Honey Bee Pests

Jennifer Lund, Maine State Apiarist
Department of Agriculture, Conservation and Forestry
Division of Animal and Plant Health
Email: jennifer.lund@maine.gov

The best technique for controlling any pest is using an Integrated Pest Management (IPM) approach. IPM is a decision making process that uses a combination of techniques to suppress pests that must include but is not limited to:

1. Planning and managing apiaries to prevent organisms from becoming pests
2. Understanding/learning about potential pest problems
3. Monitoring pest populations, pest damage and environmental conditions
4. Using injury thresholds to make treatment decisions
5. Reducing pest populations using a variety of strategies including biological, physical, cultural, mechanical, behavioral, and chemical controls
6. Evaluating the effectiveness of treatments

The goal of IPM is not to eradicate a pest but to hold potentially harmful species at tolerable levels of abundance. IPM seeks maximum use of naturally occurring pest controls, including weather, disease agents, predators, and parasites. In addition, IPM utilizes various biological, physical, and chemical controls as well as habitat modification techniques.

Varroa Mite

Varroa destructor

Biology: Originally from Southeast Asia, the varroa mite was introduced in the United States in the late 80s. It is considered the largest threat to honeybee colonies globally. The varroa mite is a small, reddish brown, triangular mite that feeds off the fat bodies of honey bees. The mite has a two-phase lifecycle: the dispersal phase and the reproductive phase. In the dispersal phase, female mites feed on adult bees and are passed from one individual to another as bees walk past one another. In this stage, mites can be introduced to un-infested colonies by bee drift between colonies. The dispersal period can last from 4.5 to 11 days if brood is present and five to six months if there is no brood in the colony. The reproductive phase starts when a female mite leaves the adult honey bee and enters a soon to be capped cell. The mite submerges itself in the brood food and the cell is capped by nurse bees. The mite lays its first unfertilized egg which will develop into a male mite. She then lays fertilized eggs every 25 to 30 hours. It takes 6-7 days for a mite to develop from egg to adult mite. Adult mite offspring mate and leave the cell when the adult bee emerges. The average female mite produces one offspring per worker cell she enters, two offspring per drone cell. Mite populations can increase 12-fold in colonies

having brood half of the year and 800-fold in colonies having brood year-round. Varroa mites transmit several honey bee viruses including Deformed Wing Virus, Acute Bee Paralysis Virus, Israeli Acute Paralysis Virus, Black Queen Cell Virus, and Kashmir Virus.

Inspection: A sampling device is needed in order to determine when a treatment threshold is reached. Do not rely on a visual inspection of mites on adult and/or immature bees to determine if a treatment is needed. Visual inspections only provide an index and are not an accurate measurement. Often, when a beekeepers starts seeing mites on adult bees their colonies, mite populations are very high and the colony is near collapse. Mite populations can quickly grow so it is important to monitor your mite populations throughout the season. You should do a mite count every 3-4 weeks starting in the spring. Mite populations increase most rapidly in the late summer, early fall so if it is possible, mite count frequency should be increased during this time.

Alcohol Wash Monitoring Method

Collect approximately 300 adult bees (1/2 cup) from the brood area of a frame into a wide mouth pint canning jar. Be careful to avoid the queen, if she is on a frame just put that one back in the hive and use the next one. Add enough alcohol or soapy water (windshield washer fluid works great) to cover the bees and put on the lid. Shake the jar vigorously for 1 minute. Replace the closed lid with a piece of screen mesh (#8). Invert the container and pour the mixture into a shallow light colored pan and count the number of mites. You can count the number of bees in the jar for a more accurate count.

Calculate the number of mites per 100 bees. For example: a roll with 300 bees and 15 mites has 5 mites per 100 bees or a 5% infestation rate (15 mites ÷ 300 bees = .05 * 100 = 5%).

Treatment thresholds have changed and varied widely over the past couple of years. There is some variation depending on time of year and growth phase of the colony, but the current rule of thumb is that a 2% infestation rate represents a high risk of damage/colony loss and requires treatment.

