Crop IQ Technologies

CONTROL VARROA MITES

IQ PROBEE

Life in the hive is highly organized, with busy insects working all around the queen. Worker bees distribute pollen, clean and look after larvae, or defend the entrance against enemy invaders like wasps and other honey thieves. But the varroa mite, Varroa destructor, slips in unnoticed on the bodies of some worker bees, evading the strict door policy. It bringsa deadly danger with it; this tiny, brown arachnid can wipe out entire bee colonies. Like a tick, it fastens it self onto a bee with its jaws and so sneaks its way into the realm of the hard-working nectar collectors. Once inside, mites reproduce by laying their eggs in the honeycombs where new bees are raised. After ten to fourteen days their offspring spread throughout the bee population along with the newly emerged bees.

Varroa mites (Varroa destructor) are external parasites that attack both honey bees and brood. They suck the blood from both the adults and developing brood, especially drone brood. This weakens and shortens the bee's life. Emerging brood may be deformed with missing legs or wings. Untreated infestations of varroa mites will increase and may kill colonies. If the colonies are not examined for mites, losses may be mistaken for winter mortality or queenlessness. The adult female mites have eight legs and reddish-brown flattened oval bodies about 1 to 1.5 mm across. They are large enough to be seen with the unaided eye on the bee's thorax or abdomen. Their flat shape allows them to fit between the bee's abdominal segments. This mite is often confused with the bee louse. However, the bee louse, an insect, has only six legs. Its body is more circular and slightly larger.

Mites develop on the bee brood. A female mite will enter a brood cell about a day before it is capped so it is sealed in with the larva. Immature mites that emerge from the eggs she lays feed and develop on the maturing bee larva. By the time the adult bee emerges from the cell, several of the mites will have become adults, mated, and are ready to begin searching for other bees or larvae to parasitize. Inspection of the drone brood in their capped cells will often indicate whether or not a colony is infested. The dark mites are easily seen on the white pupae when the comb is broken or the pupae are pulled from their cells.

Mites spread from colony to colony by drifting workers and drones. Honey bees can also acquire these mites when robbing smaller colonies. It is best to isolate captured swarms, package bees, and other new colonies from older colonies and examine them for mites before placing them in an apiary.

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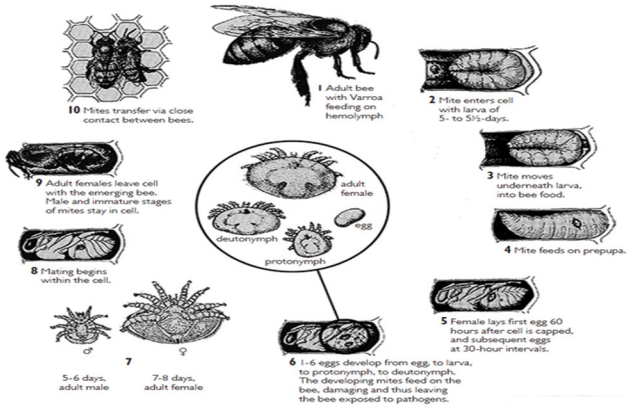
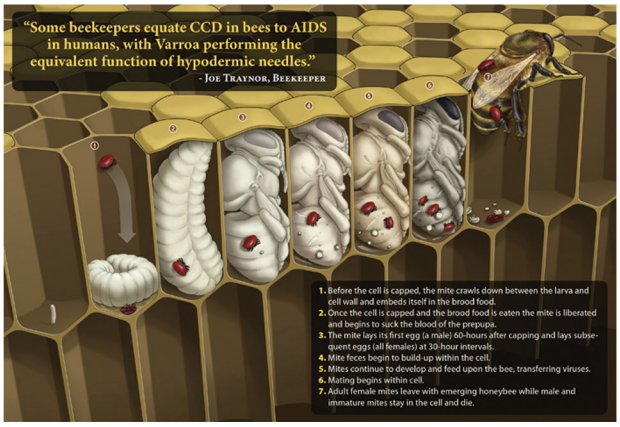
Varroa mites transmit dangerous viruses and bacteria:

Varroa mites transmit pathogens like viruses and bacteria which are damaging to bee health. This parasite has wiped out entire populations of Western honey bees over recent years. Without human intervention, infestation with varroa means certain death sooner or later for honey bees in Europe and America. Things are different in Asia, where the deadly mite originated. There, a balanced relationship between the parasite and its original host, the Eastern honey bee or Apis cerana, has evolved over many generations.

