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Protecting Pollinators Part II

A brief summary of recent research

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In [Protecting Pollinators, Part I](#), Paula Shrewsbury and I covered the concerns about potential negative impacts on pollinators. In Part II, I cover some of the recent research conducted in Europe regarding the impact neonicotinoids and some fungicides on honey bee colonies.

Introduction

Entomologists in the United States and Europe are investigating the multiple causes of the decline in health of pollinators, with much of the concentration on honey bees and bumble bees. This article is to update people in the horticulture industry on what is being found through scientific research in America and Europe.

Varroa Mites

One of the causes of honey bee and bumble bee troubles is a small parasitic mite called a varroa mite. Varroa mites were first found in Maryland in the early 1990s. Since then, these mites have been found in honey bee colonies worldwide. How do the mites spread to a bee colony? Varroa mites spread from colony to colony by drifting workers and drones within an apiary. Honey bees can also acquire these mites when robbing smaller colonies. The mite is also moved about by transporting honey bee colonies from one state to another.

Varroa mites are external honey bee parasites that attack both the adults and the brood, with a distinct preference for drone brood. They suck the blood from both the adults and the developing brood, weakening and shortening the life span of the ones on which they feed. Emerging broods may be deformed with missing legs or wings. Untreated infestations of varroa mites increase and will kill honey bee colonies. The varroa mite has also been found to transmit diseases to the bees. Under field conditions the Varroa mite, *Varroa jacobsoni*, were shown to be highly effective vectors of deformed wing virus (DWV) between bees. This viral disease cause bees to have deformed wings that do not allow flight. A relationship was found between increasing numbers of mites on individual bees and the incidence of morphological deformity and death.

The adult female mites are reddish-brown in color, flattened, oval, and measure about 1 to 1.5 mm across. They have eight legs. They are large enough to be seen with the unaided eye on the

thorax, most commonly, and on the bee's abdomen. Their flattened shape allows them to hide between the bee's abdominal segments.

How are Bee Keepers Controlling Varroa Mites?

If a colony is found to be infested, all colonies at the site are generally treated for mites with Apistan strips. These strips contain the miticide fluvalinate and are not to be used during honey flow or when there is surplus honey present in the colony that may be removed for human consumption at a later date. This use of a miticide in a honey bee colony is not completely desirable for the health of the bees but the varroa mite is considered the greater threat to bee colony health.

A predatory mite that has been used for fungus gnat control is now being used in honey bee colonies to reduce varroa mite populations. *Hypoaspis miles* was tested by researchers and honey bee keepers in Canada during 2013 and 2014 for the effects of the predatory mite on the numbers of varroa mites in infected hives. Positive results have been found so far.

Impacts of Neonicotinoids and Fungicides on Bees

Several researchers are examining the impact of neonicotinoids and classes of fungicides including chlorothalonil and how they impact bees. Researchers in England have developed a small transmitting antennae that weighs 1/10 the weight of the honey bee female. The female honey bee can carry up to half of her body weight in nectar and pollen so the weight of the antenna does not impinge on the honey bee's flight. The small micro-antennae is attached to the upper thorax of the honey bee, and then the honey bee is released. The researchers used a radar disc and computer software to track the flight of the honey bee. Honey bee researchers in Germany are using the system developed by the English to track honey bees exposed to neonicotinoids, exposed under lab conditions. They have found that exposing bees to 5- 50 parts per billion (ppb) of a neonicotinoid results in bee behavior modification, and in some cases, death. Untreated honey bees were released along with bees fed the nectar with a neonicotinoid added at 6 ppb. The bees were released and allowed to return to the hive. The bees appear to have an internal tracking system that allows them to find their hive. When they are released in unfamiliar surroundings they will use visual cues to locate the hive. The treated and untreated bees returned with little trouble. They varied the trials moving the honey bees to an unfamiliar location and released bees treated with neonicotinoids along with control honey bees. The untreated honey bees found the hive 100% of the time in the trials. Honey bees treated with neonicotinoids had greater difficulty locating the hive with the visual cues and many did not return to the hive. Keep in mind these honey bees were artificially treated in lab conditions before being released.

Researchers in England are mounting the micro-antennae on honey bees and tracking their foraging patterns and looking at what flowers they are visiting. The purpose is to determine if in field conditions the honey bees dilute the neonicotinoid nectar with other nectar sources and what impact this has on bee health. This research is continuing into 2015 and the results will hopefully be available sometime in 2015.

In France, neonicotinoids were banned over 10 years ago and bee keepers continue to experience colony bee health issues even in the absence of neonicotinoids. Neonicotinoids are widely used in agriculture in Australia and, so far, the bee colonies appear to be doing fine.

Pollen Sources

Land use researchers are looking at historical use of agricultural land and comparing it to modern agricultural practices. One thing they have noted is that in the early 20th century the agricultural land use involved multiple crops with many open areas with diverse pollen sources. In the 21st century they noted large areas of a limited number of crops planted in large blocks. Many of these crops are poor pollen sources for pollinators. Bee colony health appears to be tied to honey bee foraging on multiple sources of nectar. In England they are conducting field trials on cooperating farms by planting strips of various flowers to serve as a diverse nectar source. They are finding bumble bee species populations are up to 6 times greater in number at the farm planting pollen-rich and diverse flower sources. This practice of planting pollen source planting strips, at least based on early stages of investigation, appears to be a good way to improve pollinator health.

We will continue to keep you informed on pollinator health and ways you can help maintain healthy populations of pollinators at your farms, nurseries and landscapes.