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REVIEW COLONY COLLAPSE DISORDER IN HONEY BEE COLONIES ACROSS THE UNITED STATES

HEARING

BEFORE THE

SUBCOMMITTEE ON HORTICULTURE AND ORGANIC AGRICULTURE

OF THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

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HEARING TO REVIEW COLONY COLLAPSE DISORDER IN HONEY BEE COLONIES ACROSS THE UNITED STATES

THURSDAY, MARCH 29, 2007

HOUSE OF REPRESENTATIVES,
COMMITTEE ON AGRICULTURE,
SUBCOMMITTEE ON HORTICULTURE
AND ORGANIC AGRICULTURE,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:00 a.m., in room 1302 of the Longworth House Office Building, Hon. Dennis A. Cardoza (chairman of the subcommittee) presiding.

Members present: Representatives Cardoza, Etheridge, Davis, Gillibrand, and Neugebauer.

Staff present: Keith Jones, Subcommittee Staff Director; Scott Kuschmider, Professional Staff; John Riley, Deputy Chief of Staff; April Slayton, Communications Director; Debbie Smith, Legislative Clerk; Kristin Sosanie, Staff Assistant; John Goldberg, Minority Senior Professional Staff; Kevin Kramp, Minority Deputy Chief of Staff and Chief Counsel; Pam Miller, Minority Senior Professional Staff; and Jamie Weyer, Hearing Clerk.

STATEMENT OF HON. DENNIS A. CARDOZA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. CARDOZA. Good morning again. We are going to call this hearing of the Subcommittee on Horticulture and Organic Agriculture to review colony collapse disorder in honey bee colonies across the United States. The order will be that we will start with opening statements. As I mentioned earlier, there is a number of our Republican colleagues at the White House in another meeting, so they may be trickling in later. A number of my Democratic colleagues are at different committee hearings and should be dropping in as we go forward.

I want to thank all of you for taking the time from your busy schedules to attend this important hearing to testify about the honey bee colony collapse disorder. I want to mention that there was one of the witnesses from my colleague Kevin McCarthy's district, who is unable to make it here today, Mr. Larry Starrh from Starrh and Starrh Farms. He had to stay home and work the farm and all of you who aren't farmers understand that we can't blame him for wanting to take care of business at home. His testimony will be submitted for the record without objection.

[The information appears at the conclusion of the hearing.]

Mr. CARDOZA. We are here today to hopefully shed some light on a very troubling phenomenon. The purpose of this hearing is to examine the potential impact of possible causes of colony collapse disorder affecting honey bee colonies across the United States. Throughout the country honey bee colonies are used for large-scale pollination of many crops. The unprecedented disappearance has alarmed farmers and scientists and could cost American agriculture millions of dollars.

The sudden and unexpected drop-off of honey bee pollinators was first brought to my attention last year, when a number of almond growers in my home district of California's Central Valley began to complain about rapidly increasing cost of beehives. For those of you who are unfamiliar with the almond business, it is a billion dollar crop in California, whose survival hinges on pollination from honey bees during the crop's bloom cycle. Growers were telling me that honey bee hives were going for double and sometimes triple the cost that they had sold for just a year earlier.

These farmers were concerned for a number of reasons. First, as you would expect, this price spike created a significant and unanticipated financial strain. Secondly, and perhaps more relevant to today's assessment, my constituents were very concerned that this situation represented more than just a blip on the radar screen. They were concerned that it was a harbinger of a bigger problem to come. Unfortunately, as we now know, their concerns were not unfounded. The 2006 honey bee population decline was not a blip on the screen; it was, in fact, a precursor to a larger national epidemic.

Only recently have leading pollinator researchers assigned a terminology for this phenomenon. Researchers and industry have now termed this dramatic and unprecedented decline colony collapse disorder. Much of the current research into this massive decline is being conducted by the Pennsylvania State University and the University of Illinois at Champaign-Urbana. I am pleased that we will be hearing from distinguished researchers from both of these institutions today. We are very glad to have you because it has become clear that we must focus more attention on this emerging crisis.

Colony losses occur when bees fail to return to their hives, which is a very abnormal phenomenon for honey bees. While some level of honey bee losses are not unusual, the sudden and widespread nature of colony collapse disorder is truly unprecedented. Perhaps the most disconcerting, no one seems to know exactly what is causing this phenomenon. Some theories include parasites, mites or other pathogens, poor nutrition and high stress levels among adult bees, or a combination of these, or other unknown factors.

I am deeply committed to raising the awareness of colony collapse disorder and its possible affects on American agriculture. Thousands of California farmers and beekeepers are dependent on honey bees for their livelihood. If we do not move swiftly to get to the bottom of this, I fear we will be having an even more dramatic problem next year. We must also be smart—could I ask everyone who has cell phones to please turn them off at this time? We must also be smart in how we address this problem. I read somewhere that some in the industry are looking for upwards of $300 million to combat colony collapse disorder. Ladies and gentlemen, that is

just not a realistic number. It is important to avoid the temptation to identify a potential problem and simply throw millions of dollars at it. Instead, through hearings like this one and future congressional scrutiny, I am hopeful that we can identify exactly where our limited research dollars will be most helpful in advancing our goal of preventing of the further decline in the honey bee population.

To begin this closer examination of potential causes and solutions to colony collapse disorder, we have assembled two very distinguished panels today. I want you to take special note of the fact that we have not one but two representatives from California's 18th Congressional District with us, a good friend of mine, Paul Wenger, who grows almonds in Modesto, California and is the First Vice President of the California Farm Bureau, and he will share his insight on the impact of colony collapse disorder on California's almond industry. And we also have with us today Gene Brandi, who is the Legislative Chairman of the California State Beekeepers Association and he will speak from a beekeeper's perspective.

[The information appears at the conclusion of the hearing.]

Mr. CARDOZA. With that, Mr. Etheridge, do you have any opening statement that you would like to put forward?

Mr. ETHERIDGE. Mr. Chairman, I will submit mine for the record so we get straight to the witnesses.

[The information appears at the conclusion of the hearing.]

Mr. CARDOZA. Very good. What I would like to do now is introduce our first panel, if I can find my sheet here. We have with us today Associate Administrator Caird Rexroad, who has a Ph.D., with the Agricultural Research Service, USDA, Washington, D.C. Thank you. Sir, did I butcher your name very badly?

Mr. REXROAD. No worse than I do.

Mr. CARDOZA. Okay. We have Dr. Diana Cox-Foster, Ph.D., and professor at Pennsylvania State University, University Park, Pennsylvania. Welcome. We also have Dr. May Berenbaum, professor and head of the Department of Entomology at the University of Illinois at Urbana-Champaign in Illinois. Thank you very much. Dr. Rexroad, please start your testimony.

