BUG BIZ
Pest Management and Insect Identification Series
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Varroa destructor, *Varroa* mite *(Mesostigmata: Varroidae)*

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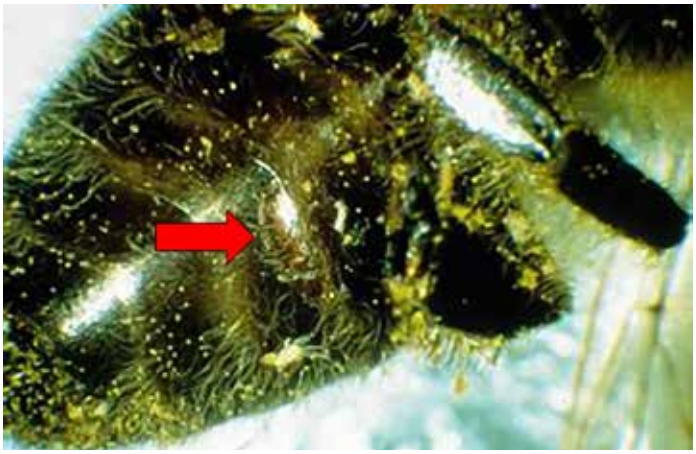
Adult female *Varroa destructor* mites. Scott Bauer, USDA Agricultural Research Service, Bugwood.org.



A *Varroa* mite (indicated by arrow) concealed between the body segments of a worker bee. Georgia Department of Agriculture, Bugwood.com.

Description

The *Varroa* mite is a detrimental external parasite of the western honey bee, *Apis mellifera.* Adult mites are oval in shape and measure one-twenty-fifth to one-fourteenth of an inch (1 to 1.8 mm) in length, and one-fourteenth to one-twelfth of an inch (1.5 to 2 mm) in width. Females are reddish brown in color, while males (rarely seen) are yellowish white. Their bodies are flattened, enabling them to fit between the body segments of honey bees, where they feed on the host bee's fat body and internal fluids (haemolymph). The mites are visible to the naked eye. While they may sometimes be observed attached to adult honey bees within the colony, this is not an effective means of detection.

Life Cycle

Varroa mites reproduce on a 10-day cycle that is completely dependent on the life cycle of honey bees. A female mite, called the foundress, enters the honey bee brood cell just prior to capping and hides beneath the puddle of liquid food at the bottom of the brood cell. The foundress mite uses a pair of snorkel-like organs, called peritremes, to breathe while hiding beneath the brood food. Around five hours after the brood cell is capped, the worker bee larvae will have eaten the remainder of this food, freeing the mite. The foundress mite may then begin feeding on the fat body and body fluid (hemolymph) of the developing bee. Around 70 hours after the brood cell is capped, the foundress lays her first egg, which is unfertilized and develops into a male mite. The foundress then lays three to four more eggs, all of which are fertilized and thus develop into females. After maturing, the virgin female mites will mate with their male brother within the cell of the still-developing worker bee. The male mite dies shortly after mating, and the foundress and newly mated female daughters exit the cell with the now-mature adult worker bee. The foundress and daughter mites then begin to feed on adult bees for approximately two weeks. This period is known as the phoretic (wandering) stage of their life cycle. After the completion of this stage, the foundress and daughters will begin the cycle anew, infesting the cells of worker bee larvae to produce another generation of mites.

Ecological Significance and Pest Status

The western honey bee, *Apis mellifera,* is not the native host of the *Varroa* mite. The mite evolved as a parasite of the eastern honey bee, *Apis cerana,* but began to infest colonies of the western bee during the 1940s and 1950s. During this time, colonies of eastern and western honey bees were simultaneously kept by beekeepers in southeastern Asia, allowing the mite to spread to the new host. The mite has since achieved near worldwide distribution, infesting honey bee colonies on all continents except Australia. The *Varroa* mite is a dangerous and potentially deadly parasite of honey

bee colonies, as the mite represents a key viral vector and is present in all colonies of bees in the United States. For these reasons, effective mite monitoring and control are crucial to continued honey bee colony health.

Monitoring and Control

Varroa mites occur in every colony of honey bees in the United States. However, many beekeepers make a critical error in assuming that because they have not physically seen mites in their colonies, mites are absent. This assumption is especially dangerous, as the mites' body shape allows them to hide between the body segments of the adult bee, leaving little or no surface of the mite visible. Thus, the use of effective mite monitoring techniques to track the ratio of mites to bees in bee colonies is important.

While several techniques may be used to monitor mite levels, two methods are sufficiently accurate and simple to satisfy the needs of any beekeeper. The first method, known as the alcohol wash, is generally regarded as being more accurate. However, this technique requires sacrificing about 300 bees. While killing this number of bees is generally inconsequential to colony health, many hobby beekeepers may find this sacrifice unpleasant and opt for the slightly less accurate "sugar shake" method. The information gleaned from these tests is crucial in the timing of mite treatments. The treatment threshold is two to three mites per 100 bees according to integrated pest management guidelines. (See Additional Resources for more details on *Varroa* monitoring using these strategies).

Many methods are currently used to control *Varroa* levels in honey bee colonies. Considering the efficacy of each method is important, as well as the monetary cost and potential effects on colony health. Several physical control methods, such as the use of screened bottom boards, small-cell foundation and powdered sugar dustings are claimed to be viable methods of control, but recent studies have demonstrated that powdered sugar dustings and small cell foundations are ineffective. While screened bottom boards lead to reduced mite levels, the level of *Varroa* control provided by these devices is not sufficient to be relied upon solely. Screen bottom boards are best suited to be coupled with other, more effective methods of control.

Many queen producers are actively breeding stocks of bees with the ability to mitigate *Varroa* levels through enhanced hygiene and grooming behaviors. While these mite-resistant stocks show great promise, additional measures of control may currently be necessary. Chemical treatments are currently the most effective means of controlling *Varroa* mites, and a wide variety of compounds are registered for this purpose. In the case of older chemistry, such as fluvalinate (trade name *Apistan*) and coumaphos (tradename *Checkmite+*), cases of mite resistance are well documented. These compounds are also believed to have deleterious effects on colony health. Newer products include the formamidine insecticide amitraz (trade name *Apivar*) and hop beta-acid (trade name *Hopguard II)* as well as various formulations of formic acid, oxalic acid and thymol. While many newer compounds have been shown to be relatively effective, consulting the product label and information on the manufacturers' websites is necessary to achieve the highest treatment efficacy. **It is critical to remember the product labels of *Varroa* treatments carry the force of law. Using the product in any manner inconsistent with its labeling is a violation of federal law, and may be harmful to the bees within the colony as well as consumers of products from affected hives.**

Additional Resources

For information about the "powdered sugar shake" test, please see the following article: https://www.lsuagcenter.com/profiles/aiverson/articles/page1527517445741.

For information about the "alcohol wash" test, please see the following article: https://www.lsuagcenter.com/profiles/bneely/articles/page1563473314018.

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