

Controlling Varroa Mites in Honey Bee Colonies

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The varroa mite

The varroa mite (*Varroa destructor*) is the most harmful pest that affects European honey bees. Native to Asia, it is now found throughout the U.S. It is an ectoparasite on pupal, larval and adult bees, feeding on bees. It weakens bees and also spreads destructive viruses in bee colonies.

Monitoring for varroa mites

Why monitor- Varroa mites are not easily visible in bee colonies. Therefore, it is necessary to monitor for varroa mites using at least one of the methods below so beekeepers can treat if mite populations become too high. Monitoring for varroa mites can give you an idea of how many mites are present in your colonies and help you decide whether treatment is needed. You may need a strong magnification hand lens to identify mites when using the following sampling methods.

When to monitor-Monitoring for varroa mites may be done at any time and if using sticky boards, as often as you like. Varroa are present and may become problematic during any season in Florida. Suggested monitoring schedule for Osceola County, FL:

- February (jar method of sampling)- so you can treat if necessary before placing honey supers.
- June (sticky board)
- July- (sticky board) right after harvesting spring honey, so you can treat if necessary, before placing honey supers for the fall nectar flow. Mite populations are rapidly increasing during this time.
- August (sticky board)
- September (sticky board)-right after harvesting fall honey.
- November (jar method of sampling)

How to monitor-It's important for beekeepers to understand that consistent thresholds for damaging levels of varroa mites have not been scientifically determined for our region. Many factors influence the extent of harm that mites may inflict on honey bee colonies. Therefore, your maximum mite threshold may be lower if a colony is newly established, weak, or if it's late summer when mite populations are increasing.

- Sticky board (doesn't disturb bees)-
 - May be the best sampling method to use during spring and summer.
 - Place a commercially available sticky board under your screen bottom board for three days.
 - Remove and count mites on sticky board.
 - You may want to treat for varroa mites if you have more than ~180 (one-hundred-eighty) mites on a sticky board after three days.



Adult female varroa mite on honey bee larva.
Photos: J. Sullivan

- Sugar shake (preserves bees)-
 - Jar sampling methods may be best to use in autumn and winter.
 - Prepare a wide-mouth quart jar with an #8 (1/8") mesh screen on lid and mark 1½ inches up from the bottom. You will also need powdered sugar and a white bowl with about an inch of water in the bottom.
 - Taking care to avoid the frame with the queen, brush/shake/scoop 1½ inches of bees into the jar from one of the middle frames of the hive and put the screen lid on.
 - Sprinkle about 2 tablespoons of powdered sugar through the lid.
 - Roll the jar to distribute the sugar over all of the bees for about a minute.
 - Let jar sit for about a minute.
 - With bees still in the jar, gently shake all of the sugar into a bowl of water.
 - Dump bees on top of frames in open hive.
 - Count mites in the bowl.
 - You may want to treat for varroa mites if there are ~18 mites (eighteen) or more in the bowl.

- Alcohol wash (kills bees)-
 - Jar sampling methods may be best to use in autumn and winter.
 - Find a wide-mouth quart jar with solid lid and mark 1½ inches up from the bottom, a white bowl, and a small kitchen sieve/strainer with big enough holes for mites to fall through that will fit inside bowl. You will also need isopropyl (rubbing alcohol) you can use 1:1 alcohol and water solution if you wish.
 - Taking care to avoid the frame with the queen, brush/shake/scoop 1½ inches of bees into the jar from one of the middle frames of the hive.
 - Pour alcohol solution into jar until about half full and replace lid. Shake jar vigorously for about a minute.
 - Place sieve/strainer in white bowl.
 - Pour bees into sieve/strainer and swish in bowl. You can pour additional liquid over bees to help wash mites from bees if needed.
 - Remove sieve/strainer and count mites in bowl.
 - You may want to treat for varroa mites if there are about 18 (eighteen) mites in the bowl.

Managing varroa mites

Preventing varroa mites-

- Screen bottom board-
Varroa mites that fall from bees through screen cannot get back into hive.

