# Honey Bee Pests and Diseases

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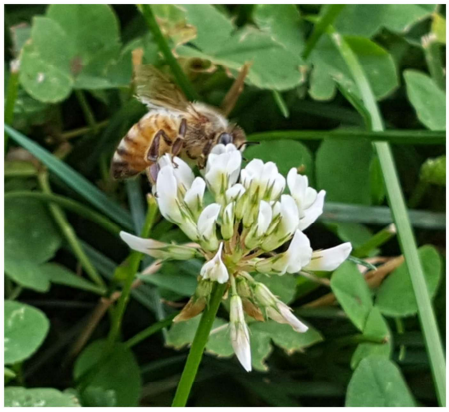
Northern KY Beekeepers Association

## Today's Discussion

- Large pests
- Top 3 pests in our area
- Other pests worth mentioning

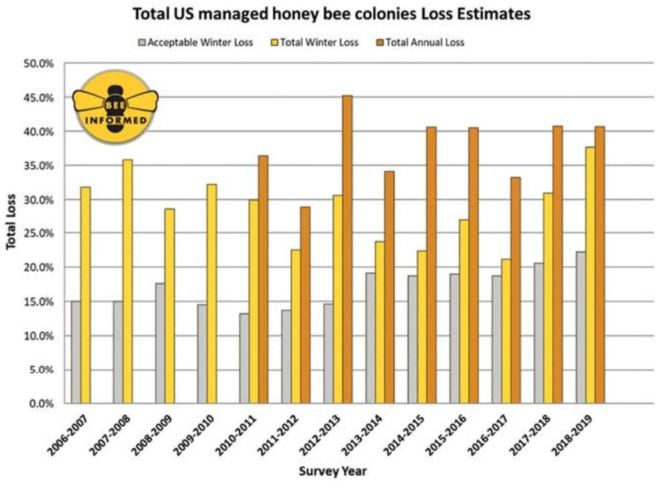
You can find this slide deck with notes at:
www.Marriedwithbees.com





One talk can't cover everything a beginning beekeeper needs to know about pests and diseases. The main objective of this talk it to help you see the need to have a pest management strategy and to provide exposure to some of the more common pests you will encounter in the Northern KY area. Check out the resources on the Northern KY Beekeepers Association web page for more in depth discussions about pests and diseases. You can be confident that information posted on the club web site will be scientifically sound and comes from a reputable source.

## Hive Losses in The US




3 2/21/2020 Kathryn L. Ackley, Ph.D. Northern KY Beekeepers Association

Most hive losses occur in winter. Just under 40% of the hives in the survey were lost last winter. Hive losses tend to be higher for hobby beekeepers than for commercial beekeepers. These statistics show why pest management is essential. This figure was taken from a July 2019 article that appeared in the journal *Bee Culture*. You can access the article via this link: https://www.beeculture.com/honey-bee-colony-losses-2018-2019-preliminary-results/

## Terms to Know

- **Swarm** – Some bees leave to start a new colony.
- **Dead out** – All the bees in the hive are dead.
- **Abscond** – All the bees leave the hive.



Bees swarm to start new colonies. The queen and a portion of the bees leave the old hive to go establish a new colony some place else. This is a natural biological process for perpetuating the species, and it is not an indication of sick bees. Beekeepers don't like swarms because it negatively impacts honey production and means that the old colony has to make a new queen. This usually isn't a problem unless something happens to the new queen (e.g. eaten by a bird on a mating flight, unable to mate due to rainy weather.) A dead out is when all the bees die. A beekeeper opens the hive and sees a pile of dead bees. Dead outs occur most frequently in the winter. Some possible causes for dead outs include starvation and pesticide exposure. Bees abscond when they all leave the hive. To the beekeeper, it appears that all the bees have vanished. Bees abscond when the conditions in the hive are bad and leaving the hive is their last defense. Bees may abscond if their hive becomes infested (e.g. mice or ants) or if the colony has a heavy load of varroa mites.

## Key Elements of a Pest Control Strategy

- Knowledge
- Maintaining healthy colonies
- Regular hive checks followed by taking necessary actions
- Hope and nostalgia are not strategies for controlling pests and disease.



The most powerful weapon against controlling pest and disease is knowledge. However, make sure you are getting your information from knowledgeable, reputable sources because the internet is full of videos and posts from backyard beekeepers that don't always have the most current information. Publications from extension offices and state apiarists are a good place to start. The American Bee Journal is also a good source of up to date information on a variety of topics including pests and disease. A year's subscription is inexpensive, and your subscription allows you to access past years' issues on line. Maintaining strong colonies is important in fighting disease. Make sure your hive is located where it gets adequate sun. The bees should have access to water, and they need enough food. Harvesting too much honey may mean the colony doesn't have enough food to get through the summer dearth or winter. You should inspect the hives regularly, know what to look for during an inspection, and make the necessary adjustments based on what you see during the inspection. The pests today's beekeepers face were rarely seen 30 to 40 years ago. Relying on outdated hive management techniques or simply "allowing nature to run its course" will dramatically increase the probability of colony loss due to death or absconding. Failing to control pests means you will also likely unleash pests and diseases on the surrounding bees.


