

PEST AND DISEASE CONTROL

Re-imagining varroa monitoring: a practical approach

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Varroa is now cited as the number one reason for winter colony loss in New Zealand. While it has been in the country for 23 years, varroa continues to present a challenge for beekeepers¹. In winter alone, it is estimated to cost beekeepers more than \$20 million a year².



Corflute board for hive-floor monitoring for varroa. Photo: Richard Hall.

With the arrival of the 2023 beekeeping season, we want to provide results from a recent field trial to help stimulate thinking and help beekeepers to plan their varroa monitoring.

The annual NZ Colony Loss Survey conducted by Manaaki Whenua – Landcare Research, and commissioned by the Ministry for Primary Industries, provides evidence to understand the impact of varroa, and gives us insights into how beekeepers can tackle the mite.

We know from the survey that 30 percent of beekeepers monitor for varroa, and what methods they use. But crucially, ‘monitoring’ is a broad term, and not all monitoring is created equal. A scientific approach is great for accuracy, but beekeepers may find methods difficult to deploy, particularly at scale in a commercial beekeeping enterprise. If monitoring methods are not fast and easy, it is possible that they may get passed over, or only done occasionally.

To better understand what practical varroa monitoring might look like, we followed a group of five beekeepers throughout their autumn treatment period, from March through to July this year. The beekeepers involved were all highly experienced and varied from hobbyists through to larger-scale commercial beekeepers. Our aim with this small trial was to systematically record varroa counts using the methods of alcohol-wash, and hive-floor monitoring boards.

Beekeepers in the trial were asked to conduct an alcohol-wash on adult bees in four hives at their apiary at the beginning of their autumn treatment period and

to place a hive-floor monitoring board in these hives. Beekeepers were asked to remove the board after two days and count the number of mites that had fallen, and then continue to check the board at approximately weekly intervals.

Hive-floor monitoring boards may have been overlooked as a monitoring tool, because they do not account for colony size, and therefore the number of mites on the board can be meaningless if a single measurement is taken. But the use of these boards allowed beekeepers in the trial to track the mite fall over time and, importantly, over the course of a treatment. This made it possible for them to see when colonies needed additional interventions. We also found that an alcohol-wash at the beginning of treatment was essential to see the level of infestation. If mite infestations were severe, it was clear that treating the infestation was going to be a challenge, regardless of the treatment method used.

We hope this field data helps beekeepers in their approach to varroa monitoring.

More resources on bee biosecurity are available on our website:

<https://www.mpi.govt.nz/biosecurity/how-to-find-report-and-prevent-pests-and-diseases/bee-biosecurity/>



Automated counting of varroa on a hive-floor monitoring board using the apizoom.app, which takes about 10 seconds.

¹<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9318748/>
²<https://www.tandfonline.com/doi/full/10.1080/00779954.2022.2146527>

Frequently asked questions about varroa monitoring

AREN'T ‘STICKY BOARDS’ TOO EXPENSIVE?

While commercially available ‘sticky boards’ may not be a sustainable monitoring method for some beekeepers, there are alternatives. Some commercially available hive floors already come supplied with a monitoring board. Widely available corflute (often used for temporary signage, like real estate signs) can also be used as an effective hive-floor monitoring board. A light spray of vegetable oil, or a layer of petroleum jelly prevents mites from crawling off the board. Corflute can be reused every week just by wiping it clean. We found that hives with solid floors could be converted with a mesh insert. If the bees were in direct contact with the hive-floor monitoring board, then problems with chewing and grooming of the boards can arise.

DON'T HIVE-FLOOR MONITORING BOARDS REQUIRE YOU TO VISIT A COUPLE OF DAYS LATER TO COLLECT? THAT JUST SEEMS TOO HARD. WE CAN'T VISIT THE APIARY THAT OFTEN.

You do not need to visit the apiary every couple of days. We found that a beekeeper could leave a hive-floor monitoring board in a hive for 7–20 days, so long as the number of days was

continued...



