

Honey Bees and Beekeeping in Connecticut

Kirby C. Stafford III, Ph.D. and Kimberly A. Stoner, Ph.D.

Department of Entomology

The Connecticut Agricultural Experiment Station

(Originally published in the Connecticut Weekly Agricultural Report; April 1, 2009)

“Many people, when they think of pollinators at all, think of honey bees.”

Stephen L. Buchmann and Gary Paul Nabhan, *The Pollination Crisis*, 1996

The honey bee, *Apis mellifera* L., is an insect in the Order Hymenoptera, which includes plant-feeding sawflies, parasitic and non-parasitic wasps, ants, bees, and social wasps. Our familiar domesticated honey bee is one of a number of bees in the family Apidae, which include honey bees, bumble bees and a group of stingless bees. The economic importance of honey bees is large, mainly because honey bees are generalists, capable of pollinating many agricultural crops. Although some other species like alfalfa bees, bumble bees, squash bees, and mason bees are often more efficient pollinators for specific plants, honey bees are generally the pollinator of choice for most crops because they build large colonies of thousands of bees that can be transported to pollinate large tracts of commercial crops and honey bees will forage up to 2 miles from the hive. It is estimated that honey bee pollination may account, either directly or indirectly, for one-third of the food we eat. Managed honey bees pollinate more than 100 commercially grown crops in North America with a value of about \$14 billion.

However, managed honey bee colonies and wild colonies in the United States have declined in recent years. This decline has been linked to the introduction of pests, particularly the varroa mite, *Varroa destructor* (Anderson & Trueman), and other factors such as disease, exposure to pesticides, and stress from management and nutritional issues. The number of honey bee colonies nationally has declined from 5.9 million in 1947 to 4.5 million in 1980 and now 2.44 million in 2008. The threat to honey bee health continued with the appearance of Colony Collapse Disorder (CCD), which became a national issue in late 2006 and 2007 with a serious die-off of honey bees outside the hive. The cause or causes remains unknown, but appears to be a combination of factors impacting bee health and increasing their susceptibility to disease. Heavy losses associated with CCD were associated mainly with larger migratory commercial beekeepers, some of whom have lost 50-90% of their colonies. CCD continues to be a problem and has been reported from at least 24 states, but as of this writing CCD has not been confirmed in Connecticut. The varroa mite is currently considered the major threat to Connecticut's honey bees. However, American foulbrood continues to be an on-going problem and each year a number of colonies showing clinical symptoms of disease must be destroyed. Dr. Douglas Dingman in the Department of Biochemistry and Genetics at The Connecticut Agricultural Experiment Station (CAES) has begun analyzing the levels of infection by the American foulbrood bacterium, *Paenibacillus larvae*, in a number of hives in Connecticut and examining factors affecting the pathogenicity of the bacteria. He has found that, when tested for low level infections, American foulbrood is more common than previously realized. It is yet unclear to what extent low infection levels suppress overall colony health and how many of these hives will eventually develop a clinical symptom of disease.

Like all states, Connecticut has an apiary inspection law requiring registration of the beekeeper and the hives, allowing inspection of hives for diseases, and certification of inspection and health for transported bees. Most beekeepers, although not all, register annually with the State Entomologist. This assists our ability to assist individual beekeepers, inspect for disease, and tabulate the importance of beekeeping to Connecticut agriculture. Registration is a prerequisite for assistance from the State Apiary Inspector and registration is free. A one page form is available on the CAES website (www.ct.gov/caes) or at www.ct-clic.com. A list of registered beekeepers by town and name is available on our website. As of May 2009, there were 537 registered beekeepers in Connecticut with 3651 colonies, worth at least \$912,750.

Most of the beekeepers in Connecticut are hobbyists with 2-3 hives, sometimes a few more. These are people who enjoy the hobby and like producing their own honey. A few beekeepers own 50 to a few hundred colonies that are rented for pollination. Many local gardens also benefit from the presence of local hives. Some Connecticut beekeepers sell honey. There are at least 28 apiaries offering local honey; many also offer beeswax, beeswax candles, and other honey bee products. A brochure listing Connecticut Honey Producers is available from the Connecticut Department of Agriculture's Marketing Bureau (860-713-2503 or www.ctgrown.gov). Connecticut residents are encouraged to visit our honey producers, buy local honey, and support local apiaries. For those interested in getting started in beekeeping, material is available on the CAES website and the State Apiary Inspector, Ira Kettle, can provide assistance to registered beekeepers. Members of our three beekeeping organizations; The Connecticut Beekeepers Association, The Backyard Beekeepers Association, and the Eastern Connecticut Beekeepers Association, would also be glad to help people get started.