Skunks love to eat bees, and they will scratch at the front entrance and wait for the bees to emerge in order to eat them. You will see scratches at the front of the hive and on the ground. Some people raise their hives off the ground by 18" to force the animals to have to get on their hind legs and expose their sensitive underbellies to the bees. Some people will also use carpet tack strips around their hive to make it uncomfortable for animals to place their paws on the hive box. Fencing around the hives to keep out small animals like skunks and dogs can also be used. Wild turkeys also like to eat bees. These birds aren't in all areas. Noises will scare away turkeys, and I have found that barking dogs are highly effective at this. Some dogs, such as our German Shepherd, will eat bees for fun. We keep our dogs separated from our bees via fencing. Small dogs with thin coats may be stung if they are close to a hive when it is disturbed. In general, think about how your pets may interact with your bees and take the necessary precautions based upon size, temperament, and behavior of your pets. Mice become a problem in the winter as the weather turns cold. The hive box provides a warm, dry place for mice to make their home during the winter months while the bees are clustered. Mice can get inside the hive even when the entrance reducer has been flipped to its smallest sized opening. In the fall, a mouse guard like the one shown here should be installed on the front of the hive to prevent mice from entering while still allowing for the flow of bees in and out of the hive. Mouse guards are available commercially or can be made yourself using mesh of the appropriate size. Humans may be one of the biggest threats to your hives. Instances of

vandalism and theft of hobby hives is rare. What is more common is neighbors who don't want hives near them because they are afraid of stings. Check zoning laws and neighborhood regulations before setting up your hives. Consider keeping your hives shielded from view with fencing or landscaping. Go on a charm offensive, and supply neighbors with free, local honey.

# Top 3 Pests in Our Area



This picture is from my hive during the winter. The bee shown here died during a cold spell and was part of normal winter hive losses and not due to a particular disease or pest.

## 1. Varroa Mite

- Reproduce in the capped brood; most mites during the warm season live inside the capped brood.
- Mated female mites live on the adult bees. They are large enough to be seen without magnification.
- The mites weaken the bees and are vectors for introducing other diseases such as the Deformed Wing Virus.



Varroa mites are one of the biggest pest problems facing beekeepers in the US. The mites (shown in top picture) are about 1/16" and can be seen without the aid of magnification. The mites reproduce within the capped brood and can be seen on pupae as shown in the lower picture. Beekeepers should regularly monitor for mites and have a treatment plan in place to keep the mite load within the hive low. Not controlling for varroa mites dramatically increases the chance a hive will be lost and also jeopardizes hives within a few miles of the infected hive. Once mites take over the hive, the bees will leave the hive looking for a more hospitable home taking mites and disease with them. These failing colonies that desert their hives are sometimes referred to as "mite bombs" that can cause neighboring colonies to fail. Mite bombs may also impact native bees, but it is difficult to assess this.

## 1. Varroa Mite



Mated female mites live on adult bees and are visible to the naked eye if you have good eyesight. This picture was taken from Flickr and is available via creative commons license.

## Varroa Mite Population

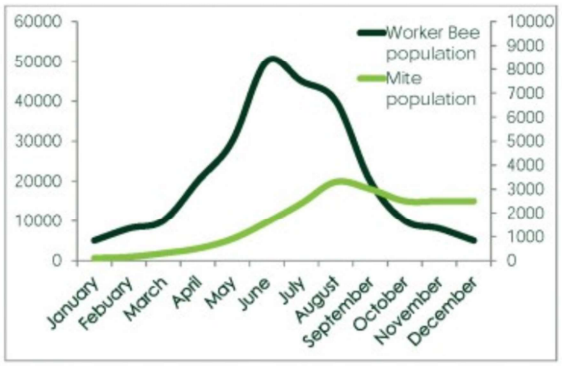



*Figure 2. Worker Bee Population (dark green) and Varroa Mite Population (light green) throughout the year.*

- Mite populations increase at the time of year when the number of bees within a colony are declining.
- Figure taken from "Winter Bees and Formic Acid: Used Right, A Successful Combination" by Ulrike Lampe. July 21, 2015 issue of *Bee Culture*.



