



IOWA BEEKEEPING INFORMATION

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Why are my bees dead?

Iowa beekeepers have experienced very high winter losses over the last several years. There are many causal factors, and bees are often faced with them, not individually, but in combination. Surely there are factors which are not yet well identified or understood, but there are several tangible causes we may assess.

Varroa mites:

These parasitic mites are widespread, existing in nearly all of our colonies. The level of damage mites can be responsible for almost can't be overstated. The mites harm bee colonies through several mechanisms. Recent work has shown that the largest gains in wintering success come from springtime control of Varroa populations within hives.

A beekeeper should not assume "all is well" based on simply not noticing Varroa mites on the bees. Sampling is necessary to determine the level of infestation prior to making a treatment decision. There are a number of ways to sample a colony for Varroa: ether roll, sticky board, powdered sugar shake, etc.

This web link leads to a standardized field test procedure for determining the level of Varroa infestation demonstrated by Katie Lee of the Dr. Marla Spivak lab at UMN:

http://www.beelab.umn.edu/prod/groups/cfans/@pub/@cfans/@bees/documents/asset/cfans_asset_381124.pdf

There are several treatment options for reducing numbers of Varroa now available in Iowa. Whichever product is chosen, it is essential to follow the label directions in application. And be sure follow up the treatment with another mite sampling to ensure the treatment was effective.

Starvation:

Often supplemental feeding is necessary in late summer and early fall to ensure adequate food stores for wintering. The amount of winter stores required by a colony varies greatly based on location, race of bee, colony size, and more. As a very general rule for colonies overwintered in Iowa 85 lbs of honey is sufficient to feed an average colony through an average Iowa winter. This is roughly equivalent to 11 or 12 deep honey frames.

However, sometimes bees starve with honey stores remaining in the hive. As you inspect the colony, take note whether the cluster is directly adjacent to food stores. If the bee cluster contracts in cold temperatures, it may become separated from the food stores and quickly consume all the honey within "reach". In extended periods of cold, or with smaller, more stressed clusters this can be a common occurrence.

Queenlessness:

Losing the queen can be either the cause of, or a response to, stress. When a colony goes queenless in winter, sometimes the hive will survive through to spring only to have problems in the spring. Having been queenless for an extended period of time, the bees are often unlikely to accept a replacement. It also appears that often when a colony goes queenless during the winter, the bees have trouble maintaining a tight cluster – maybe this is due to the lack of queen pheromone to aid in clustering focus? Occasionally, we'll open a hive to find a scattering of dead bees all around the inside of a hive, or clumped in small groups here and there rather than in a tight cluster. This may be associated with queenlessness. A beekeeper may check for evidence of brood rearing for some indication as to whether the queen may have been present.

Nosema:

Beekeepers have dealt with Nosema for over 100 years in the US. The species we are long familiar with is *Nosema apis*. *N. apis* has been largely replaced by *Nosema ceranae* in recent years. Nosema is a fungal parasite which attacks the cells lining a honey bee's gut. We have a lesser level of understanding of *N. ceranae* than *N. apis*. It appears that Nosema exists in approximately 60% of US colonies – but often the infection exists well under damaging levels. We know that these two species of Nosema share a similar life cycle with a few major differences. *N. ceranae* does not seem to cause the symptom of fecal spotting in honey bee colonies as does *N. apis*. And, significantly, *N. ceranae* may kill bees faster (as little as 8 days post-infection) than *N. apis*. Mortality caused by *N. ceranae* is seen most in older, forager, bees. The shortened life span of bees infected by *N. ceranae* may be a causal factor in Colony Collapse Disorder (CCD). In any case, *N. ceranae* infections may be a factor in instances of late season reductions in cluster size and colony mortality.

Fumigillin is a commonly used antibiotic labeled for use in beehives against Nosema sp. Recently, a study has shown that Fumigillin use for control of *N. apis* may have actually contributed to the usurpation of *N. apis* by *N. ceranae*. It may be the case that *N. ceranae* releases twice its typical number of spores in honey bee guts in response to Fumigillin pressure.

Samples may be sent to the State Apiarist for Nosema counts. These samples may be collected in spring and early summer for analysis. If spores are found in excess of treatment thresholds, then treatments may be recommended for administration following surplus honey removal from the colonies in late summer of the same year. Please contact the State Apiarist for details regarding sample collection. At this time there is no charge for the analysis service.

Winter Management:

The BeeInformed Partnership (<http://beeinformed.org/>) has shown higher wintering successes correlated with a few management techniques. Providing an upper entrance / ventilation hole is shown to be correlated with over 16% greater winter survivability. An upper entrance may be made by either drilling a hole (approximately 3/4") in the upper hive body, by separating the hive bodies from each other using shims, or by a dadoed notch of at least an inch in width in the rim of the inner cover. Excess moisture is a common stressor of bees during winter. The ventilation hole may aid the bees by allowing moisture to exit the hive and may also be advantageous as an easily accessible exit for warm day cleansing flights throughout winter months.

Insulation placed on top of the hive may also aid a colony's winter success. Closed cell foam construction insulation boards are commonly cut to dimension and placed between inner and

outer covers throughout winter. Honey bees do not work to heat the entirety of the hive; the work to maintain internal temperature of their cluster in excess of 90 degrees F. The upper insulation may decrease heat loss, particularly in late season when the cluster is located just under the cover.

Disease:

Honey bees are affected by a number of diseases; more than can be described here. Whether bacterial, fungal, viral, or other in nature, a beekeeper's identification and control of honey bee diseases will contribute to increased strength of the colony which will increase winter success.

Regular inspection of colonies is critical to early detection and treatment of honey bee disease. Control of honey bee disease is a primary function of the IDALS apiary program. Beekeepers are encouraged to contact the State Apiarist with any questions or concerns related to identification and control of diseases within their colonies.

Apiary inspection is conducted by the IDALS apiary inspectors throughout the bee season. Any beekeeper-managed colony of bees in Iowa is subject to inspection. These inspections are regulatory in nature, but also serve beekeepers as educational and informative opportunities. Beekeepers are encouraged to contact the State Apiarist to schedule an apiary inspection. There is no charge to the beekeeper for this service in Iowa.

Pesticide damage:

Colony damage from exposure to pesticides can be exhibited in several ways. There may be a gradual loss of colony strength or losses may occur very rapidly. There may be piles of dead bees covering the bottom boards and ground in front of colonies. Forager bees may die in the field before returning to a colony, or they may return carrying the contamination into the hive. When contaminated pollen is collected and stored within a hive, the bee losses may appear more gradually as the pollen is consumed by nurse bees which feed and care for brood. Queens may be ejected from colonies. There is no single way to identify pesticide damage. Proper sampling and analysis is necessary to determine the cause.

The IDALS Pesticide Bureau is responsible for pesticide incident investigations in Iowa. If a beekeeper suspects an exposure incident has occurred, he or she should immediately contact the IDALS Pesticide Bureau following the discovery at (515) 281-8591 or pesticides@iowaAgriculture.gov. Timeliness and cooperation are key to a successful investigation.

In order to reduce the occurrence of bee kills caused by pesticide exposure in Iowa, beekeepers are encouraged to register their apiary locations in the IDALS Sensitive Crops Directory each year. The Sensitive Crops Directory and associated "Iowa Bee Rule" are found here: http://www.iowaagriculture.gov/Horticulture_and_FarmersMarkets/sensitiveCropDirectory.asp