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Testimony before the House Committee on Agriculture

Subcommittee on Horticulture, Research, Biotechnology and Foreign Agriculture

April 29, 2014

Chairman Scott, Ranking Member Schrader and members of the subcommittee, I am Dr. Jeff Pettis, Research Leader of the Bee Research Laboratory in Beltsville, Maryland, a research laboratory dedicated to honey bee health and part of the USDA Agricultural Research Service. I am pleased to appear before you to discuss a serious threat to the honey bee and thus our food security in the United States.

Ultimately, if no long-term solutions are developed to slow bee decline, consumers will pay more for the food they buy. About one bite in three of the food we eat in the U.S. directly or indirectly benefits from bee pollination. These tend to be the foods that add vital nutrients, flavor and diversity to our diet: the fruits, nuts and vegetables that maintain health. Bees pollinate more than 90 crops and are responsible for $15 billion in added crop value. Over half the nation's bees are needed to pollinate almonds alone, a $3 billion crop with increasing acreage.

One of the biggest problems facing honey bees and beekeepers today is the varroa mite. The varroa mite's full name is *Varroa destructor*, and it is perhaps the most aptly named parasite ever to enter this country. *Varroa destructor* is a modern honey bee plague. It has been responsible for the deaths of massive numbers of colonies both within the United States and worldwide. This mite is native to Asia where it normally

parasitizes *Apis cerana,* the eastern or Asian honey bee, an entirely different species of honey bee from *Apis mellifera,* or the western honey bee, that was brought to the New World by Europeans, and on which the U.S. now depends for crop pollination. Asian honey bees have some natural defenses against the mite and consequently are rarely seriously affected by the Varroa. European honey bees, on the other hand, have been devastatingly susceptible to varroa mite damage. The simple act of feeding by Varroa, where it pierces the skin of the bee to suck blood, can introduce bacteria and weaken the immune system of bees. Varroa mites also transmit an array of destructive viruses to honey bees, such as deformed wing virus.

When *Varroa destructor* was first found in the Unites States in 1987, beekeepers managed more than 3 million colonies for crop pollination and their winter losses were typically about 10 to 15 percent. Today, beekeepers are having trouble maintaining 2.5 million managed colonies, winter losses are averaging over 30 percent a year, and the economic sustainability of beekeeping is at the tipping point. Beekeepers have identified varroa mites as a major problem. The costs of mite controls and replacing hives that only live 1-2 years, as opposed to living 3-5 years before the arrival of Varroa, are all accumulating to the point where varroa mites are making beekeeping no longer financially viable in this country.

For commercial beekeepers, there are currently only three fast-acting treatments for varroa mites: the miticides fluvalinate, coumaphos, and amitraz. While there are also a number of folk remedies and organic treatments, none work as well as these other treatments and all involve more labor and costs to apply. However, varroa mites are adapting and becoming resistant to fluvalinate and coumaphos. Some new treatments are

in the pipeline but even a new effective miticide will only provide a short-term solution because it is only a matter of time before the varroa mite will adapt to that miticide as well, continuing the destructive cycle. What beekeepers truly need are long term solutions to varroa mites.

The beekeeper's best hope is research that can build better tools to reduce the size of the varroa mite problem. Researchers at USDA's scientific agencies--the Agricultural Research Service (ARS) and the National Institute of Food and Agriculture (NIFA) are on that trail right now. In ARS, scientists are working with a total budget of approximately $11 million dollars in FY2014, with approximately $3 million targeting Varroa specifically. Additional temporary funding of $1.3 million in 2013 has been provided on bee health through the Areawide Program of ARS. These funds have helped augment the base funds and allow scientists to work closely with commercial beekeepers to try and improve colony survival.

