

Factsheet #203

NOSEMA

General Description

Nosema disease only affects adult honey bees, by parasitizing the cell wall of the midgut. As a result, infected bees have difficulty with absorbing nutrients from ingested food, resulting in weakness and shortened life expectancy.

Field Diagnosis

- Nosema disease is caused by a spore-forming microsporidian fungus of the genus *Nosema*. Most *Nosema* species are common insect parasites. Two species parasitize honey bees: *Nosema apis* and *Nosema ceranae*.
- *N. apis* has been considered an endemic parasite of the European honey bee in North America. *N. ceranae*, a natural parasite of the Asiatic honey bee *Apis ceranae*, has recently been found to also infect the European honey bee.
- Recent surveys show that both species infect honey bees in British Columbia.
- Nosema incidence in honey bee colonies peaks in early spring.
- Infected adult bees suffer from diarrhea and fail to control their fecal discharge. The infection impairs the digestive process and may lead to bee starvation.
- Beekeepers often fail to detect the disease because affected bees are inside the colony (during winter) or in the field, where they die.
- In heavy infestations, the outside walls of the hives are smeared with fecal deposits.
- Nosema is often confused with dysentery caused by a virus which produces similar symptoms.
- The midgut removal test for visual examination, based on degree of discolouration, has been reported unreliable. The range of discolouration of midguts of infected bees *versus* non-infected bees was not distinguishable enough to allow for identification.

Laboratory Diagnosis

For Nosema detection, adult bees are examined microscopically or through PCR testing¹.

Standard microscopic detection method:

- Place 25 dead bees in mortar. Add 1 ml of water for every bee.
- Grind up, collect one droplet of solution and place on slide. Apply cover slip.
- Examine slide under 100X power of compound microscope.
- Nosema spores are large, oblong and highly uniform in shape.

To determine the level of infestation, a haemocytometer can be used to calculate the number of spores per adult bee (for counting method, see **Factsheet #203A**).

To submit a sample for Nosema identification, collect at least 25 adult bees in tissue paper or paper bag (no plastic), freeze for 24-48 hours, and mail to the Apiculture office.

Control and Treatment

Nosema disease mostly occurs when bees have been confined to the hive for a long time, and when there is moisture build up and poor air circulation in the hive.

The antibiotic fumagillin (trade name Fumagilin-B) offers a very effective control of the Nosema disease.

The product is applied as follows:

¹ **PCR = Polymerase Chain Reaction.** This test method identifies organisms by comparing a section of gene material of the test organism with a comparable piece of known composition. The technique was developed and introduced in the 1990s and has become standard procedure in forensics, medicine and a wide range of disciplines.

- **Dosage:** 5 ml (=1 teaspoon) per treatment per colony.
- **Timing:** One treatment in fall and one treatment in spring.
- **Application Method:** Applied in syrup only, 5 ml dissolved in 4.5 litres of sugar syrup per colony. Fumagillin does not dissolve readily in water. To prepare, gradually add small amounts of warm water (not HOT) to the fumagillin, while stirring, in order to prevent clumping. Shortly before use, add antibiotic solution to syrup. Keep medicated syrup away from sunlight.

The best natural defense is a strong healthy colony with a prolific queen and sufficient food stores, especially pollen.

Higher Nosema incidence has often been reported with tracheal mite infestations.