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 to absorb 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* is a natural parasite of the Asiatic honey bee *Apis ceran*ae, and has been found to infect European honey bees in North America since early 2000s.
- Both Nosema species have been confirmed in British Columbia.
- Nosema incidence in honeybee colonies peaks in early spring.
- Infected adult bees suffer from diarrhea. 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 (viral) dysentery which produces similar symptoms.

Laboratory Diagnosis

- For Nosema detection, adult bees are examined microscopically or through PCR testing[1].
- Standard microscopic detection method allows for confirming Nosema and determination of the level of infestation. The diagnoses involves:
  - Maceration of 25-50 adult bees suspended in water.
  - A droplet of the solution is placed on the etched surface of a haemacytometer.
  - At 400x magnification, the number of spores per square allows for the calculation of the number of spores per bee.
- For further information about determining the level of Nosema infestation, refer **Factsheet #203A – Counting Method of Nosema Spores**).
- To submit a sample for Nosema identification, collect 50 – 100 fresh adult bees in tissue paper or paper bag (~**no plastic**), freeze for several days, and mail to the Apiculture office.

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[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 other disciplines.

Control and Treatment
- Nosema disease mostly occurs at the end of winter, after the bees have been confined for a long time with moisture build up and poor air circulation.
- Successful treatment involves antibiotic application to the colony and cleaning of hive equipment.
- **Treatment:**
  - The antibiotic fumagillin (Fumagillin-B, Fumadil B) offers effective control.
  - Do **not** feed antibiotic to the colony unless Nosema disease has been confirmed.
  - Application method is as follows:
    - **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, add small amounts of warm water (not HOT) to 5 ml fumagillin and stir into a paste. Add water gradually and mix into sugar syrup. Mixture can be prepared a day before use. Shake container occasionally.
  - The best natural defense against Nosema disease is a strong healthy colony with a prolific queen and sufficient food stores, especially pollen, in a well-ventilated hive body.
- **Beehive Equipment**
  - Boxes, inner covers and bottom boards must be scrubbed clean inside and out with hot water and soap. Scrape top and bottom bars.
  - Equipment can also be sterilized through irradiation at the Iotron facility in Port Coquitlam (www.iotron.com).

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