This graph is representative of bees in a slightly cooler climate, but the general trend is the same. The mite population begins to increase at the time the bee population begins to decrease. Mites heavily impact the winter worker bees, which are needed to keep the queen alive until spring. You can access the full article using this web address: https://www.beeculture.com/winter-bees-formic-acid-used-right-a-successful-combination/

## Alcohol Wash Test




You can test your bees to see how badly they are infected with varroa mites. The most common test is the alcohol wash test. You can buy a plastic, pre-measured testing kit for under $30, or you can make your own. Typically ½ cup of bees are tested. ½ cup is equal to about 300 bees. The number of mites you count dived by 300 is the rate of infection. Last fall, one of our hives had a 2% infection rate. Study how to collect the bees before you want to test. Many YouTube videos are available to show you how to collect the bees. Make sure you isolate your queen so you don't accidentally kill the queen.

## Your job is to keep the colony alive not each bee.




Many people are reluctant to perform alcohol mite tests because it kills bees. There is a similar test that can be performed that uses powdered sugar instead of alcohol. The sugar roll test doesn't kill the bees, but I have heard mixed comments regarding the accuracy of the sugar roll test. This quote and clip came from Star Trek II: The Wrath of Khan. Hopefully posting this image that I took from the internet doesn't violate a copyright law.

## Varroa Mite Treatments

- A variety of treatments exist.
- Beekeepers need to consider the following factors:
  - Effectiveness of treatment
  - Will treatment contaminate the honey, and does that matter?
  - Cost
  - Ease of application
  - Number of hives to treat

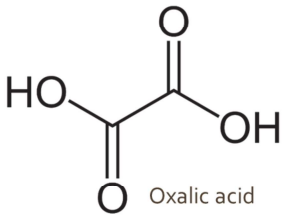


Research the various treatments to determine what is best for you and your bees. There are many different treatments to choose from, and quite a few can be very effective when used as directed. Some beekeepers look to other mite control strategies besides chemical treatments. One method is time splits or to re-queen at specific times designed to control mite populations.

## Varroa Mite Treatments

- Oxalic acid vapor
- Oxalic acid – dribble method
- Formic acid
- Miticide strips – Amitraz (Apivar), thymol (ApiLife Var and Apiguard)
- Brood breaks and timing of splits
- Intentionally increasing drone population
- Hygienic bees specially bred to be resistant to varroa
- Selective breeding

## Varroa Mite Treatments

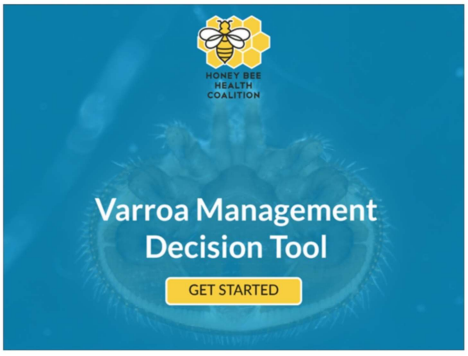


Oxalic acid



Oxalic also is sometimes called wood bleach. This is a naturally occurring acid found in plants, and it is considered an organic way to treat for varroa mites. Oxalic acid can be applied as a liquid down the frames of the hive using the "dribble method" or it can be administered to the hive in gaseous form. Be sure to read all safety information before working with oxalic acid. Although it is a naturally occurring substance, it is irritating to skin and the respiratory tract. Follow all health and safety precautions.

## How can you decide the best way to treat for varroa mites?




Click image to go to Varroa Management Decision Tool

www.honeybeehealthcoalition.org/varroatool.com



The Honey Bee Health Coalition created a tool that can help you select the best mite treatment option for your hives. The tool is easy to use. Just answer a series of straightforward questions, and the tool will then list the treatment options that are best for you.

## Varroa Mite Treatments – First Year Beekeepers

- Assume you have mites.
- Treat with miticide strips such as ApiLife Var and Apiguard
- Don't collect honey in your first year.



This is my opinion for the most effective and the least stressful approach in your first year of beekeeping. However, there are many ways to treat for mites. Find what works best for you and your bees.

## 2. Small Hive Beetle


- Native to sub Saharan Africa; appeared in US in the mid 90's.
- Stay in cracks and crevices in the hive that are guarded by bees. These are sometimes referred to as prisons.
- SHB lay eggs in the hives. The larvae will eat pollen, honey and bee brood.
- SHB can render honey unfit for human consumption.
- SHB are considered a secondary pest.



Beekeepers around the state reported that SHB were very bad in 2018. New beekeepers will likely see this pest very soon after installing their bees into the hive.

## Control of Small Hive Beetle

- A variety of traps are sold. Most contain an attractant (e.g. apple cider vinegar) and an oil to trap the bees.
- Homemade traps abound – Swifter dryer sheets, traps made from CD cases
- Larvae go into the ground to pupate. Some people spray pesticide in the ground to kill the pupating beetles.
- Maintain a strong colony & avoid excess free space in the hives



We have had marginal success with traps, but we continue to use them to help reduce the number of beetles. When we lift the top cover and inner cover of the hive for a hive check, we usually see lots of SHB because the bees force the beetles out of the brood chambers and up into the top part of the hive where they can't do much damage. During each hive check, we take the time to kill as many SHB as we can using our hive tools. We found we can eliminate as many SHB this way as we can with traps.