- Drone comb-
Varroa mites prefer drone brood, and will enter uncapped brood cells to reproduce. By trapping mites on drone brood and killing them, you can reduce mite populations. This method requires careful timing to be effective.
 - Install 1-4 drone comb frames per colony.
 - Remove drone comb from hive after cells have been capped, but before many drones emerge (with mites attached!)-after about 20-22 days. (Drone development time from egg to emerged adult is ~24 days.

- Freeze filled drone comb for 24 hours, thaw comb completely, then put back into the hive. Or, to reduce disturbance to hive and trips to apiary- you can keep extra drone comb frames to switch out immediately when you collect the frames in your hives. Frames of drone brood can be stored in the freezer until you're ready to put back into a colony.
- Varroa mite-resistant queens- If bee breeders are not testing and selecting bee stock for varroa-sensitive hygiene behaviors, then it will be difficult to source mite-resistant bees, as pure subspecies stock doesn't exist.

Treatments for varroa mites in Florida-

Most products are available through local beekeeping supply distributors who carry products from major beekeeping supply companies, or can be ordered online. All products have advantages and disadvantages and each beekeeper should select products that will be appropriate for the season, and for their beekeeping needs. Pay careful attention to product names and active ingredients, as some trade names are very similar. The following are products that are federally approved by EPA, and are registered in Florida for use as varroa mite pesticides in bee hives.

- **Formic Pro®** (replaces Mite Away Quick Strips®) (active ingredient - Formic acid)-
 - <http://nodglobal.com/>
- **HopGuard®II** (active ingredients - beta acids from hop plant) –
 - Beekeeping supply distributors including: www.mannlakeltd.com/ , www.betterbee.com
- **Api Life VAR** (active ingredients - essential oils from thyme, camphor, eucalyptus, mint plants) -
 - Beekeeping supply distributors including: <https://glorybee.com/>
- **Apiguard** (active ingredient - essential oil from thyme plant) –
 - Beekeeping supply distributors including: <http://www.dadant.com>
- **Oxalic Acid Dihydrate**
 - Beekeeping supply distributors including: www.dadant.com
- **Apivar®** (active ingredient - Amitraz, synthetic chemical, pesticide class: amidine) –
 - <http://www.apivar.net/>
- **Apistan™** (active ingredient - tau-fluvalinate, synthetic chemical, pesticide class: pyrethroid) -
 - Beekeeping supply distributors including: <http://www.dadant.com>

Checkmite+™ (coumaphos) has also been marketed for varroa mite control, however, varroa mites easily develop resistance to them, making this product undesirable for varroa mite control.

Please note: The information in this publication is a simplified overview of varroa mite management, primarily applicable to small scale beekeepers. Information is targeted to beekeepers in Osceola County, FL, and may not apply in other regions. Every effort was made to include the most current, research-based information in this publication. Pesticide regulations, formulations, and application recommendations change frequently. It is the responsibility of the beekeeper to follow all applicable pesticide laws and labels.

Resources:

- *Storey's Guide to Keeping Honey Bees*, M.T. Sanford and R.E. Bonney, 2010
- *Varroa Mite*, University of Florida Featured Creatures website, J.D. Ellis and C.M. Zettel Nalen, 2013: http://www.entnemdept.ufl.edu/creatures/misc/bees/varroa_mite.htm
- *A Video Field Guide to Beekeeping: Varroa mites*, J.D. Ellis, 2008: <http://entnemdept.ifas.ufl.edu/honeybee/extension/VarroaMites.shtml>
- *Sick Bees-Part 11: Mite Monitoring Methods*, Scientific Beekeeping website, Randy Oliver, 2011: <http://scientificbeekeeping.com/sick-bees-part-11-mite-monitoring-methods/>
- *IPM 4 Fighting Varroa 4: Reconnaissance Mite sampling methods and thresholds*, Scientific Beekeeping website, Randy Oliver, 2006: <http://scientificbeekeeping.com/fighting-varroa-reconnaissance-mite-sampling/>
- *Powder Sugar Roll For Varroa Mites on Honey Bee*, University of Minnesota Instructional Poster #155, G.S. Reuter and M. Spivak, retrieved 6/25/2013: http://www.beelab.umn.edu/prod/groups/cfans/@pub/@cfans/@bees/documents/asset/cfans_asset_317466.pdf