

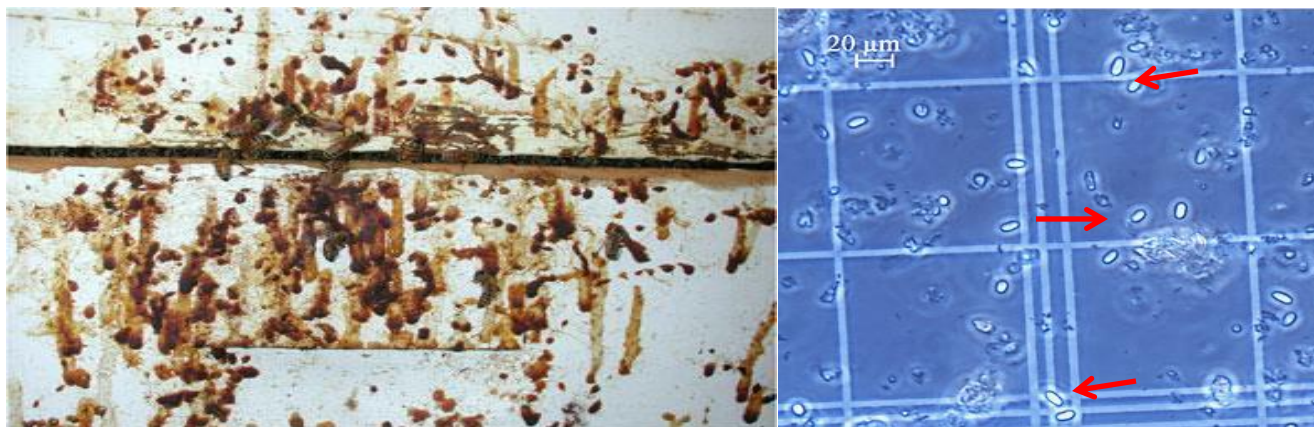
NOSEMA (*N. apis*, *N. ceranae*)

Description

The Nosema's, *N. apis* and *N. ceranae*, are microsporidian parasites (type of spore forming fungus) that affect honey bee adults – workers, drones and the queen. Nosema is mainly introduced and spread by worker bees through drifting, robbing, swarms, packages, infected comb, infected equipment, and re-queening. Spores are transmitted when mixed with pollen or bee bread, nectar or diluted honey, and then fed to larvae. Transmission of spores can also occur via water collection and grooming. The ID₅₀ (infectious dose that infects 50% of population) is 390 spores for *N. apis* and 85 spores for *N. ceranae*, so it takes very little contact for contamination to occur and a mixed infection with both pathogens is commonly observed. Once transmitted, Nosema spores, replicate in the midgut, then inflame the digestive tract causing diarrhea and constipation given obstruction of the area. A severe infection may result in colony death and permit infectious transmission since spores can remain viable in feces (frass), honey, wax and dead bees.

Signs and Symptoms

- Decline in and small overall worker population, reduced adult bee lifespan, poor winter survival
- Increase in foraging worker death, ultimately leading to colony collapse
- Decline in and small brood area, reduced brood production
- Decrease in and poor nectar/honey/pollen/bee bread collection and storage
- Increase in food consumption, decrease in trophallaxis (bee to bee feeding)
- Queen issues due to infertility, re-queening via supersedure
- Dysentery (feces/frass) in/around entrance(s) of hive, on top board, bottom board, and frames



Think You May Have Nosema?

Contact the MDAR Apiary Program Team to schedule an [Inspection](#). Nosema infected colonies can be treated with the antimicrobial agent, *Fumagilin-B* (fumagillin), if available given recent discontinuation from manufacturer. Sanitary beekeeping practices such as routine queen and comb replacement is recommended. If infection is confirmed, disinfect hive boxes and materials using vinegar, bleach (10% solution), and by freezing. Frames should either be discarded or disinfected through exposure to sunlight (UV light), freezing, or heating to eliminate spores. Mild infections may clear up with a good nectar flow or through supplemental feed. After treatment and sanitation, submit another sample of workers to the [USDA Beltsville Bee Lab](#) for analysis. The Economic Threshold (level at which to treat) is 1 million spores for Nosema.

References

1. Bee Informed Partnership. Nosema. April 27, 2011. <https://beeinformed.org/2011/04/27/nosema-2/>. Assessed June 15, 2018.
2. Huang, Z. Effects of Nosema on honey bee behavior and physiology. February 20, 2012. <http://articles.extension.org/pages/60674/effects-of-nosema-on-honey-bee-behavior-and-physiology>. eXtension. Assessed June 15, 2018.
3. Vidal-Naquet, N. 2015. Honeybee Veterinary Medicine: Apis mellifera L., 1st edition. 5m Publishing, United Kingdom. 260pp.