STATEMENT OF ASSOCIATE ADMINISTRATOR CAIRD E. REXROAD, PH.D., AGRICULTURAL RESEARCH SERVICE, USDA

Mr. REXROAD. Thank you, Mr. Chairman. As a former beekeeper myself, I am pleased to be here today, Mr. Chairman and distinguished members of the subcommittee. I am Caird Rexroad, the Associate Administrator of the Agricultural Research Service. I am speaking today on behalf of the Agricultural Research Service and the Cooperative State Research Education Extension Service in the Department. ARS is the Department's primary intramural research agency, and CSREES is the primary extramural funding agency of the Department. Before I begin, I would ask that my written statement be made part of the record and I will summarize my remarks.

Mr. CARDOZA. Without objection, so ordered.

Mr. REXROAD. Thank you for the opportunity to appear today before the subcommittee to present testimony about USDA efforts to address the problem of colony collapse disorder, known as CCD. I

will provide you with a brief overview of the disorder as a well a summary of our research and our efforts addressing the problem.

Beginning in October of 2006, beekeepers became alarmed that honey bee colonies were dying across the continental United States. Reporting unexplained losses of 30 to 90 percent, these outbreaks of unexplained colony collapse pose a threat to the pollination industry for production of commercial honey, and the production of at least 30 percent of the Nation's crops. Furthermore, with pests and diseases of bees increasing over the last two decades, we have reached a critical point for the bee industries. ARS and CSREES are both conducting and funding research to determine the cause of the sudden collapse of bee colonies.

We have a number of theories we will talk about briefly. One important thing, as you mentioned, is immunosuppression and stress on bees. Based on research by the Colony Collapse Disorder Working Group, a collaboration of researchers from government, universities and other partners, we believe that some form of stress may be suppressing immune systems of bees, ultimately contributing to CCD. I will discuss what we consider four causes of bee stress, Varroa mites, pathogens, migratory stress, and pesticides, as well as what we are doing to counter these stresses.

Varroa mites invaded the United States in the 1980s and have been linked to a serious colony decline. If you will notice when you walk through the clover in your barefoot, you will no longer be stung by a honey bee; it is very unfortunate. During this time, USDA has put considerable effort in finding solutions to the varroa crisis. ARS labs have developed several control methods and researchers are conducting genetic research to breed bees that are resistant to mites. Work funded by CSREES through the National Research Initiative is addressing suppression of varroa mite reproduction.

Pathogens also may be contributing, either by killing bees directly or compromising their immune system. Bee viruses, of which we know not nearly enough, can cause brain pathologies and contribute also to immunosuppression. We need better tests and research on bee viruses. We need to know the role of varroa mites, also, in transmitting viruses or enhancing viral diseases of bees. A new species of Nosema, microsporidian, may be relatively new to this country. We are trying to determine that and to correlate its appearance and distribution with CCD. If we understand these things better, we will try to replicate CCD and we will develop interventions to reduce the impacts of these stresses on bees. CSREES is funding grant investigations on genetic and cultural methods in controlling Nosema apis disease, as well as study mechanisms of disease virulence, transmission and epidemiology in honey bees.

Migratory stress may also contribute to CCD. It is common for as many as 10 percent of the colonies to die after transportation, with losses of 30 percent possible after the pollination of some crops. ARS has recently begun investigating the effects of migratory stress and will continue to do so.

Many pesticides are toxic to bees. Some may cause bee colonies to be susceptible to stress and disease, and others may impair neurological function and we know that the loss of bees from the col-

ony is a sure sign of CCD. Stress and impairment of bee brain function may be then linked to this disappearance. We plan to study the effects of pesticides on bee brains and to test the effects of pesticides on bees in the apiary. Those studies will also determine if pesticides are harming bees in the field.

While we continue to look for the causes of CCD, ARS will initiate a multi-year project to improve bee health by improving nutrition of the colonies to increase their ability to handle stressful situations. Mr. Chairman, ARS and CSREES, in collaboration with our other agencies, private institutions, and with the universities, conduct and fund research that addresses the paradigm surrounding CCD. We are pleased to be a part of this effort to improve bee health and prevent colony collapse syndrome, and to support the pollination industry, beekeepers and agricultural producers across the Nation. We thank you for the opportunity to share our work with you, Mr. Chairman. This concludes my remarks. I would be pleased to answer questions that you make.

[The prepared statement of Mr. Rexroad appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you. Go ahead.

STATEMENT OF DIANA COX-FOSTER, PH.D., PROFESSOR, PENNSYLVANIA STATE UNIVERSITY

Ms. COX-FOSTER. Chairman Cardoza and members of the Subcommittee on Horticulture and Organic Agriculture, thank you for this opportunity to appear before you today representing members of the Colony Collapse Disorder Working Group. I am Diana Cox-Foster, a professor at Penn State and having over 25 years experience in insect physiology and pathology. For the last 10 years, I have been extensively researching the interactions of honey bees with varroa mites and viruses and other diseases, asking how the colonies are collapsing.

My expertise is one of the reasons that beekeepers first approached me in November 2006, with colonies having unique symptoms and deaths. These were the first recognized instances of colony collapse disorder. The Colony Collapse Disorder Working Group is a collaboration among researchers having diverse expertises and coming from land grant universities, state departments of agriculture, and USDA–ARS. In addition, experts from Bee Alert are performing research. The goals of the CCD Working Group are to identify potential causal factors in the collapses, identify these factors that underlie the collapses and reproduce the CCD symptoms, and finally, devise preventative measures to disrupt CCD and ensure strong colonies for pollination. As you know and have heard and read in the written testimonies presented by others and myself, I will summarize what we have been doing.

Honey bees are essential for the pollination of many crops, as you know. Through surveys and field confirmation and unique symptoms found in colony collapse disorder, we have found that CCD is a problem facing all beekeepers and will have a major impact. With the recognition that we had a unique problem, many of our researchers used their own monies to begin attacking this problem. We also gained emergency funding that has allowed us to quickly expand our research. This funding has come from the

Foundation for Preservation of Honey Bees, several beekeeper organizations and the National Honey Board. We greatly appreciate this funding. We are also actively seeking additional federal and state funds to allow us to perform the necessary studies in a timely fashion.

We have used these funds to begin describing the symptoms of CCD and defining the problem. This has been done through examining bees for known pathogens, parasites, and documenting hive conditions. Multiple case studies and surveys have been performed to try to determine the extent of the problem. As a top priority, we have made extensive collections of samples of bees, wax, honey and pollen stores from both CCD and non-CCD beekeeping operations across the country. We have agreed to share the samples amongst the researchers and also the data. Nearly all our multiple analyses are being coordinated and will correlate multiple parameters.

We have been actively determining the causes of CCD and have considered all possible factors. Based upon our preliminary data, we have focused on three hypotheses. First, we have asked, are new and reemerging pathogens responsible for CCD? Recently, we know that many pathogens have the ability to knock out the immune defenses of their host. Among those that we found in CCD bees, none have been recognized to have these abilities to impair the immune system, and we don't think that any of the normal bee pathogens are the direct causes. We have identified several routes of entry in the United States that may have permitted inadvertent introduction of new pathogens.