The varroa mite was not seen in Europe until the 1970s and in America until the 1980s, but since its introduction it has caused massive bee deaths, as the Western honey bee has no defense against the parasite.

Mite Biology and life cycle





The adult mites have a flattened oval shape, are reddish-brown in color, and are about 0.06 inches wide, about the size of the head of a pin . The mated female mite enters the cell of a developing bee larva and lays as many as six eggs. The developing mites feed on the bee pupa and, depending on the number of mites, may kill it, cause it to be deformed, or have no visible effect. While the male mite dies in the cell, the adult daughter mites climb onto an adult worker bee and feed on its hemolymph (a fluid known as "bee blood"). The female mite can then repeat the cycle by entering cells of other developing larvae. Mites prefer drone larvae over worker larvae, but they will infest worker larvae and eventually kill the colony if preventive measures are not taken.

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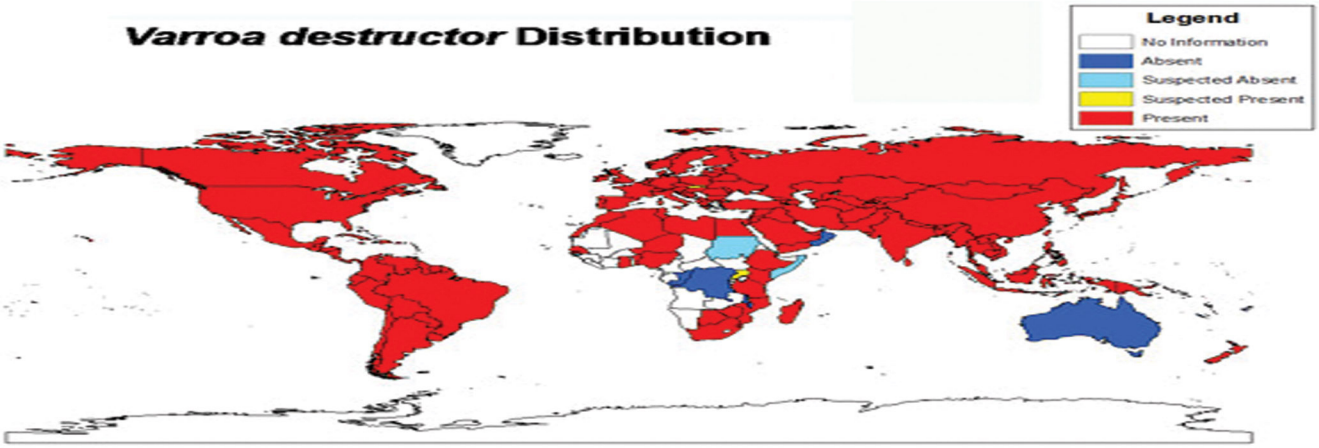
The mites can also harm the bees in- directly. In addition to the obvious effects of mites feeding on developing and adult bees, the mites can also serve as transmitters of several viruses that can kill bees. These secondary infections are facilitated when the mites compromise the bees' immune systems. They can cause a condition known as parasitic mite syndrome , which can kill colonies within months of infection.

Distribution



Economic Importance

country that it has been introduced. Individuals reporting the effects of Varroa after Varroa have affected the apiculture industry negatively in every they arrived in the U.S. stated that honey bee colonies would not survive unless beekeepers intervened with a chemical treatment Accurate estimates of the effect of Varroa on the apiculture industry are hard to find, but it is safe to assume that the mites have killed hundreds of thousands of colonies worldwide, resulting in billions of dollars of economic loss. Varroa have caused beekeeper production costs to rise, thus lowering the profit margin in beekeeping.

Varroa also have affected the feral (wild) population of bees in many areas. Since feral colonies were not managed for Varroa and the colonies were left unprotected, the loss of feral colonies quickly resulted as Varroa continued to spread. On the other hand, feral colonies that survived Varroa infestations have slowly developed resistance mechanisms that have allowed them to persist in the presence of the mite. This did not happen with managed colonies because beekeepers started treating chemically for Varroa almost instantly, thus keeping alive susceptible populations of bees. This practice is changing.