Assembly of a mesh-insert for a solid hive floor so that a monitoring board can be used. Photo: Richard Hall.

recorded. It is then just a case of dividing the number of mites by the number of days. This provides a 'mite drop per day' number. A shorter interval is of course, more precise, but a longer interval can still provide valuable results. Just classifying drop levels as high, moderate or low might be enough. From this trial, we could see that over 1000 mites on a board was a different scenario to seeing just a few.

HIVE-FLOOR MONITORING DOESN'T TAKE THE SIZE OF THE COLONY INTO ACCOUNT, SO RECORDING THE NUMBER OF MITES ON THE HIVE FLOOR DOESN'T MEAN THAT MUCH, RIGHT?

A large, healthy colony could drop more mites than a small colony that has parasitic mite syndrome, simply because there are more bees. The critical thing is that hive-floor monitoring works best when counts are recorded over time, not just as a one-off.

WHAT ABOUT ALCOHOL-WASHES, OR SUGAR-SHAKES? AREN'T THESE ALSO USEFUL?

Absolutely, they are crucial. Alcohol-wash (or the related sugar-shake, or CO₂ method) provides a good indication of how infested a colony is. Imagine at the commencement of the trial, if a beekeeper found 30 mites per 300 bees in an alcohol-wash, and at the end of the trial they still found 30 mites per 300 bees. This would mean that further treatment would be needed. However, if hive-floor monitoring had also been used then the beekeeper might have foreseen this situation as it was unfolding, without having to wait until the end of treatment.

HOW MUCH TIME DOES IT TAKE TO DO HIVE-FLOOR MONITORING?

We found it took 30 seconds per hive to check a hive-floor monitoring board.

This included taking a photograph and using an app to count the mites. We could plug these values into an excel spreadsheet and work out the mite drop per day, and graph it for each hive. This time also included wiping the board clean afterwards. A beekeeper could easily use this regimen in their regular apiary visits. They do not need to even count all the mites, but just classify drop levels as high, moderate or low.

DO I NEED TO MONITOR EVERY HIVE?

Some beekeepers in our trial suggested that hobbyists would benefit from monitoring every single one of their hives using year-round hive-floor monitoring, and an alcohol-wash (or sugar-shake, or CO₂ method) at the beginning and end of treatments. For the majority of beekeepers, who have less than 10 hives, we suggest this would be a sensible and safe way to approach their beekeeping.

When it comes to monitoring hives, commercial beekeepers face a greater challenge, due to the number of hives they have. We suggest they consider using hive-floor monitoring. This does not need to be every single hive at an apiary; however, it will be a case of 'more is better'. We also recommend that commercial enterprises run a similar field trial to ours. It can provide a hands-on learning exercise and might identify areas for improvement. The results may be surprising or reassuring—both of these responses were experienced by the beekeepers in our trial.

WHAT IF I ALREADY USE HIVE-FLOOR MONITORING BOARDS?

We know that there are beekeepers who already use hive-floor monitoring

boards. We hope there is something in this article that might be of assistance. Our key suggestion is that you record the number of days since last checking the board, so you can calculate the number of mites falling per day.

WHAT ELSE CAN WE LEARN FROM YOUR TRIAL?

Some of the beekeepers in our trial noted that by sharing the experience of monitoring, and being part of a trial, they felt compelled to keep monitoring. This suggests that beekeepers benefit from working together, even in small groups, to share their data and experiences.

The beekeepers also noted that hive-floor monitoring boards provide an insight into general hive health and status, allowing them to observe brood nest size, evidence of robbing, chalkbrood, wax moth and many other facets of hive health—and all without opening the hive.

