



HONEY BEE HEALTH

BY THE NUMBERS

- 10 of Washington's most important crops are dependent on bees for pollination.
- Honey bees make it possible for fruit, vegetable, and seed crops to add billions of dollars to Washington's economy, including \$3 billion from tree fruit and berries.
- Washington bees produce nearly \$4 million worth of honey annually.
- Honey bees make it possible to produce more than 90 crops in the United States.

2016 ISSUE

Honey bees contribute more than \$18 billion to the U.S. economy in pollination of more than 90 agricultural crops. One-third of the food we eat benefits from honey bee pollination. Thus, the serious decline of honey bees, known as colony collapse disorder (CCD), is a major concern for all of us. In Washington, beekeepers are reporting losses at two to three times the level they have historically experienced. CCD is a complex syndrome and more than 60 variables are associated with this phenomenon. Most researchers and beekeepers attribute the parasitic mite *Varroa destructor* as the major contributor to CCD. But there are several other major variables that also contribute, including various pathogens, loss of habitat, and exposure to pesticides. First discovered in the United States in 1986, the Varroa mite will kill a colony within 2 years if left untreated. Agricultural pesticides, including those used by beekeepers to control the Varroa mite, are also contributing factors in the decline of honey bees.

RESPONSE

The most common means of controlling the Varroa mite is through chemical treatments in the colonies. While these treatments can be effective, reliance on them is not sustainable. WSU is seeking sustainable solutions that include increasing the genetic diversity of honey bees and looking at natural and cultural control strategies. Increasing the genetic diversity of honey bee populations will improve our ability to find natural mechanisms of resistance to the Varroa mite. WSU is also looking at non-chemical natural approaches to controlling the Varroa mite and improving the immune system of the honey bee. In addition, WSU is considering the science behind various management strategies that can help reduce the impact of the Varroa mite.

Since 2008, WSU has imported honey bee semen from areas of the world where the bee is indigenous, including Italy, Slovenia, Republic of Georgia, Poland, Germany, and Kazakhstan. After being cleared of any disease problems and initial selection, WSU works with queen producers to distribute this stock to beekeepers throughout the United States. DNA analysis has documented significant increases in genetic diversity in stock of U.S. queen producers as a result of this program.

WSU has started the first germplasm repository for honey bees where semen from the importation program and U.S. bee breeders can be held indefinitely through cryopreservation. WSU is working with beekeepers to look at better ways to overwinter bees and help reduce Varroa populations.



QUOTES

"WSU is doing applied beekeeping research, the kind that helps our bees be healthy now. They are focused on Varroa mite control, and have been and continue to be involved in several methods of control. Finding something that works is a challenge, but they're not afraid of the challenge. The WSU bee lab's genetic program will give beekeepers the traits to better serve the needs of pollinated agriculture. By importing, verifying, and distributing to queen breeders the genetics from the countries of origin of crops needing pollination, they will breed bees uniquely suited to increase yield." - Tim Hiatt, beekeeper

PHOTO CREDIT

Photos by Kathy Keatley Garvey.

WSU has researched controlled climate facilities to better over winter honey bee colonies. Using old apple storage warehouses, bees are kept in areas with elevated CO₂ concentrations. This does not harm the bees, and can help control Varroa mite populations. This research has already changed the overwintering practices of many migratory beekeepers and should serve as a good model for others to follow.

WSU is also investigating the potential of an innovative approach to mite control using various strains of fungi that appear to strengthen the bee's immune system and negatively affect the Varroa mite. This promising alternative to chemical control of the Varroa mite is in its early stages but is showing promising results.

Some beekeepers and the public at large are concerned about a new class of pesticides known as neonicotinoids and their impact on honey bees and other pollinators. While it is known that neonicotinoids can have lethal and sub-lethal effects on bees, the results of a statewide survey of honey bee colonies found the actual exposure of bees to this class of pesticide is very low. This is good news for beekeepers and allows us to focus our attention on more likely causes of bee decline. Through fact sheets and video presentations, WSU has helped improve the knowledge of pesticide applicators and the importance of pollinators and the bee-safe use of pesticides. WSU Extension also created a video on [pollination and protecting pollinators](#) that explains the complexity of the issues of honey bee decline and includes a summary of actions WSU is taking to address concerns.

IMPACTS

- Honey bee queen producers have access to greater genetic diversity of stock to select for resistance to pests, diseases, and important behavioral characteristics.
- Beekeepers, queen producers, and honey bee researchers have the ability to store and retrieve germplasm for indefinite periods of time.
- Beekeepers have greater knowledge and understanding of non-chemical approaches to reducing infestations of the parasitic mite *Varroa destructor*, a major contributing factor in colony collapse disorder.
- The Washington Department of Agriculture has better information to respond to concerns about the impact of neonicotinoid pesticides on honey bee populations.
- Pesticide applicators and the public have increased knowledge and understanding of the importance of pollinators and how to reduce the impact of pesticides on honey bee populations.
- Washington growers have access to additional resources and knowledge concerning pollination and pollinator protection, especially related to tree fruit, small fruit, seed crops, and vegetables.