

## BioHeritage Webinar - Pest control perceptions: comparing pesticides with next-generation control methods'

1pm, Wednesday 23 November 2022

### Questions

1. What science are you doing and you will do to demonstrate that RNA formulations will be specific only to the target pest species, both in the lab and later in situ?  
The target specificity is a key part of our research. We want to ensure that this method of pest control is specific to Varroa and won't damage or influence populations of other species. It is encouraging that species such as Monarch butterflies don't seem to be affected by this product. Currently we are working on bumble bees to look for non-target effects in a laboratory trial. In addition, we will use and have used genomics data bases to look for other species that might have similar genes that could be affected. So far we have not found any species with the same sequence. These results so far are encouraging, but we cannot rule out the possibility that some other species might be affected (just as we cannot rule out non-target effects with any pesticide or pest-control method).
2. What regulatory oversight is there for the trial you are conducting in Ashburton?  
Yes, we have full regulatory oversight for these trials. We have worked with both the EPA (NZ Environmental Protection Authority) under the HSNO Act, and MPI (Ministry of Primary Industries) under the ACVM Act. Our trials are being conducted under their controls and will include us having to burn the honey produced by the treated beehives. We also have to have our hives fenced off by electric fences, which from personal experience hurt and are a major deterrent.
3. Are non-specific pesticides the only other choice for determining the options we have for dealing with wasps? What other emerging pest control strategies are on the horizon other than RNAi?  
There are other potential options for wasps (and for varroa mites, which we were focussing on for our talk). For wasps there are biocontrol agents that are being considered. Plant & Food Research are investigating using artificial pheromones, in order to reduce wasp mating success. Gene drive approaches are being considered for wasps. All of these technologies have benefits and risks.
4. The level of knockdown of Varroa daughters is significant, but not quite zero – do you have any data on the reduction of varroa load on a hive following treatment, and how effective is the reduction for hive health?  
We will, unfortunately, not confidently be able to knock down varroa to zero. Its a hard thing to do. And just one varroa mite left in one hive can go onto populate an entire apiary with dozens of hives.  
Your question about how effective our treatment is for varroa control, is exactly what we are conducting the trial to find out. We will know more in September next year!
5. Non target effects – do we have any indigenous mites that might be affected and need to be tested?

There are species like pseudoscorpions in bee hives. They might even be beneficial for the hives by controlling Varroa mites. We are conscious of their potential benefit and the need to examine them for off-target effects. There are issues that will make this assessment difficult, for a range of reasons including that we don't know the genomes of these animals.

6. Is the requirement to continually top up application of the RNAi treatment seen by people as a positive in terms of acceptability – you have the ability to stop treatment, compared to self-replicating/spreading treatments?

It is a treatment that is very like a pesticide: if you stop applying the dsRNA then there is no effect. It isn't self-replicating.

We see the RNAi approach as one potential tool in the toolbox for varroa control. Perhaps beekeepers could use a pesticide in spring. The bees collect and produce honey over the spring and early summer, which beekeepers then collect. After honey collection, perhaps the dsRNA could be used for mite control in the autumn. That would substantially limit dsRNA contamination of honey and have it for mite control when it is most needed.

7. Comment = Great work team

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