Put your Queens in "Time-Out" to Improve Varroa Control

A Method Widely Used in Italy

Brandon Hopkins, PhD—Washington State University, Pullman

Beekeeping is a fun and fascinating hobby for many people and can be a valuable source of income for others. Learning about bee biology, behavior, and social systems can keep people captivated for many years. However, it is now imperative that beekeepers also learn about the Varroa life cycle and basic biology as in integral part of their honey bee education. With a basic understanding of Varroa biology, beekeepers can take advantage of the Varroa life cycle to improve mite control. When Varroa mites are not inside capped brood reproducing, they are hitching a ride on adult bees or crawling around looking for brood cells that are about to be capped. They are the most susceptible to miticides during this phoretic stage.

There is no effective miticide that can kill Varroa while they are inside the capped brood cells. Many products attempt to get around this constraint by either developing slow-release mechanisms like ApiVar or multiple treatments like oxalic acid. On the other hand, all registered miticides are very effective at killing Varroa mites while they are phoretic. Because of this, it is very important to take advantage of opportunities when colonies are without brood to treat for Varroa mites.

There are some key opportunities when colonies are naturally broodless that provide an excellent chance to get great Varroa control: packages, swarms, broodless splits, and in some cases winter clusters (before winter solstice). However, the swarms, packages, and splits are generally early in the season and don't apply to established colonies, and winter treatments are often far too late to save established colonies that are heavily infested. Most critical treatments need to happen shortly after the honey crop is removed and before they start to produce their winter bees (September–October), and colonies have a lot of brood at this time.

This is where queen caging can be a very useful tool to improve Varroa mite control. Queen caging prevents the queen from laying and forces the colony to become broodless. This can be done before, during, or shortly after the honey supers are removed with little to no effect on honey production. It is important to use the proper queen cages for this technique. Ideally the cage should be constructed out of queen excluder material so that workers can access the queen to care for her and spread her pheromones (prevent supersedure), but the queen cannot have access to the comb. There are a few excellent published studies on the technique (Gregorc et al. 2017; Giacomelli et al. 2016), and they clearly demonstrate how much more effective treatments are when they are combined with queen caging. Our experience with queen caging was presented at the 2017 OSBA Fall Conference. We compared the use of queen caging combined with oxalic acid dribble with oxalic acid dribble alone. The colonies we chose were heavily infested and showed clear signs of Varroa damage in the brood. All hives treated with queen caging + oxalic acid dropped below treatment threshold for Varroa. Hives treated with oxalic acid without queen caging maintained deadly levels of Varroa mites with very little chance of making it through the winter.

Back to the importance of understanding Varroa life cycle and how the relationship with the timing of queen caging is a critical component to its success as a Varroa control method. For example, Varroa infest brood cells at day 8 just before the cell is capped. Drone brood takes 24 days to emerge. The queen needs to remain in the cage for a minimum of 17 days, then the treatment will have to go in exactly one week later. Not before, because there could still be capped drone brood, and not later, because brood cells will start being capped and Varroa crawling in 8 days after releasing the queen. The queen can be caged for longer to increase the window of time you have to apply the treatment. For example, you could cage the queen for 24 days, then you could treat the same day you release the queen or any time in the next 7 days. Of course, the longer the queen is caged, the greater the loss of brood production and the increased risk of supersedure.

Every beekeeper's calendar and availability to work colonies is different, and the timing has to be worked out to fit each individual operation, but the technique provides flexibility and dramatically increases the effect of your mite treatment.

References

Gregorc, A., Alburaki, M., Werle, C. et al. 2017. Brood

removal or queen caging combined with oxalic acid treatment to control Varroa mites (*Varroa destructor*) in honey bee colonies (*Apis mellifera*). *Apidologie* 48: 821. https://doi.org/10.1007/s13592-017-0526-2.

Giacomelli, A., Pietropaoli, M., Carvelli, A. et al. 2016. Combination of thymol treatment (Apiguard®) and caging the queen technique to fight *Varroa destructor*. *Apidologie* 47: 606. https://doi.org/10.1007/s13592-015-0408-4.