In collaboration with Dr. Ian Lipkin at Columbia, we are identifying the microbes and viruses associated with the CCD bee colonies. We predict that any pathogens that may be linked to the collapses will be common in operations having CCD and will not be found in operations lacking CCD. In this analysis, we expect to isolate many new organisms that we didn't know where there in bees. We will need to do extensive studies to try to figure out which of these important and find new methods to control these pathogens. With samples from these same colonies, we are combining these studies with others, using the newly developed knowledge of honey bee genomics and molecular physiology. We are letting the bees themselves tell us how they are being affected and what are the most likely causal factors underlying CCD by asking what genes are being turned on and off in the bees. We expect these analyses will reveal how the bees are responding to potential pathogens, environmental toxins or other stressors.

The second hypothesis is that we are asking, are environmental chemicals impacting bees and triggering CCD? It is known that environmental toxins can impair the immune systems of animals. In insects, sub-lethal effects of insecticides are increasingly being recognized as stressors that may be impacting immune defenses and other physiology. We are asking, what chemicals are present in the hives, wax, honey and pollen stores? Given our surveys, we have failed to identify any common chemicals being used at colonies that are experiencing CCD, and we expected environmental contaminants. Of particular concern are pesticides being widely used to control insect pests in agriculture, urban environments and animal systems. Among these are the neonicotinoids, a class of pesticides

that have been extensively adopted for pest management. This class of pesticides has extremely low toxicity in humans and other vertebrates and is highly effective in controlling insect pests. However, these chemicals are known to be highly toxic to bees and other pollinators. Research has suggested that these pesticides can move through the plants to become localized in pollen nectar at concentrations that can affect bees. Research is warranted to determine how these pesticides affect bees and other pollinators at the concentrations found in the honey and the pollen. It is essential to determine whether pesticides are a causal factor in CCD symptoms.

The third hypothesis is the combination of stressors weakening bee colonies and allowing stress-related pathogens to cause final collapse. Several members of the working group are asking what stressors are part of the migratory operations. Recently, migratory beekeepers have told us they experience regular significant losses of the honey bee colonies. By following the migratory colonies and their bees and correlating the healthy performance to operational practice from stresses, we will gain baseline information. We expect to develop ways to overcome these stresses to ensure adequate pollination of crops.

Finally, the CCD Working Group recognizes the importance of trying to breed bees that are more resistant to diseases and the impacts of parasites such as Varroa Mites. We are asking how genetic diversity in bee populations correlates with CCD and resistance traits. Developing new genetic strains of bees may be essential to the future of beekeeping.

In closing, Mr. Chairman and members of the Subcommittee, I thank you again for inviting me to review the colony collapse disorder affecting honey bees and to highlight some of the ongoing activities and research of the CCD group. As you have heard, we have formed extensive collaboration among researchers of diverse expertises and affiliations, who bring together federal, state and land grant university research to target real-world problems with cooperative extension providing a bridge between the beekeepers and those dependent on pollination and the research community. It is clear that we are facing several challenges in unraveling the causes of CCD and developing preventative measures to ensure the health of bees and the pollination industry. I would be happy to answer any questions you may have.

[The prepared statement of Ms. Cox-Foster appears at the conclusion of the hearing.]

Mr. CARDOZA. Please proceed, Doctor.

STATEMENT OF MAY R. BERENBAUM, PROFESSOR AND HEAD, DEPARTMENT OF ENTOMOLOGY, UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Ms. BERENBAUM. Good morning, Mr. Chairman and Members of the Subcommittee. Thanks for inviting me to talk to you about colony collapse disorder and related issues affecting American agriculture. I am May Berenbaum, the Swanlund Professor and head of the Department of Entomology at the University of Illinois at Urbana-Champaign, and I have been a member of the National Academy of Sciences since 1994.

The principal focus of this hearing is colony collapse disorder, the sudden inexplicable disappearance of millions of honey bees across the U.S. But to understand the magnitude and impact of this problem, it must be placed in the broader context of pollinator decline in general. Approximately 3/4ths of the world's 250,000 flowering plants require mobile animal partners, or pollinators, to reproduce. Over the past two decades, concern has grown around the world about declining abundance of pollinators of all descriptions. During this period in the United States, the honey bee, the world's premier managed pollinator, experienced dramatic declines. Between 1947 and 2005, colony numbers declined by over 40 percent, from almost six million to less than 2½ million. Thus, the National Research Council, the research arm of the National Academy of Sciences, convened an ad hoc committee funded by the USDA, the U.S. Geological Survey, and the National Academy of Sciences itself, to document the status of pollinators in North America. I served as chair of that committee.

Our committee of 15 experts quickly established that there is an extraordinary paucity of reliable data on pollinator populations. This dearth applies even to honey bees, which is surprising given that they are essential six legged livestock that manufacture agriculture commodities, honey and wax, more importantly, contribute to agricultural services. Pollination of nearly 100 crop species in the United States could collectively make up 1/3 of the U.S. diet, including the most high-value healthy foods. Although economists differ in calculating the exact dollar value of honey bee pollination, virtually all estimates range in the billions of dollars. It is difficult to think of any other multi-billion dollar agricultural enterprise that is so casually monitored. Methods for estimating honey bee availability for pollination are outdated and inadequate.

Since 1947, the National Agricultural Statistics Service has conducted an annual survey of honey bees and conducts a census every five years, but the focus of data collection has been honey production and not pollination. This was appropriate 60 years ago, but today the value of pollination greatly exceeds the volume of honey production. Nor do these surveys consider colony health. The magnitude of decline in honey bee abundance and efficacy, despite six decades of data collection, cannot be definitively evaluated. Bee health is utterly critical here. CCD is just the most recent of an unrelenting series of devastating problems affecting American honey bees. Introduced pests and parasites, microbial diseases, pesticide drifts and competition with Africanized bees have all contributed to the decline since assessments began.

Shortages were sufficiently acute that in 2005, for the first time in 85 years, since passage of the Honey Bee Act of 1922, bees were imported from outside the United States to meet pollination demand. Importing bees is risky and it increases the chances of introducing new pests and parasites. Even before CCD, we estimated, if honey bee numbers continued to decline at the rates documented from 1989 to 1996, managed honey bees in the United States will cease to exist by 2035. Historically, wild honey bees have provided pollination for both natural and managed plant communities. Parasite infestations have eliminated wild colonies in many areas, but

without any systematic monitoring, there is no way to know how many are left.

Committee recommendations include the changing data collection practices to account for pollination service and colony health. Increased investment is also needed to encourage innovative approaches to keeping bees healthy and improving genetic stocks. Many aspects of contemporary apiculture remain largely unchanged since the 19th Century, in part, due to low priority accorded to honey bee research in the agricultural sector. These are living in 19th Century housing comparable to dairy barns without electricity and running water.

