

Factsheet #222

VARROA MITE DETECTION METHODS

Effective mite control is dependent on frequent and reliable mite detection. Varroa mites spread rapidly between hives and bee yards due to drifting, robbing and hive movement. Mite levels rise rapidly in late summer and early fall. When an area is heavily infested, individual colony infestations can grow from being undetectable to life-threatening levels within a few months.

It is important to monitor mite levels by sampling all or most colonies on a regular basis. Larger beekeepers should sample at least 10% of the colonies in each yard in the spring and the fall. Unusually large or small colonies and those at the end of rows should be tested.

How Often To Monitor

Early detection offers the best opportunity for effective Varroa control. Frequency of colony testing is as follows:

1. twice per year (spring and fall) - when mites are not thought to be around;
2. every two months (excluding winter) - when mites are known to be around.

There are different detection methods available, some more sensitive than others. Some methods require a mathematical conversion to estimate the actual number of mites in a colony. A colony's mite load will indicate the treatment necessary.

The following are a number of detection methods to choose from:

Sampling Brood

Up to 85% of the mites in a colony are in capped brood cells and not visually detectable. Varroa mites are more attracted to drone brood than worker brood, so look there first. Sample about 100 cells. Locate a patch of drone cells in the purple-eye pupal stage. Slide the prongs of a de-capping fork along the comb face and into the protruding drone cappings. Pry upward and remove the pupae. Carefully examine the bodies and the interior of the cells for mites.



Detection Boards

Boards are available commercially or can be prepared by beekeepers. The commercial boards are covered with a sticky film and require a screen (8-gauge) to prevent bee entanglement.

For home-made preparations, white sheets of paper, cardboard or corrugated plastic (eg. Tenplast) can be cut to cover most of the hive bottom surface (40 x 30 cm / 16 x 12 in). One side of the board surface should be covered with a 1:1 mixture of cooking oil and petroleum jelly, or the surface can be sprayed with a thin coating of PAM vegetable oil. A cover screen is not required. Boards must be cleaned thoroughly before reusing them to prevent mite transfer.

Install the sticky board for 24 hours only. When the board is left longer, the accumulation of debris makes mite counting difficult.

Apistan strips (10% fluvalinate)

Apistan is applied in plastic strips and is a contact miticide. It does not affect mites developing in capped (bee) brood cells.

The use of Apistan strips in combination with a sticky board for 24 hours has proven very effective in determining the level of mite infestation. For detection purposes, use recommendations below under "CheckMite+".

***Note:** Mite resistance to Apistan (fluvalinate) has been observed in a few areas of British Columbia. In such areas, the use of Apistan for detection and treatment purposes may not be as effective as before. Please check with your Apiary Inspector or the Apiculture Office.*

CheckMite+ (Coumaphos)

Coumaphos is applied in plastic strips under the trade name CheckMite+. Coumaphos does not kill mites in sealed brood cells. When there is no brood in the colony, the mite count on a sticky board will accurately reflect the colony's infestation level. When brood is present, as much as 85% of the mite population is hidden under the capped brood cells.

For detection purposes, use one CheckMite+ or Apistan strip per nucleus or two strips for a standard two-supered hive, where the strips are placed between frames in the central brood area. Daytime temperatures should be 10 degrees C or higher. Strips and sticky board should be removed after 24 hours. For treatment purposes, follow label instructions.

Mite Level Determination: Multiply the number of mites on a board by 6.

***Note:** CheckMite+ or Apistan strips used only for detection purposes can be re-used 10 times for 24-hour tests before disposing of them. Make sure that the strips are not exposed to sunlight. When not in use, store in marked container in a cool, dry and dark place.*

***Note:** With the development of mite resistance to Apistan and CheckMite+ in some parts of the province, it is important to determine the efficacy of these products. For efficacy testing, refer to **Factsheet #223**.*

Formic Acid

Formic acid is used to control both Varroa and tracheal mites. Several application methods have been developed. It is important to recognize the variability in effectiveness of this product because of factors such as colony size, weather, condition and behavior of the colony, etc. Notwithstanding its variability, formic acid has been recommended for use as a component of overall mite control strategy.

