Protecting Pollinators: Part II

A Brief Summary of Recent Research

By Stanton A. Gill

In **Protecting Pollinators, Part I**[1], 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 of 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 workers and drones drifting 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 spans of the ones on which they feed. Emerging broods may be deformed with missing legs or wings. Untreated, infestations of varroa mites will increase and kill honey bee colonies. The varroa mite has also been found to transmit diseases to the bees. Under field conditions, varroa mites, *Varroa jacobsoni*, were shown to be highly effective vectors of deformed wing virus (DWV) between bees. This viral disease causes 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 bee's thorax, most commonly, and also on the 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 to measure 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 as to how they impact bees. Researchers in England have developed a small transmitting antenna that weighs 1/10 the weight of the honey bee female. The female honey bee can carry up to half of her body weigh in nectar and pollen so the weight of the antenna does not impinge on the honey bee's flight. The small micro-antenna 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 own 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 difficultly 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-antennas on honey bees, 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 im-

pact 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 six 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.

References

[1] Published in ***The Azalean***, Spring-Summer, 2015: 37 (1-2): 25-27. Please see author's note in that issue for relevance to azalea gardens.

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ASA Seed Exchange

By Lindy Johnson

Contributing Seed

Seed contributions will be accepted from ASA members and other sources throughout the year until December 31.

The seed from each plant should be described by the:

- contributor's name
- seed parent name
- pollen parent name
- plant type (evergreen, deciduous, azaleodendron)
- pollination type (open pollinated, hand pollinated or wild cutting)
- where collected (geographic feature or town)
- notes

This information can be written on seed envelopes, or we have a seed data form to describe the seed, as a short (4KB) file to down load and print.

If you have digital pictures of the parents, please e-mail them to Dave Banks, with the name, date and location taken, for posting on the web linked to your seed. dfbanks@earthlink.net.

Seed should be current year production and can be cleaned or not. Put the seed from one plant into one paper envelope with one completed form (or write the information on the envelope), and mail to: Lindy Johnson, 843 Wallace Rd, Trade, TN 37691.

When we receive the seed, it is cleaned and distributed into #1 coin envelopes, and each lot of envelopes is assigned a number and stored until it is ordered.

Ordering Seed

The seed list will be posted online on or about January 1st. The notice also gives the address to request a hard copy list of seed available.

Seed is shown on the web on a seed list page, where it is listed alphabetically by seed parent name with the information provided by the seed contributor, including links to any pictures of the parent plants.

After January 1st seed is distributed to contributors and ASA members on a first come, first served basis. After April 1st seed is distributed to anyone on a first come, first served basis.

All seed is packaged in #1 coin envelopes, and costs $2.00 for approximately 50 seeds. Shipping and handling is an additional $3.00 for all the envelopes in one order. Orders can be placed by e-mail to appalnativeplants@gmail.com or by a letter addressed to the Lindy's address provided above.

All seed not distributed before the annual convention will be offered for sale there.

Seed orders can be paid for with a check made out to "ASA" with "seed exchange" on the memo line, or by a credit card payment through PayPal using the form on the Seed Exchange 2016 page.