The committee concluded its deliberations before CCD appeared, but enormous losses incurred were predictable. Over-reliance on one managed non-native species is inherently unstable. CCD has accelerated the rate of colony loss and beekeepers as well as growers need immediate relief. Many investigators, as Dr. Cox-Foster mentioned in the CCD Working Group, are donating their own time and money to solve this problem, and altruism is not a sustainable long-term strategy. Completion of the honey bee genome in October 2006 provides extraordinarily powerful new tools for diagnosed and development of management strategies, but new federal competitive funding to support multi-disciplinary research is necessary to enable and expand this limited pool of investigators. The proposed 2007 Farm Bill identifies specialty crops as a high priority for research. Most of these depend on insect pollination. Pollination sustainability should be a conspicuous component of this legislation. As well, a permanent surveillance program for parasites and diseases of honey bees is urgently needed to prevent the introduction of new pests.

A consequence of relying overwhelmingly on a single species is that few alternative actively managed species exist. Wild pollinators are not exploited to any significant extent, either. Efforts to monitor honey bees may be inadequate, but efforts to monitor wild pollinators in North America are essentially nonexistent, despite the fact that wild pollinator contributions to crop pollination are worth $3 billion annually. Evidence indicates that some North American pollinator species have declined or even gone extinct. For many species, there is no evidence of decline because their populations have never been monitored. Systematic monitoring programs of wild pollinators in Europe have revealed dramatic declines in abundance and diversity. Monitoring is needed here to document changes in pollinator status. Wild pollinators maintain plant diversity and hence ecosystem diversity in every state in the country. Conserving America's pollinators will require economic incentives. The farm bill provides an opportunity to address this need by encouraging state-level natural resources conservation service offices to promote pollinator-friendly practices for all farmers participating in the USDA cost share programs, land retirement programs, and production and stewardship programs.

Ensuring the security of our food supply is an explicit national priority. Although it is generally discussed in the context of vulnerability to attack from beyond our borders, food security faces a greater threat from within our borders; the overly optimistic deep-seated conviction that pollination resources will always be avail-

able. Armies of economists devote hours to calculate our energy need reserves, but there has never been a comparable effort to calculate our pollination reserves. Human technological innovation has not, in most cases, replaced or even improved upon animal pollinators and is unlikely to do so in the immediate future. As long as plants depend on pollinators, America depends on pollinators and right now they need your help. Thank you and I would be happy to answer any questions.

[The prepared statement of Ms. Berenbaum appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you very much. Your testimony was quite enlightening. I will start off the questioning and for this first question, I will submit it to all three panelists. Some groups have speculated that pollen from genetically modified crops could be a contributing factor to the development and spread of CCD. What is your belief with regard to that question?

Mr. REXROAD. Mr. Chairman, we have reviewed the literature related to the availability of GMO pollen and its use by bees and we do not find any significant findings that would suggest that GMO crops contribute to CCD.

Ms. BERENBAUM. That was also a finding of our committee, NRC committee, on size of pollinators. The review of the available literature didn't, not in the context of CCD, but in the context of honey bee decline.

Ms. COX-FOSTER. We have also been looking at that in our studies and what we have seen is that the reported toxins that are in these plants are very species specific, that they impact moths and butterflies and beetles, but there is no evidence that the impact bees and we have no evidence to suggest that the symptoms we have would be like those that you would expect to see with a BT toxin.

Mr. CARDOZA. Thank you. Dr. Rexroad, in your testimony, you state that the Varroa mite is becoming resistant to many miticides. Can you discuss the alternative miticides under development and how your research is working to minimize the long-term resistance?

Mr. REXROAD. We think that, in the long term, that the real approach is to develop genetic resistance in the bees. One of our main strategies right now is to breed bees and introduce gene lines where they will have resistance to Varroa Mites so that the bee itself can overcome the resistance, can overcome the Varroa Mites, as opposed to having to treat them with miticides.

Mr. CARDOZA. Okay. As well as a follow-up question, in your written testimony, you indicate that, in the future, ARS will involve researchers from all ARS labs with the CCD Working Group. Can you comment on that?

Mr. REXROAD. Yes, it is our intention to be a full participant in the working group. We appreciate the leadership that we have had from working with the universities on this, and all of the labs have a different contribution to make. For instance, work on genetic resistance to Varroa mites done in our lab in Baton Rouge. Our laboratory in Beltsville has a lot of expertise in diseases of bees. So each one brings a different aspect or contribution to working on CCD.

Mr. CARDOZA. What is your timeframe for making this happen? It seems to me that this is an urgent question, so it is imperative that we get to work on this right away.

Mr. REXROAD. It is an ongoing process. We had a very early response to the challenge of CCD, where a number of our investigators have already worked with, the consortium, and have already gone out to assess what the problems might be associated with CCD, and are working closely with the universities on that. They are continuing the work they do in a very focused way on CCD, on Varroa Mites and on others. And in addition, we have put together a long-term project related to feeding of bee colonies, where we hope that improved or enhanced nutrition will increase the bee colony resistance to whatever the CCD factors are. So it is an ongoing process, in addition to the strategic plan that we are looking for from the consortium group, which will help us focus our research in the future.

Mr. CARDOZA. I want to go a little deeper into this, Dr. Rexroad, because it seems to be that this is an urgent crisis that demands urgent attention. I understand there is a long-term plan to get there, but it seems to me that there needs to be short-term urgency within the Department about this. Could you speak more specifically to the timelines with which you are planning to proceed?

Mr. REXROAD. Yes, we do plan to proceed immediately with the nutrition studies, putting those in place, the long-term feeding studies. It is a five year study that will begin as the funds are available. Within the Department, our state funding agency, CSREES, is also looking at what they can do in the short term on critical issues and then planning in the fall to have the ability to submit grants related to those issues, to be able to recognize what kind of requests or proposals might be best suited to serving this particular issue. So we are focusing the funds that we already have within labs. We are changing the projects that are currently ongoing to focus more specifically on CCD.

Mr. CARDOZA. I think we are going to hear in just a few moments from some of the beekeepers, that they believe that there is an urgent crisis impending, the CCD situation is bad and getting worse rapidly. I think one of my folks from my district is going to testify to the fact that just this year, when you normally see the beehives increase in size while they are in the orchard, they are decreasing. That indicates to me that Congress is going to be incredibly interested in how we can accelerate the research into this problem in a much more rapid fashion that what I am hearing. It doesn't mean you are not trying to do a good job. I appreciate that. But I think we are going to need to have a lot more examination of how we can put some gas to the fire on this one and get it moving.

The next question I have is best management practices are widely used in agriculture to address farm-level environmental protection issues while providing for economic returns. Are there recommended best management practices at a state or federal level for the management of bees currently in place?

Ms. COX-FOSTER. I know, within the State of Pennsylvania, that we have developed the best management practices and recommended those and I think that those extend outwards to the Federal areas here. Part of the problem with that best manage-

ment practice is that Varroa, which has been the major killer in the last 20 years, that we are running out of controls or ways to keep that parasite in check and we don't fully understand what it is doing with the bee diseases. So there is a lack of effective controls for that various mite out there. But there are best management practices in place and I know that they are getting completely renovated all the time.

