

Nosema: An existent problem

Two different types of Nosema are affecting the European Honey Bee: **Nosema apis** and **Nosema ceranae**. Nosema apis has been found in hives since the beginning of the twentieth century but Nosema ceranae was only discovered in the early 2000s. When N. ceranae was first found it was thought to be very similar to N. apis. As more research has been conducted and trials performed it has become clear that the two Nosema species are very different. The research group, Bee Doc, has found between 50 and 90 percent of hives throughout Europe, from Scandinavia to Southern France have Nosema. The majority of these hives have N. ceranae

Nosema apis: The prevalent disease

Nosema Apis has been a documented problem for over 100 years. It is particularly a problem when bees are not able to fly for long periods of time, especially the period associated with the colder winter months. This allows the disease to spread to other bees who consume the infected spores as they try to clean up. The disease considerably weakens the bees; bees live half as long and hives with Nosema apis have been shown to produce significantly less honey and less bees. When colonies are heavily infected with Nosema apis there can be visible signs such as the inability of bees to fly, excreta on combs, piles of dead or dying bees and the failure of a colony to build up in the spring. However, the majority of N. apis-infected hives will not show any signs and hence it has been nicknamed the 'no-see-um' disease. One way to confirm *Nosema* is by microscopy, although it is almost impossible to distinguish between N. apis and N. ceranae. While colonies can die from Nosema apis, in general they will survive, albeit weakened and producing less honey and brood. The spores of N. apis are quite resistant to cold but not to heat.

Nosema Ceranae: A new disease that cannot be seen.

It has no obvious symptoms, is more prevalent in warmer climates, its spores are more resistant to heat and are more sensitive to the cold. Importantly, N. ceranae is not as seasonal as N. apis and tends to build up over years. It was only first discovered in the European honey bee in Vietnam in 2004, but it probably transferred across to Europe sometime late in the 1990s and has been spreading rapidly since. Although there is no confirmed evidence to show N. Ceranae is the cause of Colony Collapse Disorder (CCD), its prevalence in hives suffering with the problem seems more than coincidental. Recent scientific studies have demonstrated that N. ceranae on its own can be fatal for bees, causing the collapse of hives.

Nosema spread

N. apis is spread through feces. N. ceranae spores can also be spread through pollen. It is possible that spores are spread through water sources also.

Impact on hives

- ✓ Shorter life span
- ✓ Decrease in colony population
- ✓ Reduction in honey production
- ✓ Digestive disorders in the bees

- ✓ Increased vulnerability to pesticides
- ✓ *N. ceranae* stressing bees throughout all seasons
- ✓ If the queen becomes infected, her ovaries begin to degenerate. This means her egg laying ability will be reduced.

Measures to reduce Nosema levels

- Change comb regularly
- Don't transfer combs between hives or apiaries
- Try to avoid squashing bees during hive inspections
- Promote good queens with high resistance levels
- Minimize stress on bees
- Avoid conditions that promote dysentery like late autumn syrup feeding, dampness and fermented stores

Nosema check

Most infected colonies will appear normal with no obvious symptoms. When hives are heavily infected with *N. apis*, fecal staining can be observed on frames and outside of hives. This is not visible when hives are infected with *N. ceranae*.

In order to confirm the extent of Nosema presence, gut samples can be viewed under a microscope (a 400x microscope is sufficient to observe spores).

Foragers should be collected for sampling - take at least 10 bees per hive from the entrance, the more bees taken, the more accurate the results.

- Remove guts by pulling on the stinger and combine together
- Add 1ml of water per bee
- Grind using pestle and mortar
- Filter through cheesecloth or filter paper
- Add a drop of filtrate to a glass slide and gently place a cover slip over it
- View under microscope