ARS scientists are developing improved best management practices to help beekeepers deal with immediate issues of overcoming varroa mites. By applying microbiological, genomic, physiological, and toxicological approaches, we are creating new tools for beekeepers to build and maintain healthy bee populations. For long-term solutions, ARS is looking to the genetics of both the mite and the honey bee. ARS has an active breeding program designed to increase resistance mechanisms in European honey bees. For example, some bees have a propensity for nest cleaning and grooming behaviors and these have been exploited in breeding programs as control measures. ARS is also working on improving epidemiological nation-wide monitoring of pest and diseases, biochemical disruption and a host of other possibilities.

NIFA is supporting extramural research, extension, and educational programming to scientists, extension specialists and educators to address declines in pollinators. Dozens of competitive and capacity grants are focused on novel strategies to manage the varroa mite, which are expected to better protect pollinators from this devastating pest. Since 2010, NIFA has awarded competitive grants on pollinator health worth an estimated $13 million dollars, including approximately $2.6 million targeting Varroa specifically. Varroa does not act alone on bee health and thus many of these projects take a holistic approach, looking into the multiple factors affecting honey bees and other pollinators. In one NIFA funded project, University of Minnesota extension specialists are assisting honey bee queen breeders in selecting for hygienic behavior, a trait that helps bees defend against varroa mites and other diseases. In another, Cornell scientists are testing the hypothesis that giving colonies smaller hives will provide the mites fewer opportunities to reproduce and this will lower the per capita level of mite infestation of the bees.

The work at USDA is part of a government-wide response to the large and ongoing declines in pollinator populations in the U.S. and world-wide. The President's FY 2015 budget proposes over $71 million for USDA alone to focus on this issue. This includes a $25 million initiative to create an Innovation Institute on Pollination and Pollinator Health, a competitive program that will be managed by NIFA.

As a measure of the seriousness with which the varroa issue is regarded, USDA hosted a Varroa Summit in February of this year. More than 75 representatives and researchers from beekeeping organizations, agricultural commodity groups, the crop protection industry, universities and federal agencies such as APHIS, ARS, NIFA, NRCS

and EPA attended to discuss research needed to solve the problem of varroa mites. The attendees identified numerous specific short-term and long-term research priorities. Most of these concerned the need to develop the underpinnings for new approaches to controlling varroa mites: finding natural biocontrol agents, developing RNA interference as a control measure, developing areawide management practices and improving best management practices, and identifying genetic markers and breeding for bee traits that will provide varroa survivability. Attendees also recognized the need for more extensive communication between researchers and beekeepers for collection of epidemiological and economic varroa mite data and for transmitting new information from researchers on techniques for controlling varroa. One potential outcome of the Varroa Summit will be an increased level of collaboration between scientists and more public-private and Federal-university partnerships.

But even if the varroa mite problem were solved today, this would not by itself solve all of the problems facing honey bees and beekeepers. In the last 20 years, a whole host of new honey bee pathogens—viruses, bacteria, fungi, mites—have entered the United States. We know that the effects of viruses in particular are significantly exacerbated when coupled with the presence of Varroa. Colony collapse disorder, a syndrome for which scientists still do not have a cause, continues to take a toll on apiaries. Exposure to pesticides in the environment may be weakening bee colonies, possibly making them more susceptible to other stresses. A lack of diversity in nectar and pollen sources may also play a major role in stressing honey bee colonies. The loss of honey bees may also reflect a much larger issue of general pollinator declines, with honey bees acting as an indicator species. The relative contributions of different stressors

for CCD is not well understood and solving this problem will take an all hands on deck approach, including research, public education, increased foraging lands and public-private partnerships to address CCD and the larger loss of pollinators.

To meet today's increasing pollination demands, we need well over 3 million managed honey bee colonies in this country. To do that, we need to make beekeeping profitable again and that starts with controlling *Varroa destructor*.

Mr. Chairman, I look forward to working with you in support of honey bees and pollinator health, a vital link in U.S. food security. Thank you again for your time. I would be pleased to answer any questions you have on varroa mites and pollinator health.