Ms. BERENBAUM. I don't know how much background you need, but there is a real challenge in managing honey bee problems, at least in part because they produce, well, honey production is for human consumption and therefore the use of pesticides has to take into consideration the fact that ultimately the product might end up in the human diet. Another problem is specificity. The varroa mite is an arthropod just like an insect. It is really challenging to develop an agent that will kill one arthropod that doesn't kill another arthropod. They are very closely related. And what makes this even more challenging is that honey bees don't appear to be very well equipped to deal with pesticides themselves. So this has been a thorny problem for a long time and we now have more problems to factor in.

Mr. CARDOZA. Thank you. I have several other questions, but at this time, I am going to turn it over to my colleague, Mr. Etheridge, from North Carolina. Chairman Etheridge.

Mr. ETHERIDGE. Thank you, Mr. Chairman, and let me thank you for being here today. You know, in my home State of North Carolina, we have always grown some fruits and vegetables, but in the last few years that has grown rapidly with our proximity with the country. So this issue is not only important, but it is alarming to us, too, because we are having some of the same problems. One of the themes I have heard to today, or an observation I have, I guess, from listening to the testimony is that we don't really know what is causing CCD, or at least there is no certainty about one thing that is causing it and I guess this problem has arisen relatively quickly. Is it a possibility that it could be something similar to the 1980s, when we had the mite problem that we have identified but never really figured out what we were going to do? So what can be done to maximize, I guess, federally-supported universities in the base research that we do? And I think question I would like to pose to Dr. Rexroad. We spend a lot of money with federal universities. Why can't we link those up in some of the things we are doing and utilize the dollars we now have out there?

Mr. REXROAD. I think that is an excellent question and to some degree, I think that is happening right now with this working group, this consortium, that was mentioned a few moments ago by Dr. Cox-Foster, where a number of universities, plus our federal labs, are working together to answer the very question that you indicated—trying to discover, first, what is the primary cause of colony collapse disorder? So they have pulled their resources, their intellectual resources, and I think there will be opportunities over the next few months to pull some other resources, but part of that will be through applications for grants to the funding agencies. And in addition, we will focus ourselves on this issue and put out some resources in terms of nutrition and those kinds of interventions for the bee colonies.

Mr. ETHERIDGE. Well, let me follow that up because the chairman touched on it. Is there a short-term strategy and a long-term strategy or is it just a strategy?

Mr. REXROAD. Do you want to answer that?

Ms. COX-FOSTER. So we have obtained some emergency funding and it is rather limited in scope. We greatly appreciate everything that we have gained. It is through the beekeeper organizations and the National Honey Board, to tackle this problem directly. So we have a gap that we foresee here in proceeding and going beyond our initial studies that we are looking at that causes this directly and fully resolving the issue here, and that is part of the problem. So as you may be well aware of, for the granting process, it usually takes a full year, at least, before you submit the grant and you actually get the monies to do the work. And at the national level here, there is a limited amount of monies out there to explore all insect-related problems, both at the field, the applied levels, and at the basic research, and the competition for those dollars has greatly increased. So the number of grants that are being funded, it is down below, I think, 10 percent with USDA and we are competing and trying hard to compete with other federal agencies, like National Science Foundation, and even some researchers are finding a way to tailor their research to fit into National Institutes of Health. But there is this lack of where we can figure out how to get monies. We are, for some of us, figuring out how to gain state emergency funds, some of which are part of Homeland Security.

Mr. ETHERIDGE. Well, let me ask you a question. Who is the clearinghouse on this?

Mr. REXROAD. Yes, if I may? Our federal funding agency, CSREES, they do have some short-term funds available under something called critical issues, which they will apply to looking at some of the issues of CCD and help the universities prepare for the granting cycle, which is a longer-term issue.

Mr. ETHERIDGE. The reason I asked that question is that, you know, we are reaching out to a number of places.

Mr. REXROAD. Yes.

Mr. ETHERIDGE. And it seems to me that the USDA will be the ideal place to have a clearinghouse, because we are working together for one goal.

Mr. REXROAD. That is certainly true. There are also multi-state projects that already exist on bees, where the states do have some discretion in the use of those funds, so they can turn those immediately to CCD.

Mr. ETHERIDGE. And we are gathering that data at USDA, so we aren't repeating?

Mr. REXROAD. Yes.

Mr. ETHERIDGE. Okay. My time is about out. Dr. Berenbaum, you mentioned something that I thought was probably a good idea, a best practice management plan for people who put their land in conservation programs like CRP. I always say this: it is a little bit easier to solve a problem if everyone pitches in. And there are a lot of people using these programs right now. What kind of things could these individual landowners do to help solve the problem or deal with this problem?

Ms. BERENBAUM. Well, there are a number of programs that provide opportunities for pollinator sustainability, for managing wild populations. One reason we may be so utterly dependent on this one species for partial pollination is that, through habitat loss, through urbanization and industrialization, we have lost native pollinators that used to provide this service for free, essentially. Among the possible programs, there are cost share programs at USDA include the Wildlife and Habitat Incentives Program, the Environmental Quality Incentives Program. The land retirement programs include the Conservation Reserve Program, the Conservation Reserve Enhancement Program, and Conservation Security Program. CRP can explicitly incorporate pollinator habitat into the environmental benefits index that is used to evaluate land parcel proposals, and CSP can incorporate the value of that pollinator habitat development into its determination of the stewardship tiers that are the basis for federal payments. USDA cost share and land retirement and product stewardship programs should be available to producers of all commodities that depend on pollinators. There is an organization called Xerces Society for Invertebrate Conservation and I am at the moment president of this society. It has as its mission promoting conservation of some of the world's least charismatic animals and it has been working with the Natural Resource Conservation Service to incorporate native pollinators into farm bill programs at the national and state level. And I know the Xerces Society is happy to offer its time and expertise to congressional staffers for language for the farm bill and its programs to help achieve this goal. But again, pollinator management sustainability programs are a long-term solution to this pressing problem.

Mr. ETHERIDGE. Thank you.

Mr. CARDOZA. I am going to turn this over in just a second to my colleague, Mr. Davis, from Tennessee, but I want to make this observation now so that you might possibly integrate it into your testimony as we go forward. A few years back when I was in the state legislature in California, we discovered the glassy-winged sharpshooter problem in Temecula, California. We went down there and did a hearing on it. The standardized method by which we were doing university research for that particular pest wasn't adequate for dealing with the crisis, so we had to come up with, very quickly, increased emergency methods to deal with that problem. We did that through state funding, through industry funding and finally the federal government caught up. This time we are finding this problem more on the federal level first, but we need to bring—it is sort of like ringing a fire bell and having all hands come to fight the fire together. It is time to call up the bucket brigade to get everybody pitching in and so that is why I am making this observation. I am going to turn it over to my colleague, Mr. Davis, for his question period.

