



Atlantic Tech Transfer Team
for Apiculture



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Summer Disease and Pest Monitoring in Honey Bees

Summer, for beekeepers, represents the interval between spring and fall treatment for pests and diseases. The labels of chemical treatment products require a withdrawal period of usage prior to extraction of honey, so the summer months offer an opportunity to monitor levels of pests and diseases.

European Foulbrood

European foulbrood (EFB) is a brood disease caused by the bacteria *Melissococcus plutonius*. Unlike its cousin American foulbrood (AFB) – caused by the bacteria *Paenibacillus larvae* – EFB appears in weak colonies or during times of stress (e.g. seasonally poor forage availability, transportation stress, etc.). Symptoms of EFB are typically prevalent in the spring and subside at the onset of a good nectar flow but can return when food resources become scarcer later in the summer.



Healthy uncapped brood.

EFB infects brood in its larval stage (i.e. uncapped brood). The appearance of spotty brood pattern is commonly seen with infections of EFB but can be indicative of several other in-hive stressors. Typical symptoms of EFB include:

- Dead, coiled, twisted, rubbery larvae
- Larvae discoloured - dull yellow to brown
- Dead larvae not adhering to cell walls
- Dry dark brown scales on cell walls easily removed (unlike scales of AFB)
- Tracheal tubes often visible in dead larvae



Larvae displaying symptoms of EFB (from www.beeinformed.org)



Funders and Contributors:

Bleuets NB Blueberries

Nova Scotia Beekeepers' Association

Prince Edward Island Wild Blueberry Growers Association

Oxford Frozen Foods

New Brunswick Beekeepers Association Inc.

Wild Blueberry Producers' Association of Nova Scotia

PEI Beekeepers' Association

Jasper Wyman and Son

Toothpick Test

This test is typically used as a diagnostic tool for AFB and so is useful to determine whether a colony is infected with EFB or AFB. Immerse a toothpick into an infected larval cell and stir its contents until the infected larva becomes liquefied. Slowly draw back the toothpick. A larva infected with AFB will produce a coffee-coloured rope or string attached to the toothpick that can extend to approximately 2.5 cm. A larva infected with EFB may produce a rope, however it will be much shorter than 2.5 cm and lighter coloured.

Varroa Mites

Populations of varroa mites should be monitored at least twice a year: in the spring and late-summer. Economic thresholds (i.e. level of mite infestation reached at which chemical treatment is warranted) can be quantified to assess whether it is appropriate to treat for mites. In addition, one sampling event should take place mid-summer to monitor for possible post-treatment introductions of mites from drifting bees. There are several methods to do this; the first two require a 300 bee sample.

Note: it is critical to isolate the queen before collecting samples.

Taking a 300 Bee Sample

Bees used for varroa mite sampling should be taken from the centre frames in the hive containing the most brood. These bees are young housekeeping adult bees and are the most likely to have adult varroa mites in their phoretic stage parasitizing them. This area within the hive is also the most likely location of the queen; so it is important to either isolate her or choose a frame she is not on.

Remove one of these central frames from the hive and shake the bees off the frame into a rectangular dishpan. Gently tap the bees that were shaken into the tub into one corner to more easily scoop them up and prevent them from flying away. Use a ½ cup measure (for baking) to scoop a sample of bees out of the tub. Place the bees into a sample jar and immediately screw the lid on. Pour the remainder of the bees back into the hive and replace the frame to its original location in the hive.



Using a dishpan and measuring cup to take a 300 bee sample (from www.scientific-beekeeping.com).

1. Ether Roll

This method involves collecting a sample of 300 young housekeeping adult bees (see Taking Sample of 300 Bees above) in a 500 g glass jar. After collecting the bees in the jar spray them with ether (i.e. engine starter fluid) until they are damp. Immediately replace the lid of the jar and gently swish the bees around in the jar for one minute. Mark a line with a marker on the jar for orientation and slowly rotate the jar on its side one full revolution to count the varroa mites that stick to the side, bottom, and lid of the jar. Divide the number of mites counted by three to assess whether the economic threshold has been reached.

Economic threshold:

May: 1 mite/ 100 bees
August: 2 mites/ 100 bees

Pros:

- Results available immediately in apiary
- Equipment (i.e. jar, ether) available at many stores; trip to beekeeping supply store not necessary

Cons:

- Kills sample bees
- Ether scent agitates the bees

2. Alcohol Wash

This method uses Bee Shaker 500 g sampling jars available from the local beekeeping supply store (or perhaps create them yourself). Two jars are connected via one lid separated by mesh large enough to allow mites to pass through yet small enough to stop bees from transferring between the two jars (i.e. #8 mesh screen).



Performing an alcohol wash with a Bee Shaker sample jar.

Collect a sample of 300 bees into one of the sampling jars and add 70% isopropyl alcohol or winter windshield washer fluid until the bees are fully immersed. Attach the two sampling jars together via their shared lid and shake the bees for two minutes. After shaking, orient the jars vertically to let the alcohol and dislodged mites flow into the bottom jar while the bees remain in the upper jar. Count the number of mites that flowed into the bottom jar. Divide the number of mites counted by three to assess whether the economic threshold has been reached.

Economic threshold:

May: 2 mites/ 100 bees
August: 3 mites/ 100 bees

Pros:

- Samples can be stored and shaken at a later time or immediately in the field.
- Only one trip to the bee yard is needed.

Cons:

- More time consuming than ether wash
- Requires special sampling jars
- Kills sample bees

3. Sticky Board

This particular monitoring method is special in that it doubles as a physical (i.e. non-chemical) treatment method for varroa mites. Sticky boards are commercially available at beekeeping supply stores or online but can be constructed with household materials. To construct and use a sticky board, follow these steps:

1. Open a standard letter file folder and draw a grid on it to facilitate the counting process.
2. Coat one side of the opened folder with commercially available insect adhesive or petroleum jelly which is less expensive and more readily available commercially. (Lunch-style trays are handy to transport sticky boards around and saran wrap to protect the adhesive surface).
3. Place the sticky board directly beneath the brood chamber, ideally underneath the mesh of a screened bottom board. (If a screened bottom board is not available, place a piece of hardware cloth or wire mesh overtop of the sticky board).
4. Leave the sticky board in the hive for 24 – 72 hours (ideally 72 hours) before removing it to count the mites stuck to it. (Mites in their phoretic stage naturally fall off their bee hosts and fall down to the bottom of the hive).
5. Divide the number of mites counted by three to deter-

mine how many fell on average per 24 hour period when determining the economic threshold.

Economic threshold:

May: 9 mites/ 24 hour drop
August: 12 mites/ 24 hour drop

Pros:

- Mites can be counted at later convenience.
- Samples entire brood nest.
- Does not kill bees.

Cons:

- Two trips to bee yard are needed.
- Boards cannot be reused.

Economic thresholds in this fact sheet are derived from OMAFRA recommendations.

Resources:

Medhat, Nasr. Recommendations for Management of Honey Bee Diseases and Pests in Alberta 2014-2015.

<http://www.omafra.gov.on.ca/english/food/inspection/bees/varroa-sampling.htm>

Kempers, Melanie, Devan Rawn, and Brian Lacey. "Monitoring: Detection & Assessment of Honey Bee Pests and Diseases." Integrated Pest Management for Beekeeping in Ontario. By Les Eccles. Ontario Beekeepers Association.

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