Varroa Mite Detection Methods

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

It is important to monitor mite levels regularly by sampling all or most colonies. 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

The Varroa mite have become an endemic pest in British Columbia. Its high virulence demands frequent monitoring throughout the beekeeping season. It is recommended to start with an early spring mite test, followed by a test every 3-4 weeks.

There are different detection methods available, some more sensitive than others. High-sensitivity tests are labor intensive and more costly, while less sensitive tests may be quicker to apply and cheaper. To compensate for lower accuracy, these tests can be applied more frequently. To optimize the value of the test methodology chosen, it is recommended to,

- **To ensure consistency of test results, use the same testing method through the entire season.**
- **Keep a record of each test result. While the actual number of counted mites is important, equally important is to observe any trend of mite numbers which may project future population rises.**

Common detection methods and required equipment include:

- Drone Brood sampling – decapping fork.
- Alcohol Wash Method – windshield wiper fluid, sieve, bucket, cheese cloth
- Icing Sugar Method 1 – Icing sugar, sticky board
- Icing Sugar Method 2 – Icing sugar, screened containers.
- 24-hour Strip / Sticky Board Method

Sticky Boards

Some detection tests require the use of Sticky Boards that are commercially available or can be easily prepared by the beekeeper:

Commercial Boards: Commercial sticky boards are covered with a super sticky film of "Tanglefoot". These boards require the installation of a 8-gauge screen on top of the sticky surface to prevent bees getting stuck.

Home-made Boards: white sheet of thick paper, cardboard or corrugated plastic (eg. Tenplast), cut to cover most of the hive bottom surface (40 x 30 cm / 16 x 12 in). Spray one side of the board with a thin coating of PAM vegetable oil, or apply a coating of a 1:1 mixture of cooking oil and petroleum jelly. No cover screen is required.

Install the sticky board for 24 hours only. When left longer, debris will make it difficult to count mites. After mites have been counted, wipe the board clean with a squeegee.

Note: Sticky boards are recommended for use in combination with any of the miticide strips or formic acid. The installation of a sticky board by itself relies on natural mite drop which doesn't offer an accurate measure of mite infestation levels.

Drone Brood Sampling Method

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.

This method is easy to apply frequently but only offers an approximate indication of low or high mite levels.

Alcohol Wash Method

This method is simple, quick and quite accurate when applied to a larger number of colonies in the apiary. It doesn't require a second visit after 24 hours. The 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 for several minutes.
- Remove the lid and pour contents into a container covered with light metal wire-mesh screen (8 mesh/in) or a coarse sieve. Repeat.
- Pour alcohol solution into a second container covered with cheesecloth or fine sieve. Count number of mites.

Mite Level Determination:

With a bee sample size of 300, every three mites count for 1% infestation increase. At nine (9) mites, infestation level is 3% when colony damage can be expected. At 15 mites (5% infestation level) immediate treatment is recommended.

Icing Sugar Method (1)

This is a very easy, quick and cheap method to detect mites and determine level of infestation.

- Install sticky board on the bottom board.
- Sprinkle a cupful of icing sugar at the top of spaces between brood frames of the single box colonies, or onto the second brood chamber of two boxed colonies. Colonies with honey supers, remove honey supers, apply icing sugar to the top of the second brood chamber, and reinstall honey supers.
- Remove sticky board after 24 hours.

Icing Sugar Method (2)

This mite testing method is the same as the Alcohol Wash Method except Icing Sugar is used instead of alcohol.

- Collect approximately 300 bees in a jar. Add about 100 ml of icing sugar.
- Gently shake the container with bees for about 2 minutes.
- Pour contents over a sieve that allows the icing sugar and mites to pass through but not the bees.
- Spread the mite-containing icing sugar on a flat dark surface and count mites.

"24-Hour Strip & Sticky Board" Method

This testing method offers the highest level of accuracy in determining Varroa mite infestation levels in the colony. It requires the use of one of the three registered strip formulations for 24 hours in combination with a sticky board. For details about the three strip formulations, see below.

To determine mite levels, install one 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: Same as Alcohol Wash Method.

Note: *Strips that are only used for detection purposes may be re-used 10 times for 24-hour tests before disposal. Make sure that the strips are not exposed to sunlight. When not in use, store in a marked container in a cool, dry and dark place.*

Note: *The development of mite resistance to Apistan and CheckMite+ in parts of the province, has made it important to determine the efficacy of these products. For efficacy testing, refer to* ***Bulletin #223.***

- **Apivar strips (Amitraz)**

  Amitraz is the active ingredient of Apivar, a plastic strip formulation applied to the colony. Apivar strips are specifically formulated for use in beehives as it is wax-soluble, reducing the risk of residues. Apivar strips should not be substituted with other amitraz formulations used in livestock production to control ticks and fleas because they are water soluble.

- **Apistan strips (10% fluvalinate)**

  Fluvalinate is a contact miticide and is applied in plastic strips under the trade name Apistan. It does not affect mites developing in capped (bee) brood cells. In some parts of British Columbia, Varroa mites have developed resistance to Apistan. Apistan may not provide the same accuracy of determining mite infestation levels compared to other strip formulations. To determine efficacy of Apistan, repeat 24 hour test with Apivar or CheckMite+ and examine sticky board for additional mite drops.

- **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.

Formic Acid

Formic acid is used to control both Varroa and tracheal mites. Several application methods have been developed. It is important to remember that efficacy of formic acid is influenced by colony size, weather, condition and behavior of the colony, etc. Notwithstanding its variable efficacy, formic acid is recommended as part of an overall mite control strategy.

For detection purposes, apply 40 ml (1.5 oz) of 65% formic acid liquid onto several layers of paper towels placed on the top bars of the upper brood chamber. Use enough paper towels to prevent acid from dripping. Install a sticky board and check after 24 hrs.

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

Note: *There are various application methods, including soak-pads (used in packaged meats) or formic acid dispensers such MiteGone and Neissenheider. All methods involve the evaporation of formic acid.*

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

When to Treat?

After determining the estimated mite infestation level, one must decide when to treat. In general, treatment should be applied **when 10-15 mites or more are counted**.

Full-length treatments can be applied in the spring and fall but may be difficult when honey supers are in place. When mite controls must be applied during the honey season, remove honey supers and treat the colony with formic acid for 24 hours with sticky board, and then reinstall honey supers. Repeat one week or two weeks later.

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

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