Mr. DAVIS. Thank you, Chairman Cardoza, for having the hearing today on what I think is an important issue for many different reasons. I will describe my childhood somewhat as I grew up. Most of us certainly treasure those days when we were back on the farm. In the area that I lived in, the neighbors up the stream and down the stream from us were about a half a mile apart, and my brother and sisters and I, at the first sign that the ground started cracking,

would go barefoot, and to me the pesky things called honey bees that loved to get on the clover tops that were blooming in the spring, would often remember me that I had no shoes on by stinging the bottom of my foot. So as far as I was concerned, had there appeared a time when we were losing bees, I probably would have been delighted at that, because it would have meant that I wouldn't have been irritated by the swollen foot that I would later have.

But then I went to school and I was amazed to realize how important those honey bees were to fruits and vegetables, to pollination. I then started watching those bees as they would bury up into honeysuckle vines and lilac bushes that my grandmother would raise, the snowball trees that had big white blooms on them, and I was fascinated that they were doing part of nature's work and that without those bees, that a lot of the creation that we enjoy would probably cease to exist. And so I became aware of how everything works together in this world that we live in and that these certainly are a major part of that, as far as pollination. So I started looking somewhat with a little disdain almost 30 years ago, when we started losing colonies of bees and then just recently started again hearing that we are losing bees, maybe at a more rapid pace. Actually, colony collapse disorder may be occurring more rapidly now than it did some 30 years ago. Certainly I hope that this is not a phenomena that will destroy our bee population in America, that will, I think, be a major negative impact on agriculture in America and certainly our environment.

But I guess the question I wanted to ask, after defining my childhood that all of us probably can remember, as we look at existing USDA pollinator research programs and see basically just this out-of-the-blue problem that we have today, do you think that we have adequate researchers able to handle this or other phenomena that may happen, Mr. Rexroad?

Mr. REXROAD. I think it is always a challenge to have those resources immediately available to switch gears and to take this on. We believe that we do have significant resources to apply to this problem. Over the last several years, we have had about $9 million in bee research in ARS. The amount of funds provided by the Cooperative State Research Service, CSREES, rather, has been between $1 and $3 million, depending on the years and kinds of grants that have been applied. We are taking a look at this and seeing what kind of new resources might be needed and looking to future budgets as a way of strengthening our own program.

Mr. DAVIS. I think one of the best bargains that the American consumer has, taxpayer has provided for the American consumer and it has been the farm programs that we have had to supply the good, safe, abundant source of food, pretty much everlasting like an everlasting spring at an affordable price. I notice that as we look at the generic term that we use, mad cow disease, certainly in beef cattle production, we jump very quickly to try to shut down any fear among the American public consumer and to the beef cattle producer that if there is a problem, that we, with the USDA, have resolved that and again, obtained the confidence of the American and the world consumers of American beef. I certainly hope that we have adequate researchers in USDA that would look at all of

the problems that we may face in the future, and especially as we have, the last 30 years, increased dramatically our pesticide and herbicides that we use in agriculture production. I thank you all for being here and thanks for allowing me to be a part of the discussion on this important issue today.

Mr. CARDOZA. Thank you, Mr. Davis. I'd like to now ask a question of Dr. Berenbaum and Dr. Cox-Foster. Both of you have raised the need for better data collection and pollination activities and colony health, particularly the need for having accurate annual surveys of bee colonies. Both of you assert data collection to be a critical component to monitoring the health of pollinators. Can you tell the committee what the cost of such a survey might be? And Dr. Rexroad, you are free to chime in, as well.

Ms. BERENBAUM. Interestingly, that is not one of the issues we discussed in our committees, what the cost of implementation would be. But just to put this in context, you know, there is no free lunch, essentially, and the U.S. Ag economy has been benefiting from, I guess, the altruism of honeybees in a sense that for decades, pollination services were not paid for. They were assumed to be available for free.

There is controversy as to putting a dollar value on pollination services and the number that is frequently quoted is $14 billion. That is from a study that is already 10 years old. I don't know what that would be in 2007 dollars, but averaged over the years, this is billions and billions of dollars. $9 million may sound like a lot, but this is a multi-billion dollar enterprise. It just is diffuse and basically is intriculated throughout the entire ag enterprise in the United States.

One reason it is difficult to rally those most directly affected, I mean, most directly affected are beekeepers, but in reality, bees and other pollinators are an essential component of over 90 crops in North America.

Mr. CARDOZA. All right. We are going to have to keep our answers just a little bit short because we have an impending vote. No problem. Thank you very much for your answer, though. Dr. Cox-Foster.

Ms. COX-FOSTER. So at a recent meeting with the Colony Collapse Disorder down in Florida, we did discuss a survey on what the costs would be. We came up with the estimated value of at least a million dollars. And part of the problem that we face is that within different states, we no longer have state apiaries in place who would help to facilitate this and we have many obvious beekeepers, sideliner beekeepers out there that we need to also monitor and learn what they are doing. So it will be an extensive issue and also one in which we need to respect and maintain the confidentiality of some beekeepers for security reasons.

Mr. CARDOZA. Very good. Thank you. Dr. Rexroad, do you agree with this? And I am going to ask my last question at the same time, so you can answer both in time expediency. In your testimony you noted that a request to USDA/APHIS for national honeybee pest surveys was declined last year. Do you know why that request was denied?

Mr. REXROAD. I will answer the second question first and we can find that information for you, but I don't know right now why it

is, but I do think there are two different approaches to answering the question of how we should do surveys. One is the question of within NASS, the statistical service of whether or not we should change that and we don't know what the cost would be of changing that from focusing on honey as the commodity as opposed to the pollination services.

I think an alternative way to look at that, though, is to look at this and we look forward to some more information from a consortium that Dr. Cox-Foster is part of, looking at this scientifically to discover, in a survey system, what the problems are, the direct problems are with the bee colonies.

Mr. CARDOZA. Thank you. I now want to recognize my colleagues. As you have noted, they have gotten back from the White House. They have had a very busy morning and I appreciate their attendance. I turn it over to my Ranking Member, Mr. Neugebauer.

Mr. NEUGEBAUER. I thank the Chairman and I will submit my opening statement for the record, so we will get into questions.

[The information appears at the conclusion of the hearing.]

Mr. NEUGEBAUER. Dr. Rexroad, does the USDA regulate the interstate movement of honeybees and honeybee pests and if not, why not?

Mr. REXROAD. APHIS has the authority to regulate the movement of honeybee pests and of the colonies if they are contaminated with a pest. In particular, I might mention that they, at one point, when Varroa mites were discovered in the United States in Wisconsin apiary, did for a short time restrict the movement of colonies. However, what they discovered subsequent to that was that this pest was widely spread throughout the United States and that there was no benefit to restricting the movement of those colonies, but they do have the authority.

Mr. NEUGEBAUER. Okay. My second question is along the same line. From where are we allowing the importation of adult honeybees and how do we justify allowing these importations?

