VARROA RESISTANCE

This brochure outlines:

- The importance of the proper use of chemical pesticide treatments in varroa control;
- Strategies to slow down resistance; and
- Methods to determine whether resistance has developed.

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Pesticide resistance occurs when a pest becomes more and more able to withstand the pesticide being used. This means that, that the pesticide no longer kills varroa mites effectively.

Varroa mites can build up resistance to pesticide chemicals and misuse can speed this process.

Overseas, varroa mites have developed resistance to all the pesticides that are used to kill varroa mites in New Zealand. To avoid major losses of beehives it is important to slow the development of pesticide resistance in New Zealand and detect it quickly when it occurs.

Slowing resistance can be accomplished by the proper use of pesticides:

- **Only use products approved for varroa control in New Zealand.**
- **Follow the instructions on the label fully.**
- **Only use the pesticide when needed.**
- **Use the recommended concentration of pesticide** so that varroa mites are not exposed to low concentrations. Low concentrations can build up resistance.
- **Remove the pesticide when recommended**, so varroa mites are not exposed to low concentrations of the chemical. A useful tip is to mark the hive with the date of application and the number of strips. This way it is obvious when all the strips need to be removed.
- **Do not re-use strips.**
- **Do not rely on just one pesticide.** Varroa mites that develop resistance to Apistan® are often automatically also resistant to Bayvarol® (cross-resistance). Alternate pesticides that are from different chemical classes to reduce the chance of resistance, e.g. use of Apivar® in the spring and Apistan® /Bayvarol® in the autumn, rather than alternating between Apistan® and Bayvarol® (which are from the same chemical class). The Apistan® / Bayvarol® treatment will kill any Apivar®-resistant varroa mites and the next Apivar® treatment will kill any varroa mites that have become resistant to Apistan®/Bayvarol®. Eventually, varroa mites may develop resistance to both Apivar® and Apistan®/Bayvarol®. However, this will hopefully take a long time.
- **Encourage other beekeepers to use techniques that will delay resistance**. Resistant varroa mites from other beekeepers will eventually find their way into your hives.

Suspect resistance if you still see varroa mites or symptoms of parasitic mite syndrome in a hive immediately after the hive has been treated with Apistan®, Bayvarol®, or Apivar® for the recommended time.

To determine the number of varroa mites still in the hive, carry out a sugar shake.

Sugar shake

Steps:

1. Collect about 300 bees in a 500-ml jar (about one-third full) and add about 1 dessertspoon of icing sugar to the bees by rubbing it through a mesh lid (2mm holes))

2. Gently roll the jar of bees for about 10 seconds, ensuring each bee is coated with icing sugar.

3. Turn the jar upside down and vigorously shake the jar above a white tray. The varroa mites and sugar should pass through the mesh, but the bees will remain in the jar.

If there are more than five varroa mites or if you can't carry out a sugar shake but still suspect resistance, contact the person who sold you the strips. However, it may take some time for an investigation to happen.

Resistance testing

This can be done yourself in a couple of days using a sticky board test or a jar test.

The sticky board test is done by placing a sticky board in the hive and a new set of strips which you think varroa mites are resistant. After 24 hours, remove the board and strips and replace them with a new board and a different brand of strips for another 24 hours. If there are twice as many varroa mites using the different product, then you may have resistance.

The jar test is carried out with the same jar and mesh lid as used for the sugar shake. Staple a small piece of a new strip 9 mm x 12.5 mm of the same brand you think the varroa might be resist to, to the top centre of a 150 mm x 100 mm index card or similar.

Steps:

1. Place about 300 bees in the jar (about one-third full) and a sugar cube to keep them alive.

2. Place the cardboard and piece of strip in the jar so the cardboard curls around the inner wall of the jar with the piece of the strip facing into the centre of the jar.

3. Place the wire mesh lid over the jar to stop the bees from escaping. The holes in the mesh should be large enough to let varroa mites through easily.

3. Place the jar in a warm room in the dark for 24 hours. After 24 hours, invert the jar above a piece of white paper and hit the bottom of the jar with the palm of your hand until no more varroa mites fall out.

4. Count the number of varroa mites. This is the 'initial kill' figure.

5. Place the jar of bees in the freezer to kill them.

6. Remove the cardboard and fill the jar half-way with methylated spirits. Be careful not to inhale the fumes

7. Remove the mesh lid and replace with the original solid lid for the jar, then shake the jar vigorously for five minutes.

8.Replace the solid lid with the mesh lid to keep the bees in the jar.

9.Pour the methylated spirits though a funnel lined with a paper towel. Refill the jar with methylated spirits

10. Swirl the bees around and tip the spirits into the paper towel again.

11. Remove the paper towel and count the number of varroa mites

If there is less than a total of 50 varroa mites you will need to repeat the test until there are more than 50 varroa mites recorded.

To calculate the percentage of varroa mites killed, divide the number of varroa mites that fell on the white paper before the bees were placed in the freezer by the total number of varroa mites recovered (both on the white paper and on the paper towel). Multiply this number by 100 to get the % of varroa mites killed by the strip.

$$\% = \frac{\text{initial kill}}{\text{(initial + final kill)}} \times 100$$

If fewer than 50% of the varroa mites were killed by the varroa control product, the varroa mites may be resistant and should be tested with a more sensitive laboratory test. Contact the person who sold the strips.

If your colony has parasitic mite syndrome-like symptoms (below and you do not find any varroa mites when you test the hives, it might be European Foulbrood (EFB). EFB has similar symptoms to Parasitic Mite Syndrome and is not thought to be in New Zealand. In this case, you should contact the MAF Exotic disease Hotline (Phone 0800 809 966).