For detection purposes, apply 40 ml (1.5 oz) of 65% concentration formic acid liquid onto several layers of paper table napkins placed on the top bars of an upper brood chamber. Install a sticky board and check after 24 hrs.

Note: Do not apply Coumaphos, Apistan, formic acid or other chemicals to a hive for detection purposes when honey supers are in place. Use the Alcohol Wash, Ether Roll or Icing Sugar Roll method instead.

Mite Level Determination: Multiply the number of mites on a board by 6.

Alcohol Wash Method

This method is simple, quick and quite accurate when applied to a larger number of colonies in the apiary. Test is carried out as follows:

- Use a wide-mouth glass jar and scoop about 300 bees (~ 1 cup) from the brood area. Make sure that the queen is NOT included!
- Add 50 ml (~ 2 oz) of windshield wiper fluid (or diluted methyl hydrate, or rubbing alcohol) to the jar and shake vigorously for several minutes.
- Remove lid and pour contents into a container covered with light metal wire-mesh screen (8 mesh/in). Repeat.
- Pour alcohol solution into a second container covered with cheesecloth or fine sieve. Count number of mites.

Mite Level Determination:

No Brood: Multiply by 100 to estimate the total Varroa mite population.

Plenty of Brood: Multiply by 600.

Ether Roll

This test is simple but less accurate than the Alcohol Wash method because it is more difficult to obtain an accurate count of the number of mites in the sample.

- Select a brood frame with plenty of adult bees, and preferably with drone brood. Make sure the queen is NOT on the frame!
- Gently scrape 150-300 young bees from the frame using a wide-mouth jar.
- Apply a 2-second burst of ether (automotive starter fluid) into the jar, replace the top and shake vigorously for 30 seconds.
- Gradually rotate the jar horizontally and look for any mites sticking to the sides. Normally, the ether causes the bees to regurgitate, making the sides sticky. If not, add a bit of syrup or water.

Because the Ether Roll technique samples only a portion of the adults in a hive, the total mite population in the colony must be calculated. In early spring, when a colony occupies one standard

deep box, there are approximately 15,000 bees in the hive. A sample of 150 bees represents only 1% of the population.

Mite Level Determination:

No Brood: Multiply by 100 to estimate the total Varroa mite population.

Plenty of Brood: Multiply by 600.

Icing Sugar Method

Instead of Ether Roll where all the bees are killed, icing sugar can be used.

Procedure is as follows:

- Collect a lightly packed cup of bees (about 300 bees) from a frame of uncapped brood.
- Quickly place bees into a wide-mouth jar, fitted with a 1/8th wire mesh screen lid.
- Place two heaping tablespoons of sugar powder through the screen.
- Shake jar thoroughly, tip it and shake five times like a salt shaker.
- Dump the sugar containing the mites on a white flat surface.
- Repeat the above two steps until virtually no more sugar shakes out.
- Count the mites.

Mite Level Determination: When 5 mites or more are counted, treat the colonies.

When to Treat?

After determining an estimate of the total number of mites in a colony, it must be decided if and when to treat. In the spring, before honey supers are in place, or in the fall when honey supers have been removed, **treat when 15 mites or more are counted.**

When honey supers are in place, use the following guidelines:

<u># Mites/Col.</u>	<u>Recommendation</u>
less than 100	. not an immediate problem . treat in September and October, after honey removal . continue to monitor bimonthly
100-999	. mite infestation will have an economic impact . treat as soon as possible after removing honey; start in August, even if some crop potential is lost (winter bee population must be protected) . continue to monitor bimonthly
1000 +	. colony collapse imminent . remove supers and treat immediately . treat again in October

For more information on Varroa Control Methods, refer to **Factsheet #221.**