Mr. REXROAD. Currently, we allow the importation of honeybees from Australia, New Zealand and Canada. In each case, there has been a risk assessment done by APHIS, looking at the types of pests that are prevalent in those countries, determine whether or not they are free of pests and, in addition, if they do have pests, whether or not those are the same pests that are present in the United States already, so that they wouldn't add an additional burden to the bee population.

Mr. NEUGEBAUER. And have you determined any problems? I mean, do you think we are doing a good job of inspecting these and that we are not bringing a problem from somewhere else into our country?

Mr. REXROAD. I think the risk assessments would suggest that we are doing a good job. In a very specific way, though, what the specific inspections are, I couldn't speak to right now.

Mr. NEUGEBAUER. This is to the entire panel. This phenomenon of CCD, is that a problem just in the U.S. or is this a problem that is going on in other parts of the world? And just go down the panel there.

Ms. COX-FOSTER. So if the CCD, of the surveys that we have been doing, we have been asking if these unique symptoms that we

find in these colonies that collapsed are present. We find that they are occurring across the continental United States. Recently, we have reports out of Canada that they have the exact same symptoms and collapses ongoing there. There are other collapses ongoing in other parts of the world. As we can determine right now, they don't match these exact same symptoms. But I think we need to further define that and get their researchers on board with what we are seeing.

Ms. BERENBAUM. I know there has been some concern in Germany over inexplicable bee mortality, but again, whether it is the same phenomenon or not, it is difficult to ascertain if we don't know what is causing this phenomenon.

Mr. NEUGEBAUER. Do you think there is collaboration going on with these other countries to talk about some of these issues and to put the sides together?

Ms. COX-FOSTER. I know that I have been personally contacted by people from other countries, researchers, to ask whether we are seeing the same thing and I know that Dr. Jeff Pettis, who is USDA/ARS, has also been contacted and involved in these discussions. Likewise, other members of the CCD working group are actively involved, but I think it is a growing problem. There are people involved in the CCD working group that we have been deluged with media attention, including media and questions from outside the United States, that this is a global issue and being recognized as a problem.

Mr. NEUGEBAUER. Dr. Rexroad, I guess a question I would have is, is USDA collaborating with the agricultural entities and ministries in some of the other countries? Is there some ongoing dialog at that level?

Mr. REXROAD. On the research agency level, most of the dialog is scientist to scientist. These folks are very involved. They know each other. The worldwide community of people that do this kind of science is not large, so they are very aware. At a higher level, at the ministry level, probably less. We rely very much on the scientists keeping those lines of communication open and providing us information on what the issues are and what approaches others are doing, using.

Mr. NEUGEBAUER. I believe my time is about to expire.

Mr. CARDOZA. Thank you, Mr. Neugebauer. I appreciate your questions. I have one final question for the panel. That would be we have documented pretty well today the decline in organized hives and the business of beekeeping. You also testified, however, that there has been precipitous declines of wild beehive activity. Could you all speak to that? And as you hear, we have votes coming up, so we will take this as our last question. We will take a recess at the end of your answers and then we will come back after votes and reconvene the hearing to hear the second panel.

With regard to the wild bee question, please.

Ms. BERENBAUM. Again, the results of the NRC study of mostly documented the scarcity of data, but those few examples, the most charismatic species are known to have experienced decline, including some in your home State, actually. There is one bumble bee species that hasn't been seen; it is thought to have gone extinct, which actually happens to be a crop pollinator, as well.

So there is a taxonomic impediment and an unfortunate situation where we don't even have an ability to assess the diversity of wild pollinators. But there are a number of surveys that have been done, long-term monitoring surveys that have been done in England and in Belgium and elsewhere in Europe, cooperatively, among the European Union that clearly demonstrate that there are many different groups of pollinators that are experiencing declines.

Mr. CARDOZA. As you discuss this, could you also discuss the potential impact, whether there is or is not any impact that you know of from the Africanized bees that came north a few years ago and I assume are still with us?

Ms. COX-FOSTER. So I could address that. With the Africanized bees, it is interesting that they seem to be much more resistant or refractory to the Varroa Mites, themselves. And in those areas where the Africanized bees are, namely, in Arizona, they are not seeing this collapse ongoing in those colonies. So there is a chance there that there are genes present in that particular strain of Apis Mellifera, the honeybee that could be utilized or directed towards breeding a more resistant bee strain. So the Africanized bee, by itself, doesn't appear to be impacted by the Colony Collapse Disorder right now.

Mr. CARDOZA. Can Africanized bees be used to pollinate and are they a threat to the general population?

Ms. COX-FOSTER. So the researchers I know at the Tucson BEE Lab, Gloria DiGrandi-Hoffman, swears by Africanized bees and that they are great pollinators and wonderful. You do have to maintain certain size limitations on the colonies in order to have them be effective pollinators and not present extreme defensiveness that they can exhibit, so there is potential there to manipulate them, but there is also potential there to get genetic stock away from the defensive traits to be incorporated in our more gentle European strains.

Mr. REXROAD. The evidence that we have currently on the Colony Collapse Disorder and its association and non-association with wild bee colonies is pretty much anecdotal. We think it is an important question. It is a proper one to grab a hold of because we don't have somebody overseeing those bees on a daily basis to see the bees disappear and not be present. But we do think it is an important question. We are hoping it is one that the consortium will spend some time on, also.

Ms. COX-FOSTER. We do have the reports from recognized researchers at Harvard who have made observations and relayed them to us that they have seen collapses or deaths of bees from probably feral colonies, that there are no managed hives around. So it is an issue that we need to address.

Mr. CARDOZA. Clearly, there has been a compelling case for more research to be made this morning on this first panel. Thank you very much for your testimony. We will reconvene the hearing directly after the last vote on the floor in the House. Thank you very much. This hearing is temporarily recessed.

[Recess.]

Mr. CARDOZA. Mr. Neugebauer just reminded me that things are buzzing around here today. The Chair would like to remind members that they will be recognized for questioning in order of senior-

ity and those who were here at the start of the hearing, as they come back and trickle back in. After that, members will be recognized in order of arrival and I appreciate the members that are standing on this question.

We would now like to invite our second panel to the table. We have with us today, as I introduced earlier in the hearing, Mr. Paul Wenger, First Vice President of the California Farm Bureau Federation, Modesto, California; Mr. David Ellingson, Commercial Bee Keeper, Ortonville, Minnesota; Mr. Gene Brandi, Legislative Chairman of the California State Beekeepers Association from Los Banos, California; Mr. Jim Doan, Commercial Bee Keeper, Hamlin, New York; and Mr. Richard Adee, Legislative Committee Chairman of the American Honey Producers Association, Bruce, South Dakota.

Mr. Wenger, please begin when you are ready and welcome to the panel.

