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# Detecting and controlling honey bee brood mites

*Varroa jacobsoni* Oudemans

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## Detecting and controlling honey bee brood mites (*Varroa jacobsoni* Oudemans)

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The varroa mite, *Varroa jacobsoni* Oudemans, was first discovered by E. Jacobson on the eastern honey bee (*Apis cerana* F.) on the Island of Java in 1904. Oudemans described the mite that same year. Varroa causes little damage to its original host, the eastern honey bee—so its importance to beekeeping wasn't realized until after it was found on the western honey bee (*Apis mellifera* L.).

Since 1953, varroa has been known to occur in the eastern U.S.S.R. on the eastern honey bee. In 1964, it was found on the western honey bee in the same area. Because the Russians considered the eastern strain of *A. mellifera* to be superior, they moved these bees west during the 1960's—and varroa moved west with the bees.

Since the early 1970's, varroa has been a serious pest in Europe. Queen importations, movement of *A. mellifera* and *A. cerana* colonies, migratory bee keeping, and swarm collections have aided the spread of varroa throughout Europe and Asia.

Also during the 1970's, varroa was found in Japan when beekeepers imported *A. mellifera* to replace *A. cerana*. Examples of damage caused by varroa mites are contained in reports from Japan from 1970 to 1973: 22% of their hives were lost, and 58% were severely damaged by varroa.

In March 1983, German researcher F. Ruttner argued that nothing could stop *V. jacobsoni* on its way west through Europe—and that neither legislation nor public education could prevent the parasite from spreading to any country in the world.

Varroa was first reported in the continental U.S. on September 25, 1987. It's now generally widespread throughout the Nation.

Varroa reproduces in the capped drone and worker brood of *A. mellifera*, and in the drone brood

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of *A. cerana*. It's known that grooming behavior of *A. cerana* helps eliminate varroa from *A. cerana* worker brood.

Female varroa move into cells of 5-day-old worker larvae and into cells of 5- to 7-day-old drone larvae just before the cells are capped (cover photo). These mites embed themselves into the larval food and are released from it when the bee larva consumes the remaining food.

Once released from the food, the female begins to feed on the bee prepupa and lays her first eggs 2½ to 3 days after the cell has been capped (figure 1). The first egg becomes a female, the second a male.

Varroa lays up to five eggs during the bee's pupal development in the capped cell, but only the first two mature in the worker brood cell (12.1 days from capping to worker emergence). Up to five mites can mature in the drone brood cell (14 days from capping to drone emergence).

Several honey bee strains from Africa have a shorter development period from capping to adult emergence—short enough to prevent successful reproduction by varroa in about half the infested cells. Female mites often invade a second brood cell



Figure 1.—Varroa mites infesting a honey bee pupa within an exposed cell



Figure 2.—Adult honey bee infested with a varroa mite just behind its thorax

and produce another male and female mite. Occasionally, they invade a third brood cell.

Older female mites spend 3 to 15 days on adult bees before entering a brood cell. Younger female mites spend 1 to 48 days on adult honey bees before entering a brood cell.

Most colonies of bees are killed within 4 years of initial parasitism by this mite. Death of the colony results from damage to the developing bees by the feeding mites (figure 2). This damage causes the emerging adult bees to be deformed. These bees usually emerge, but they're rejected by the normal workers.

Thus, in colonies with high numbers of varroa, too many emerging worker bees are deformed, and there are no bees to replace those that die of old age or while foraging. Because the average lifespan of a worker bee in summer is 4 to 6 weeks, a colony can't survive without replacing its worker force.

Transferring brood between colonies (such as during spring maintenance activity to boost weak colonies) is a technique that may speed the dispersal of varroa within an apiary.

Early detection of varroa infestations is difficult because initial mite population levels are quite small.

In addition, the mites are concealed within brood or aren't readily noticed on adult bees. It's not unusual for mites to invade a colony and remain undetected for 2 to 3 years; during this time, the colony becomes severely stressed by the mites.

## Detection

Several methods of detection are possible, and using two or more at the same time will produce the most accurate results.

**Using worker bees.** Take samples of workers from a brood comb, place them in a quart jar, and anesthetize them with ether. The ether will also anesthetize any mites present and cause them to fall from the bees. Ether sprayed into the jar will have caused the sides of the jar to become moist, and the mites will stick to the sides, where they're usually easy to see.

**Using the brood.** Remove the capped brood from a hive, decap it, and knock out the larvae and pupae onto a piece of white paper. You can see the dark adult mites against the white immature bees and the paper.

## Control

**Chemical.** At this time, there are no registered miticides for use in hives to control varroa mites. The Zoecon Apistan Strip has a Section 18 quarantine exemption for use in Oregon to detect varroa mites in beehives and to certify that beehives are free of varroa mites.

**Nonchemical** control relies on the fact that varroa reproduces in brood and on the mites' preference for drone brood. In heavily infested hives, you can remove the brood and destroy it, killing large numbers of reproducing mites. You can cage queens for long periods (21 to 28 days) so that brood production ceases, stopping mite reproduction.

You can encourage large amounts of drone brood in a hive. Because varroa prefers drone brood, many female mites will enter these cells. Then you can remove and destroy the drone brood. Unfortunately, all these methods will reduce the working force of a colony and (therefore) its productivity.

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## Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
  - **Read** the pesticide label—even if you've used the pesticide before. **Follow closely** the instructions on the label (and any other directions you have).
  - **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.
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