoring mites have been developed over the years ranging from collecting a known number of bees in a quart-size mason jar and either spraying the bees with ether and then rolling the jar so that the mites stick to the jar's sides, drowning the bees with rubbing alcohol which will wash the mites off the bees, or adding a couple tablespoons of powdered sugar to the jar with a five-mesh screen cover, and after shaking the jar so that the bees all become covered with sugar and waiting a minute or two, the sugar (and mites) are dumped out into a container. Unlike the first two sampling methods the bees are still alive after the sugar treatment and can be returned to their hive, while water can be added to the powdered sugar to dissolve it and make it easy to count the mites that have fallen off the bees.

Monitoring mites can also be accomplished by counting the natural level of mite fall through a screened bottom board over a 72-hour period. One challenge with trying to use any of these monitoring methods is that they can provide the beekeeper with false results. Too many times I have spoken to beekeepers who insisted that they sampled for mites in late Summer/early Autumn and found very low mite levels that did not indicate that a treatment was required only to have their colonies overwhelmed with mites a couple months later when the weather has turned cold, allowing for fewer treatment options, and closing the window of opportunity for the hive to raise enough healthy Winter bees to make it through the season of dearth alive even when an effective treatment can be applied.

False monitoring results can occur a variety of ways. Some false readings can be caused by the person taking the sample, such as when bees are collected from frames that are not filled with open brood cells ready to be

capped and are not covered with young nurse bees that will tend to be among the adult bee population most heavily infested with mites. Results can also be skewed by hive conditions such as when significant amounts of burr comb and brace comb have built up between the frames impeding the fall of mites through the screened bottom board after they lose their grip on their hosts. Even luck can play a role since the bees sampled may just happen to contain a significantly higher, or lower, number of mites than the rest of the colony's population even though they were collected, or counted, correctly.

To help eliminate these pitfalls, some beekeepers duplicate their monitoring efforts a couple days later in order to confirm the initial results. Not only has it been advisable to monitor and confirm the results before you treat for Varroa, but I believe that if you are going to monitor at all, it is even more important to monitor mite populations following a treatment to try and measure the treatments effectiveness. Sampling colonies more than once, or taking two or more 72-hour natural mite fall counts are likely to give you a more accurate picture of the mite loads in your hives than a single effort.

The Underlying Reason For Monitoring... Still Valid?

Historically there has been good reason to take the time to monitor Varroa population levels in hives. The use of toxic chemicals to control pests has consistently resulted in the development of pests with resistance to chemical treatment. By avoiding treatments that are unnecessary when pest population levels are low, the speed with which chemical resistance will develop is reduced. In addition, most treatments are not cheap. Significant savings can be realized by applying treatments only when necessary, especially in commercial, or side-line operations with numerous hives. However, times have changed and these reasons to monitor for Varroa may not be all that applicable any more.

It is the rare beekeeper that is still using the approved hard chemical treatments for Varroa: Apistan (fiuvalinate) and Checkmite+ (coumophos). Since these products utilize a single mechanism to short-circuit the mite's biological system resulting in death, Varroa developed resistance to these compounds within a relative short period of time (three to five years). This fact combined with the warnings revealed by research that these chemicals build up in the beeswax and can have sublethal impacts on colonies has resulted in the majority of beekeepers now using soft chemicals to treat for mites ... if they treat at all. These alternative treatment options work in ways that make the likelihood of the mite's developing resistance remote.

Manufactured chemical compounds like fluvalinate, coumophos, and the unapproved yet too often used, amitraz, tend to work by confounding a single biological mechanism within the target organism. This is part of the reason that pests are able to develop a level of tolerance to them relatively quickly. Treatments manufactured with natural ingrethents on the other hand, tend to be composed of a complex mixture of compounds that act synergistically and often create a multi-pronged threat to pests. Materials that are toxic to pests through a variety of pathways are much less likely to lead to pesticide resistance within a few years, if at all. The mite treatments ApiGuard®, Api-Life VAR®, and HopGuard(TM) all fall into this category. Other treatment options such as powdered sugar dusting and organic acid treatments such as the MiteAway Quick Strip (MAQS) work physically which, at least in theory, prevent Varroa from being able to develop resistance of any kind.

Should Varroa Monitoring Recommendations Be Changed?

Given that the recommendation to monitor mite populations in hives is partly driven by a desire to curb the speed with which Varroa will build up resistance to treatments, the need to monitor when using treatments that are unlikely to lead to resistance makes the need for monitoring questionable. Beekeepers may be better off assuming that mites are present (as their ubiquitous nature undoubtedly ensures that they are) and automatically treat at the appropriate time of year.

There is the economic argument that says that if treatments can be avoided when they are not needed, costs will be reduced and profitability increased. In commercial beekeeping operations however, it is the rare business that will absorb the labor cost associated with monitoring for mites. It tends to be cheaper and safer for

beekeeping outfits to simply treat all their hives "just to be sure." Once I began keeping more than a dozen or so hives, I gave up on monitoring and just treated all my colonies as a matter of course, usually once in Autumn. Given the propensity for the various monitoring techniques to provide false readings, it may be prudent for small-scale, and backyard beekeepers to do the same . . . forgo the time and energy it takes to try to evaluate the level of mite populations in colonies and automatically treat their hives for Varroa once or twice a year with a soft chemical treatment. Sure some money may be spent unnecessarily on occasion, but such an expense is minor compared to the cost of replacing a colony of bees that have died because a false reading indicated that a treatment was not necessary. Besides, even the most costly mite treatment on the market is fairly inexpensive when you only have one or two hives that need treating. If you are among the minority of beekeepers that still use the hard chemicals for mites monitoring makes a lot of sense, but at this point it seems that the value of monitoring for beekeepers who use soft chemicals is really only obtained after the fact in an effort to confirm that the treatment was effective.

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