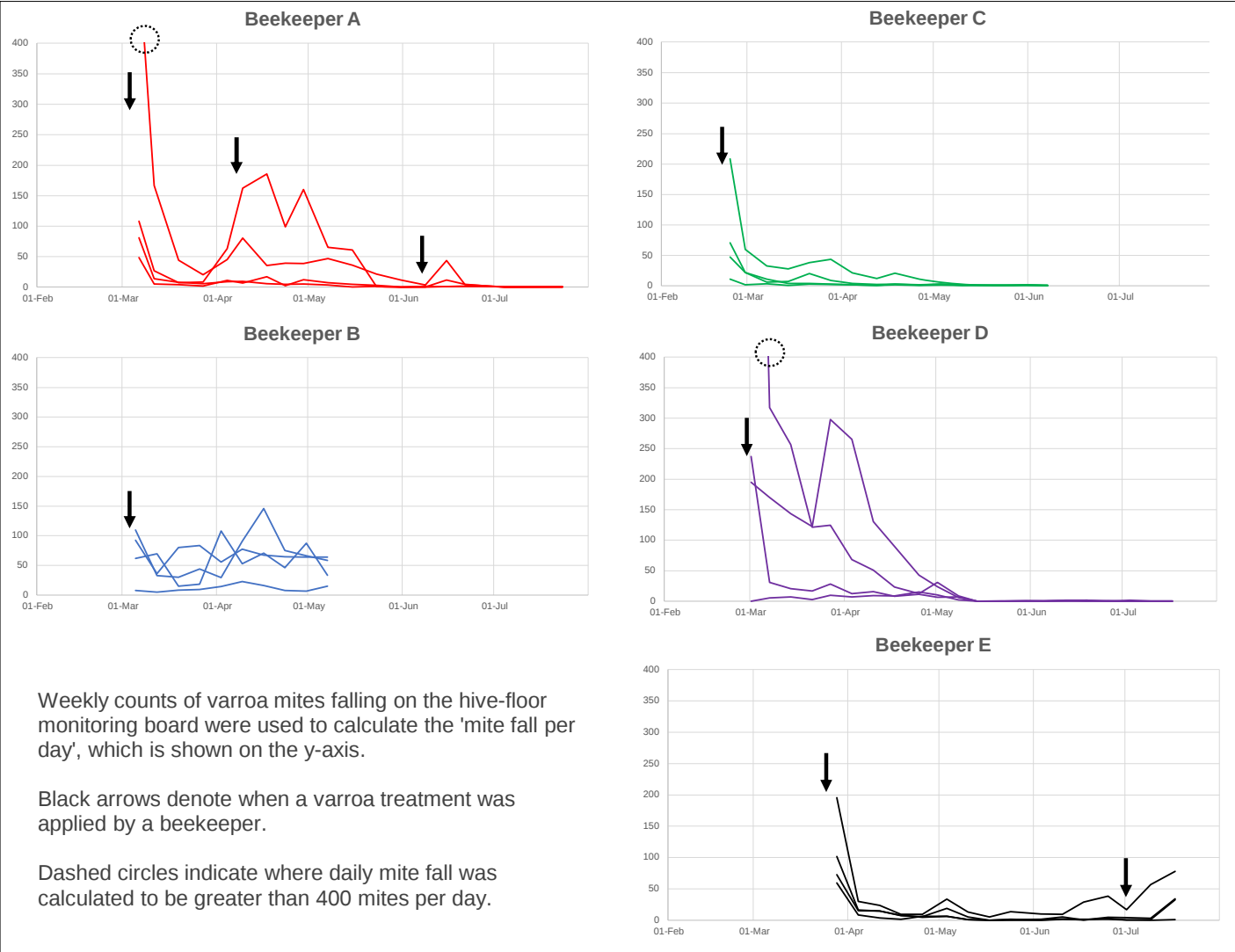
WHEN SHOULD I TAKE ACTION ON VARROA?

To stay on top of varroa, beekeepers need to be responsive to varroa levels in their hives and have multiple treatment options up their sleeve.