Varroa weakens and ultimately kills colonies by out-reproducing their host. Typically, bee populations peak in late spring/mid summer with a steady decline in population occurring in mid-late summer. Varroa population increase is similar to that of the bees but is offset by a number of weeks. Therefore, Varroa populations are just beginning to peak when bee colony populations typically begin to decline. This is usually the start of significant mite problems.

Varroa rarely kill adult bees, but they do shorten the lifespan and may even alter bee behavior. Varroa can kill immature bees, and their ability to do so is correlated with the number of Varroa foundresses that enter a brood cell prior to it being capped. The more mite foundresses in a cell, the less likely the immature bee will develop successfully and emerge as an adult.For some time, scientists have known that honey bees host a number of viruses. There is evidence that some of these viruses are associated with Varroa presence and levels in a colony. It now is believed that Varroa can transmit multiple viruses to their hosts and that these viruses, not the mites themselves, may cause the majority of the damage that bees experience while hosting the mites.

To illustrate this point, one of the most telling signs of a Varroa presence in a colony is the occurrence of newly-emerged adult bees with misshapen wings. A virus, called deformed wing virus and present in immature bees, is responsible for this symptom. Bees with this virus are unable to use their wings and will die or be killed by the other workers within a few days of emergence. Deformed wing virus can be so prevalent in maturing bees that they can emerge without any wings at all. Researchers suspect that other viruses play an important role in the Varroa mite/honey bee relationship, but the roles of these viruses are not well understood.

Newly emerged worker honey bee exhibiting symptoms of Deformed Wing Virus which is transmitted by the Varroa destructor

Crop IQ Technologies

Crop IQ Management program:

Even though Varroa can be detected visually on adult and immature bees, the number of mites on each only gives one an index rather than an accurate measurement of Varroa populations in the hive. Measurements have become more accurate with the advent of sampling tools, the most popular of which is sticky screens, ether rolls, or sugar shakes.

IQ Varroa sticky screens are pieces of cardboard coated in a sticky substance. The cardboard is then covered with a wire mesh that prohibits bees from touching the sticky substance but allows Varroa to fall through the mesh. These screens can be inserted under the honey bee nest and used to trap falling mites. Varroa, both living and dead, regularly fall off their host bees. This may be facilitated by the grooming activity of the bees, but it probably occurs naturally as well. When a sticky cardboard insert and screen are present underneath the nest, the falling Varroa will pass through the screen and get trapped on the sticky surface of the cardboard. Researchers have been able to correlate mite fall in 24-, 48-, and 72 hour periods with actual Varroa populations in the colony. Sticky boards are useful because they sample the entire colony for the presence of Varroa, rather than any subset of bees within the colony.

IQ PROBEE

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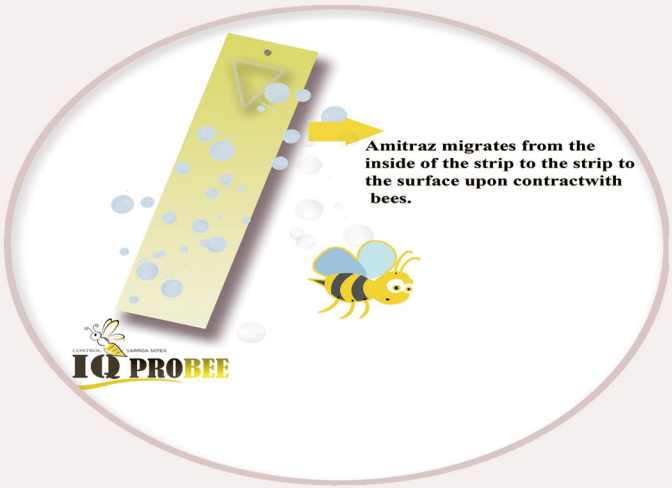
IQ PROBEE is the only amitraz-based controlled- released technology that treats not just one generation of Varroa mites, but several successive generations, reducing mite populations in the hive by up to 99%

IQ PROBEE works by contact: The active ingredient is delivered continuously over time. As bees walk on the strip's surface they pick up molecules of the active ingredient and then distribute them throughout the colony.



IQ PROBEE Safe for bees and for honey

NO SIGNIFICANT RESIDUES IN HIVE PRODUCTS
NO NEGATIVE EFFECT FOR BROOD OR QUEENS

IQ PROBEE

KILLS UP TO 99% MITES IN 1 APPLICATION
NO EVIDENCE OF RESISTANCE

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