Treatment: Strategies to control varroa mites are often broken up into two categories: preventation and intervention. Preventative measures often rely on disrupting the mite lifecycle in order to slow mite population growth. These methods are not intended to eliminate all mites in a hive but maintain populations at low levels.

Some preventative measures are:

1. Drone brood sacrifice: Female mites raise more mites on drone brood and preferentially select it for reproduction. Special plastic drone frames or foundation can be purchased and installed into a hive. After the bees cap the brood, the frame is removed and the brood and mites are killed (freeze, scrape, feed to chickens, etc.).

This method can be effective but has some drawbacks. Firstly, it is very easy to forget to remove the frame in time and as a result you have just added to your mite population dramatically. Secondly, raising drone brood is very energy and resource intensive for bees, energy and resources that can be used other places in the hive.

2. Brood interruption: This method is commonly used during the time when beekeepers are splitting or re-queening colonies. The hive or split is left queen-less for at least a week, interrupting the growth cycle of the mite. This method is most effective when used in combination with a miticide.
3. Screened bottom boards: Screen bottom boards are used above or without standard solid bottom boards. As bees move around and groom themselves, mites are dislodged. These dislodged mites fall through the screen and away from the hive. This method is easy and simple. The major drawback is that this method does not have a large impact on mite populations with reductions up to 15%.
4. Re-queening with resistant stock: There are several stocks that have shown some mite resistance. These include Varroa Sensitive Hygienic, Russians, Minnesota Hygienic, and Buckfast.

Intervention methods are used when mite infestations have reached treatment levels, determined by alcohol wash monitoring. Read product labels carefully and follow all label instructions and precautions. Many miticides have very specific time of year, colony cycle, and temperature guidelines. Using a miticide differently than described on the label is not only against the law but can harm or kill a colony. It is always good practice to rotate the use of products to reduce the development of resistance in mite populations.

Some intervention methods are:

1. Apivar® (Active Ingredient: Amitraz)
   This product is applied as a slow release impregnated plastic strip that works through direct contact. It cannot be used when bees are making honey and must be removed two weeks before a honey flow. There have been reports of mite resistance to this product.
2. Apiguard® (AI: Thymol)
   This product is a gel that works as a fumigant. It is only effective in a limited temperature range and cannot be used when bees are making honey.
3. ApiLife Var® (AI: Thymol, Menthol and Eucalyptus Oil)
   This product is a tablet that works as a fumigant. It is only effective for a limited temperature range and cannot be used when producing honey. There is some evidence that this product can interfere with queen laying and kills brood.
4. Formic Pro®/ Mite-Away Quick Strips® (AI: Formic Acid)
   This product is an impregnated pad that acts as a fumigant. It can be used during honey flows but if applied at high temperatures it can kill brood and queen.

5. HopGuard III® (AI: Potassium Salt of Hops Beta Acids)
   This is a cardboard impregnated strip that works through direct contact. It is most effective when there is little or no sealed brood and can be used during honey flows.
6. ApiBioxal (AI: Oxalic Acid Dihydrate)
   This product can be applied either as a sugar syrup drip or as a fumigant. It works through direct contact. It is most effective when there is little or no brood present.

For more information:

Honey Bee Health Coalition's Tools for Varroa Management
https://honeybeehealthcoalition.org/varroa/

MDACF/MDAR Varroa Mite IPM Brochure
https://www.maine.gov/dacf/php/apiary/documents/factsheets/varroa-mite-ipm-brochure.pdf

Tracheal Mite

Acarapis woodi

Biology: Tracheal mites were introduced into the US in the mid-80s. The mites live and reproduce in the tracheae of bees, feeding on bee hemolymph. A female mite attaches 5–7 eggs to the tracheal walls. The eggs hatch and larvae develop to adult mites (11-15 days). Mature female mites leave the tracheae, climb out on a hair and wait for a new young bee. Once on the new bee, they will move into the airways and begin laying eggs. More than a hundred mites can populate a single trachea. For about 10 years following the introduction of tracheal mites to the United States, beekeepers saw huge colony losses. Since then, many of the surviving honey bee stocks have some degree of resistance and loses attributed to tracheal mites are minimal.