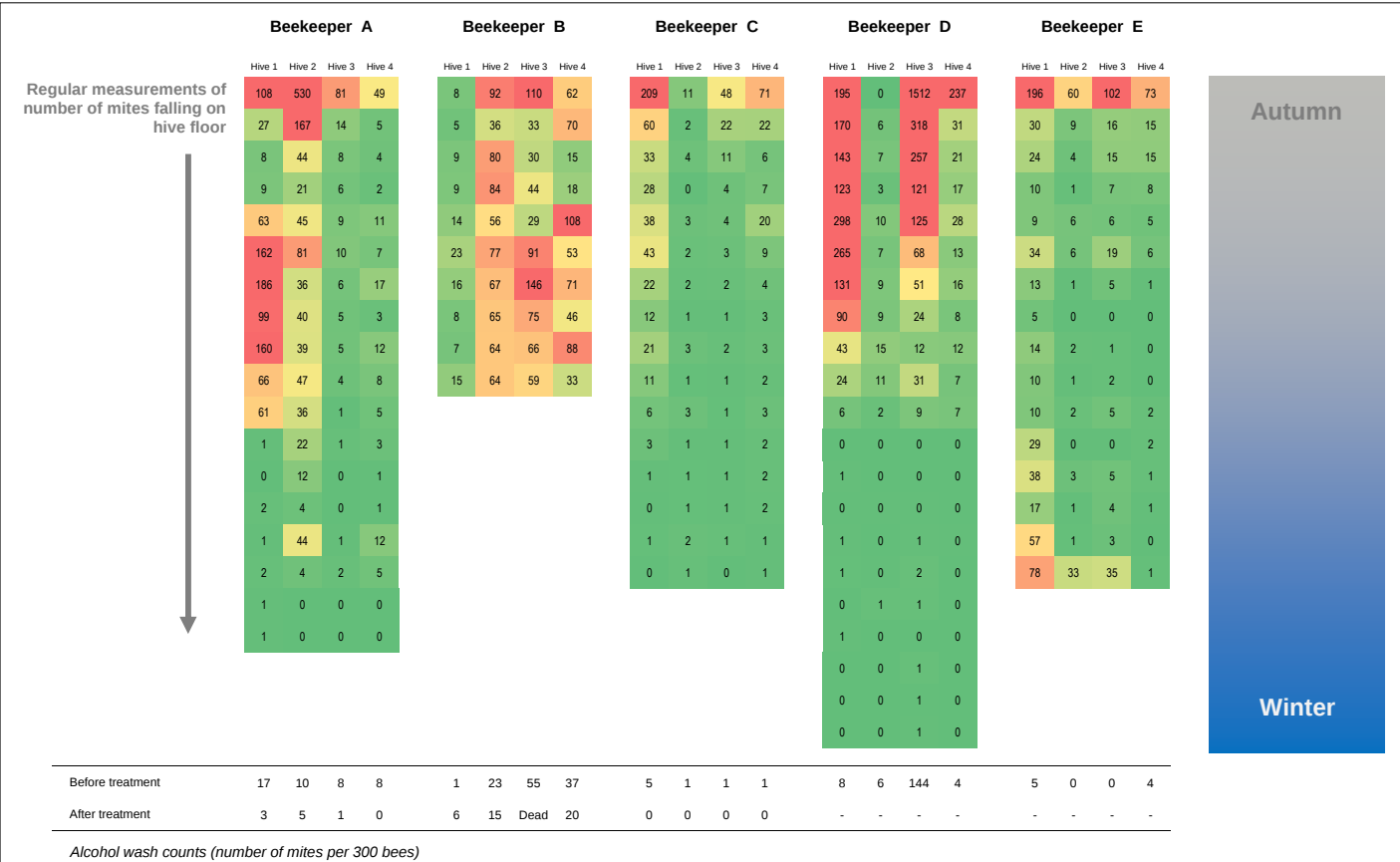
ISN'T JUST OBSERVING MITES ON BEES ENOUGH?

Visual observation of varroa mites on bees is not a precise or effective method to determine infestation. If you see a significant number of mites on your adult bees, then the infestation in the hive is likely to have already reached damaging levels. The level of infestation can only be revealed using an alcohol-wash (or equivalent method such as sugar-shake, or CO₂ method). Hive-floor monitoring will show if large numbers of varroa mites are falling at the end of treatment, or at any other time, and then beekeepers will know they need to consider additional interventions. Treatment by 'the calendar' can set a beekeeper up for failure.

We gratefully acknowledge the beekeepers involved in this field trial, who provided their varroa monitoring data, expertise and time. Our thanks to Frank Lindsay, Martin Laas, Kim Kneijber and Norbert Klose.



Varroa mite fall during autumn treatment period.



Heat plots showing the number of varroa mites falling on the hive floor during the autumn treatment period.