## Control of Small Hive Beetle – Unconventional Approaches

- Chickens
- Diatomaceous Earth
- Plywood or tarps under stands



Chickens eat the small hive beetle pupae in the ground. Diatomaceous earth also inhibits the pupae. We had some old sheets of plywood that we placed under our hive stands. We found that the hives with the plywood had fewer small hive beetles than those that did not have plywood on the ground.

## 3.0 Wax Moths

- Wax moths are a problem for weak or small hives.
- Larvae feed on wax and damage brood comb.
- Enter the hive through gaps and spaces in the top.
- Prevention is the better than trying to treat after an infestation.

## 3.0 Wax Moths

- Wax moths can destroy comb in storage.
- Some people choose to store frames with paradichlorobenzene.
- You may also want to store frames with comb in a freezer.



Picture taken from Kentucky Beekeepers Facebook group. This picture was submitted by a member asking for help.

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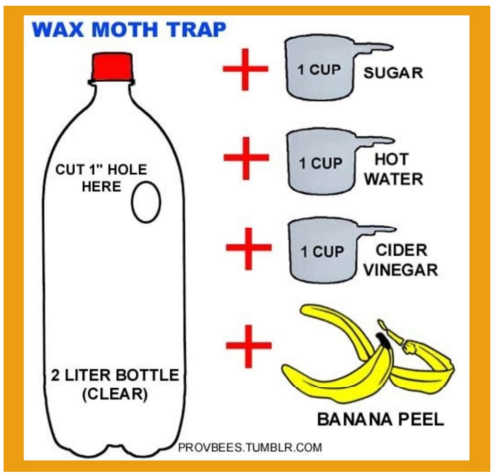




This is a recipe for making a homemade trap for wax moths. It is supposed to work for yellow jackets as well. The bottle should be hung in a tree near the hives.

# Other Pests Worth Mentioning

## American Foulbrood

- Disease caused by spore forming bacteria
- Fatal to brood; infected brood die at the pre-pupal or pupal stage
- Spores remain viable for 50 years.
- AFB first weakens the colony making it susceptible to robbing, which spreads the infection to other colonies.
- AFB can't be cured. Infected colonies must be destroyed.



The picture is of hives contaminated with AFB being burned. Picture came from Wikimedia Commons, author Jrmgkia, available for use under Creative Commons Attribution - Share Alike 3.0 Unported.

## American Foul Brood



One sign of American Foulbrood is that when the cap is scraped away, the brood cell will have a dark, stringy liquid as shown in the picture. Picture came from Wikimedia Commons, author Tanarus, available for use under Creative Commons Attribution - Share Alike 3.0 Unported.

## American Foulbrood

- You can buy American Foulbrood test kits for ~$15. The club keeps kits on hand so you can test immediately.
- Be very cautious of buying used beekeeping equipment. – Some states have laws governing the sale of used equipment.
- KY State University has a mobile autoclave for KY beekeepers to sterilize used equipment.



The photo was taken from the Kentucky State University Cooperative Extension Bee Autoclave flyer. The autoclave was on display at the 2018 Kentucky State Fair.

## Chalkbrood

- Fungal disease
- Usually weakens but doesn't kill the entire colony.
- Larvae die once sealed in their cells. Their bodies look like mummies.
- Replace contaminated comb and foundation.
- Cool temperatures, damp conditions, and poor ventilation promote chalkbrood.
- Make sure you feed your bees when nutrition is poor.



Chalkbrood is easy to recognize because you will see what appears to be mummified bees at the entrance of the hive. The fungus kills larvae sealed in the cell. Worker bees clean the cells and deposit the infected, dead bees at the front of the hive. If you detect chalkbrood within your hive, make sure that frames of contaminated comb including foundation are removed. The fungal spores will stay within the comb, which causes the infection to spread. Chalkbrood is usually observed when temperatures are cool and damp and when nutrition is poor such as in early spring. Picture taken from the website of the Ontario Ministry of Agriculture, Food, and Rural Affairs.

## Nosema

- Two different types, Nosema ceranae and Nosema Apis
- N. apis is a cold weather disease. Dysentary is the most common symptom
- N. ceranae has few symptoms. Bees have shortened life span. Population doesn't build as expected and bees will "go off of feed".
- Must be controlled through best practices. Pharmaceuticals are no longer available.

# Bees in your hive should fare better than the bees in the trees.



This is a paraphrased quote from Phil Craft, former Kentucky state apiarist. Mr. Craft spoke to the Northern Kentucky Beekeepers at one of our 2018 meetings.