Pollination of Connecticut agricultural crops and gardens is the most important and valuable contribution made by Connecticut's beekeepers and their honey bees. This benefit to Connecticut agriculture is huge with beekeepers servicing apples, pears, peaches, and many other crops. Our beekeepers currently meet all the pollination needs for growers in the state. Blueberries, cranberries, apples, pears, plums, cucumbers, strawberries, raspberries, and various cucurbits (i.e., squash, muskmelon, watermelon, and pumpkins) are some of the plants/crops in the northeast pollinated primarily by honey bees or for which honey bees play an important supporting role. In 2007, the value of utilized production for apples, peaches, and pears in Connecticut was \$14,009,000 (New England Agricultural Statistics, 2008). Conservatively based only on the value of these three commodities in the state and the relative role of honey bees (vs. other pollinators) in their pollination, the value of the pollination services to Connecticut agriculture is at least \$11,465,500. In addition, honey bees are the primary pollinators of rapeseed and there is an increasing interest in the potential of rapeseed for bio-fuel production in Connecticut. Dr. James LaMondia at CAES is examining cultivars of rapeseed for their oil as well as their value as a green manure for the control of parasitic nematodes.

While the lack of sufficient food in the winter and mites have usually been determined to be the most common cause of colony losses by our State Apiary Inspector, the exposure of honey bees to pesticides continues to be a concern for many beekeepers. New questions have been raised with a relatively new class of insecticide, the

neonicotinoids. One of the first and most commonly used neonicotinoid is imidacloprid, which is widely applied in agriculture and by homeowners. These compounds provide effective pest control. For example, two neonicotinoid insecticides, imidacloprid and dinotefuran have been shown by Dr. Richard Cowles at our Valley Laboratory and other scientists to be very effective in managing hemlock woolly adelgids until biological control methods can be established. These compounds are effective, in part, because they are systemic in plants and, consequently, these insecticides have been found in the nectar and pollen of some plants (applications to hemlocks do not present a hazard to honey bees because the bees do not visit hemlocks). Neonicotinoids are toxic to bees, have some documented sublethal effects, and have been suspected of contributing to colony collapse disorder. Beekeepers in Europe suspected neonicotinoids of killing honey bee colonies before the advent of CCD. Based on early reports and studies coming out of Europe and a lack of published data on pesticides in pollen in the U.S., Dr. Kimberly Stoner in the Department of Entomology and Dr. Brian Eitzer in the Department of Analytical Chemistry began a program at the Experiment Station in 2007 to determine what pesticides are found and in what quantities in pollen collected from honey bee colonies at four locations in Connecticut. Pollen was collected from honey bees using a pollen trap, a series of screens that knocks the pollen pellets off of foraging bees as they return to the hive. Analysis of 102 pollen samples found 37 pesticides: 15 insecticides/acaricides, 11 fungicides, 10 herbicides, and 1 plant growth regulator. The most commonly detected pesticide was coumaphos, which is used for varroa mite control in hives. Carbaryl and phosmet, both highly toxic to bees, were the most commonly detected field pesticides. Imidacloprid was detected 30 times, mostly at low levels (3.4 parts per billion or below), but one sample had an unusually high level of 70 ppb. The analysis of samples collected in 2008 is in progress. Based on these early data, pesticides appear common in pollen albeit at generally low levels. The significance of these residues for honey bee health remains unclear.

In conclusion, beekeepers, both nationally and locally, have faced a number of challenges in the past 20 years with the arrival of a number of new pests and diseases, occasional public interactions with honey bees and beekeepers due to suburban residential development, and for those who market honey and pollination services, increasing costs. Public support for beekeeping will be important to keeping honey bees a viable hobby and agricultural enterprise in Connecticut. The Connecticut Agricultural Experiment Station will continue to work with our beekeepers, our beekeeping organizations, and the public to keep our honey bee industry healthy and viable. The biggest problem continues to be the varroa mite, which affects all honey bee colonies in Connecticut. The true impact of American foulbrood and the role of some of the newer insecticides in honey bee health in the U.S. remain unclear and is the subject of recent investigation at CAES. Fortunately, honey bees in Connecticut are relatively healthy and our beekeepers continue to provide pollination services to our gardeners and farmers and locally produced honey for our residents. At this point, we do not anticipate a negative impact on our crops.