Inspection: This mite is very small and can only be seen and identified under a microscope. Collect 50 live bees from around the entrance of the hive and place in a container of 70% alcohol. To dissect, grasp the bee between your thumb and forefinger, head facing up. Remove the head and first pair of legs with a pair of tweezers exposing the trachea in the "neck" area of the honey bee. Remove the exposed trachea and examine them under 40x magnification. If mites are present, they will appear egg shaped and semi-transparent. Infested tracheae can appear darkened, but this is not always a reliable method of identification.

Treatment: Most of the time, tracheal mite is controlled inadvertently while hives are being treated for varroa mite. Grease patties and menthol crystals (Mite-A-Thol®) have been used successfully as method of control for tracheal mites. Grease patties made from 1 part vegetable shortening mixed with 3–4 parts powdered sugar are placed on the top bars of the hive. Bees feed on the sugar and pick up traces of shortening on their bodies. The shortening disrupts the

mite's ability to identify a young bee. Menthol crystals work as a fumigant. There are temperature restraints and it should not be used during or one month prior to a honey flow.

Small Hive Beetle

Aethina tumida

Biology: Originally from South Africa, the small hive beetle (SHB) was first found in the United States in the late 1990s. It is now found throughout North America but is most problematic in the Southeastern U.S. Adult beetles are small (5-6 mm long) and oval. Adult female beetles lay eggs in cracks and crevices inside the hive. One female can produce up to 1000 eggs during her lifetime. After hatch, the cream colored larvae feed for 10-16 days on brood, wax, honey, and pollen. Larval feeding often spoils the honey, rendering it unfit for human or honey bee consumption. When a larva is ready to pupate it leaves the hive and pupates in the soil surrounding the hive. Colonies heavily infested (>1000 beetles/hive) with SHB may abscond.

Inspection: SHB are easily detected by visual inspection of colonies. Adult beetles are often seen running across the inner cover, on the top bars of frames, and across the surfaces of combs. You can make an inexpensive beetle monitoring trap by placing strips of corrugated plastic or cardboard on the bottom board at the rear of the hive. Adult beetles seeking shelter will use the strips as hiding places which can easily be checked for beetles. If you use a screen bottom board you can place trap strips of plastic/cardboard on the top bars of your hive. Signs of beetle activity are slimy comb, fermented honey bubbling from the combs, and a rotten orange smell.

Treatment: Small hive beetles are considered a secondary pest of honey bee colonies so maintaining strong, healthy colonies is the best practice to reduce the impact of SHB. Several SHB traps have been developed. Though they vary in design and efficacy, most SHB traps use an attractant (usually apple cider vinegar) and a killing agent (mineral oil or soapy water) to attract and kill adult small hive beetles. The two available insecticides for small hive beetles are GuardStar® and Checkmite+®. GuardStar® is a permethrin product used as a soil drench that targets the late larval and pupal stages of SHB in the soil around the colony. Permethrin is highly toxic to bees so read and follow all label instruction carefully. CheckMite+® is a cumaphos impregnated plastic strip used under pieces of cardboard inside a hive to kill adult beetles. It cannot be used during honey flow or two weeks before the start of honey flow.

Wax Moth

Galleria melonella

Biology: This insect was first reported in United States in the early 1800s. Adult moths are small, brown and non-descript. Female moths deposits eggs in cracks and crevices. After egg

hatch caterpillars consume wax, old bee parts, honey, and other debris in a hive. They can very efficiently reduce combs to a mass of silk, frass, and wax remnants.

Inspection: Signs that wax moths are in the hive are silk trails on the face and between combs, tunnels in and through the comb, small brown frass on the bottom board, cocoons along the edges and sides of boxes, and caterpillars crawling on the bottom board.

Treatment: Wax moth is a secondary pest, only negatively affecting living colonies that are stressed due to some other problem. Maintaining strong, healthy colonies will keep wax moths out of a living colony. Stored comb is where wax moths often pose the biggest problems. To dissuade moths, beekeepers can store equipment in cool, well ventilated places. Lightly infested comb can be frozen to kill eggs and larvae. Heavily infested comb should be burned.

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