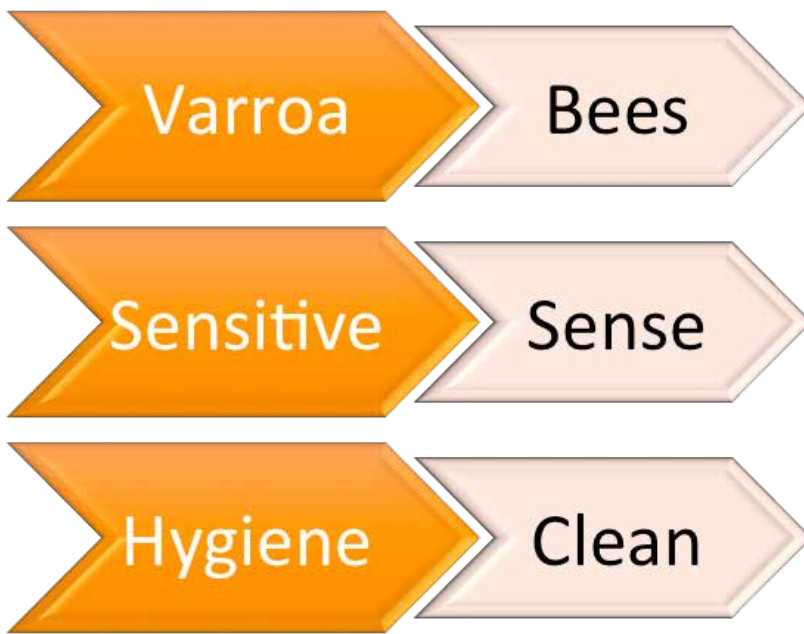


PEST AND DISEASE CONTROL

WHAT IS THE VARROA SENSITIVE HYGIENE TRAIT?

Rae Butler, Queen Breeder at Bee Smart Breeding

This is the first of a series of articles on varroa sensitive hygiene (VSH), a behavioural trait of honey bees proven to assist bees in becoming resistant to varroa mites (*Varroa destructor*).



Varroa

The varroa mite (*Varroa destructor*) is a parasite that can reproduce only in a honey bee colony.

To comprehend how the VSH trait works, it is important to understand the life cycle of the varroa mite in correlation with their honey bee hosts.

A mature female mite enters a worker brood cell when the larva is five days old and about to be capped. The mite will hide behind the larva and waits for the cell to be capped, then starts laying 70 hours (day 3) after entering that cell. The first egg she lays is always a male, then she lays one female egg at subsequent intervals of 30 hours.

The single male will mate with all the females that are mature before the worker bee emerges. It will take seven days for the female to mature and become fertile. Therefore, in most cases, when a worker bee hatches there will be two mature female varroa, one male, three immature females and their mother released into the hive as well. The male and immature female varroa mites do not survive once outside the cell.

The two mature fertile varroa mites will invade uncapped larval cells and start the reproductive cycle over. Each female mite goes through several reproductive cycles during its life.

If the varroa were to have invaded a drone cell, there is an extra three days in the incubation period, which gives enough time for all five female offspring to become fertile.

Sensitive

VSH bees have the VSH trait and are highly sensitive to the presence of varroa in the pupae. It was thought that odours and movement of the varroa alerted the VSH bees of the varroa's presence; it is now surmised that the pupae give off a chemical cue which signals a varroa incursion.

Hygiene

VSH bees respond to the stressed pupae by uncapping the cells and removing the pupae, which in turn releases the varroa mites. VSH bees are also known to uncap and then recap pupae. This sometimes releases some of the invading varroa.

The uncapping response is normally when the pupa is at the white, pink and purple-eyed stage, at which point the varroa mother would have had two to five offspring. The uncapping displaces the mother varroa and her offspring, who are at different stages of maturity.

A displaced varroa may be killed by adult worker bees, or may enter a new larval cell where the mother often cannot produce a normal family of offspring. These 'non-reproductive' mites are a key feature resulting from high levels of VSH activity.

In this way, the VSH bees are able to keep the mite population levels down by interrupting the life cycle of the varroa.

VSH is a heritable breeding trait that can be selected and can be used in combination with an Integrated Pest Management Plan.

It is documented that many New Zealand bee colonies already have the VSH trait—so it may be able to be selected in your colonies along with the other desirable traits that you have previously been selecting.

Some simple techniques can be used to put your colonies through an initial screening for the VSH trait. More information on these methods are described by Villa, Danka & Harris (2009).

Reference

Villa, J. D., Danka, R. G., & Harris, J. W. (2009). Simplified methods of evaluating colonies for levels of Varroa Sensitive Hygiene (VSH). *Journal of Apicultural Research and Bee World*, 48(3): 162–167. Available online at <http://dx.doi.org/10.3896/IBRA.1.48.3.03>

