Tracking the Health of Feral Bees in Pennsylvania

By Margarita M. López-Uribe

Honey bee losses in the US continue to be over 40% on average every year. In Pennsylvania, the Bee Informed Partnership (BIP) reported that approximately 53% of colonies were lost during 2015-2016, placing PA as the fourth largest state for honey bee losses across the country. Varroa mites are one of the major causes associated with these losses, as they weaken bee immunity and vector deadly viruses.

Despite experiencing the same pressure from varroa, there are reports of surviving populations of unmanaged (feral) honey bees that naturally deal with mite problems around the world. The best-known example of mite-surviving European honey bees in the US is the population from the Arnot Forest, located in upstate New York. This population of 15-20 colonies has remained stable for over four decades, even after the introduction of varroa in 1987. The high survival rate of these colonies, in the absence of beekeepers providing mite treatments, raises interesting questions about how these colonies are able to overcome the threat of varroa.

Experiments have recently demonstrated that nest size may be one key feature of healthy mite-resistant honey bee colonies. In a study led by Dr. Tom Seeley, he and his collaborators compared the number of mites in small (42L) and large (168L) hives. After monitoring these colonies for two years, they found that small hives had less disease and survived longer. They concluded that nest size may be one way that unmanaged honey bees better deal with varroa problems. Small colony size has also been identified as an important factor in the mite-resistant population from Gotland (Sweden).

In other parts of the world, mite-resistant honey bee populations are able to reduce mite development. For example, Africanized bees—that are smaller in size than the European honey bees—are capable of reducing mite numbers by reproducing faster and using a smaller cell comb. However, forcing European honey bees to develop on small comb has not been effective to control varroa, probably because large bees cannot develop well on small comb. The use of small cell comb is therefore a potential solution for mite control in southern regions of the US, where European and Africanized honey bees may be hybridizing. Still, this remains to be tested.

Another way honey bees could become resistant to varroa mites is by increasing their ability to reduce mite reproduction. For example, bees of the mite-resistant population from Gotland (Sweden) show stronger chemical defenses in their cuticles (the bee's skin), which hinders mite reproduction in comb cells. Worker bees from mite-resistant colonies in Avignon (France) are better than mite-susceptible colonies at detecting and removing reproducing mites. Both of these populations have not been managed for varroa control for decades and

Transition to Email Distribution of *The Pennsylvania Beekeeper*

With Yvonne Crimbring retiring after 42 years of outstanding service to the Pennsylvania State Beekeepers Association we are facing some challenges accomplishing the tasks that she performed. One issue we are addressing is the expense of printing and mailing The Pennsylvania Beekeeper newsletter. Currently about a third of the newsletters are sent by email leaving approximately 600 to be printed and mailed. We are asking everyone currently receiving printed copies to please consider converting to the email distribution. If we can't reduce the printed number to a manageable level we will have to look at other ways to address the issue. Please consider transitioning to an electronic format, by emailing Bob Tatro at psbasecretary@gmail.com. Please include your name and email address that you wish to receive the newsletter.

have developed the ability to reduce mite reproduction after going through natural cycles of population crash and recovery.

All the studies documenting mite-resistant populations in the Arnot Forest (NY, USA), Gotland (Sweden), Avignon (France), Primorsky (Russia), and Fernando Noronha (Brazil) show that over time, feral colonies can evolve a balanced host-parasite relationship with varroa mites. A recent study in North Carolina also showed that unmanaged (feral) honey bees have stronger immune systems than managed bees in the same region. Because honey bees with stronger immune systems can directly reduce mite longevity and reproduction, it is possible that we could use their genetic material to create more varroa resistant colonies for beekeepers in the future.

The Lopez-Uribe lab at Penn State is working on a project that aims to (1) map feral honey bees—defined as unmanaged colonies that have been established for at least one year—across Pennsylvania, and (2) analyze and compare their immune systems to managed honey bees located in similar landscapes. Because tracking feral bee colonies can be difficult, we need your help. If you are aware of an unmanaged honey bee colony that has survived at least one winter, please go to our website (http://lopezuribelab.com/tracking-feral-bee-health/) and share with us the information you have. Colonies will remain unharmed after our study. We will only record colony locations and take about 50 individuals from each colony. Those samples will be brought to the laboratory for genetic analyses. We will present an update of this project during this year's PBSA meeting on November 3rd and 4th. Stay tuned for our results!