STATEMENT OF PAUL WENGER, FIRST VICE PRESIDENT, CALIFORNIA FARM BUREAU FEDERATION

Mr. WENGER. Thank you. My name is Paul Wenger. I am a third generation farmer growing almonds and walnuts in Stanislaus County, which is west of Modesto in California. My sons are actively involved with me in the family operation, so I look forward to a long future of our family working the land. I am also, as you mentioned, Mr. Chairman, the first vice president of the California Farm Bureau Federation, a position that keeps me in close contact with farmers and ranchers throughout the State.

The California Farm Bureau is the State's largest general farm organization, representing more than 90,000 member families. We represent producers of all commodities and of all sizes of operations. Most are family farms. This forces us to take a broad view of what is important and how what might affect one commodity will impact another. That is certainly the case with the topic of today's hearing. I appreciate the opportunity to address this committee. I commend you, Chairman Cardoza, and the committee, for taking time to review an issue that is very critical to us.

I have to admit that in addition to my Farm Bureau duties, I have a personal interest, as well. As an almond grower and someone who pays $130 a hive to pollinate my crop, I am personally concerned about the health of the bee industry. Bees are the unsung heroes of our State's vibrant almond industry that has an annual farm revenue of more than $2.5 billion. Each year, in February and early March, our almond trees require honeybees, more than a million colonies statewide, to produce a crop. The bees come from California from all over the United States. This demand for bee colonies feeds into what is a national network of beekeepers.

Each year, as growers, we worry about the supply of bees and what the weather will be during the critical pollination period. Our crop fortunes rise and fall on that outcome. The size of our State's almond industry has been steadily rising from 400,000 acres in 1985 to nearly 600,000 bearing acres today. At least 100,000 additional acres will be coming into production in the next few years.

Almonds are almost unique to California. We are the dominant producer of almonds in the United States and around the world.

Our State combines a special climate and infrastructure to maintain this dominance in an important, value-added product. I am sure that countries such as China, Spain or parts of South America would very much like to share in this market. So far we have been able to maintain our dominance, but a healthy and productive bee industry will be key to our continued success.

While almonds may be the single largest commodity to benefit from bees, it is not the only one. There are scores of other crops that also have a crucial or strongly beneficial reliance on bees. The list includes melons, cherries, avocados, Bartlett pears, bushberries, kiwi, many apple varieties, cucumbers, plums, prunes, pumpkin, squash, ornamental plants and dozens of vegetable and flower seeds. Bees are critical to our alfalfa and Ladino clover seed industries. Alfalfa seeds drives the hay industry that supports a $4.5 billion dairy industry.

We rely on bees foremost as pollinators, but California also has a thriving queen bee industry that supplies nearly a million queen bee packages to beekeepers around the country to revitalize their colonies. We produce more than 20 million pounds of honey annually. In 2005 the California honeybee industry generated $176 million in direct revenue, while the value of crops pollinated exceeded $6 billion and many associated jobs.

While the role of bees grows in importance, the research and technical support side of beekeeping has declined. I know you can't always make a direct correlation between loss of research dollars and growing disease and pest problems, but it has to be more than coincidence that both are occurring today. We need answers to the parasitic mites and colony collapse problems, but the health issue and the state of the industry is of an even broader concern.

Through attrition, we are losing apiculture expertise at the professional, research and extension levels through the United States. We are losing this infrastructure at a time when it is vital to the ability to respond to major bee health concerns.

Let me provide some examples. Attrition has severely impacted the bee research program at the University of California Davis, with the loss of key researchers. Mr. Brandi will describe this in greater detail, but I want to at least point out that California Farm Bureau has urged UC Davis to appoint faculty in apiculture in the Department of Entomology and to ensure that a specialist position is filled upon the retirement of the current statewide apiculture specialist.

When it comes to research there is a growing concern in the farm community over the dwindling support for production agriculture by the land grant universities. This is a trend that seems to exist across the board, including apiculture research. Stepped up efforts by the U.S. Department of Agriculture, ARS, on current health problems and other issues are vital.

We have continually expressed to Congress our support for the four USDA–ARS bee labs. We join the American Farm Bureau Federation in supporting research at these regionally located bee research centers to find solutions. Just this past September we urged USDA to expedite its research effort to produce effective treatments controlling honeybee mites.

Research will be the key to overcoming the current problems. I would urge this committee to spearhead the Congressional action to help restore the honeybee industry to full health. I want to thank you for taking the time on what some would think is a very minor issue, but has extremely large concerns in our agricultural industry, not only in California, but throughout the United States. Thank you.

[The prepared statement of Mr. Wenger appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you.

STATEMENT OF DAVID ELLINGSON, COMMERCIAL BEEKEEPER

Mr. ELLINGSON. Chairman Cardoza and Members of the Subcommittee, my name is David Ellingson. I live in Ortonville, Minnesota, where I operate 3,700 colonies of honey bees for pollination and honey production. I ship my bees to both California and Texas for parts of the year. I also operate a business that processes beeswax for beekeepers.

First, I want to express the thanks of our entire industry for the concern you are showing for our problems by holding this hearing and my personal appreciation for being invited to tell you my story. I have been in beekeeping all my life, having followed my father in the business. Over those years, like any other farmers, we have seen our shares of ups and downs, but now I am experiencing the lowest point of my beekeeping life.

For many years we have wintered a portion of our bees in Texas, where the milder climates and earlier springs allow us to get a jump-start in spring, compared to Minnesota. Looking back over the years, I see we have had to increase the number of hives brought down each year to make up our numbers for the summer. 30-plus years ago we could depend on having a five to one split, that is we could haul 800 hives to Texas and able to split these into making 4,000 colonies. Today we are hauling around 2,000 colonies to Texas just to make up those same numbers for those 3,700.

Now comes the winter of 2006–2007. We hauled 2,000 hives to Texas in the fall. We went through the colonies and fed them corn syrup and pollen substitute. The queens were starting to lay some eggs for new young bees. My observation at this time was the colonies were strong, the mite counts were very low. There were good amounts of food storage for the bees. I felt that following a good honey crop last summer and a good fall in Minnesota, that my bees were looking as good as I had ever seen in a long time. I even felt that we would have some surplus bees to sell to others.

Now, we came back to Texas on January 5 to sort out the best colonies to ship to California to rent out for almond pollination. I found more hives than normal without bees. These hives still had food stores; honey, pollen. The colonies didn't starve to death. The percentage of small clusters was higher than expected. I know now that many of these colonies also were dying.

We selected 808 hives and shipped them to California. By January 25, our beekeeper-partner in California reported that one-third of these colonies were gone and another third were too weak to rent. We then went and shipped out another 400 hives to fill the

contract. Within two weeks of delivery, 50 of these colonies had disappeared. These also had plenty of honey and pollen.

My loss on the bees not going into the almonds is in excess of $60,000 plus freight, which is $9800 per load, that had to be paid without regard to the condition of the bees, once they arrived in California. The second load, which should have been worth more because there were more bees and they were in two-story hives, should have netted me at least $26,250. So overall, I should expect to have a net profit of $6,600. Now, when I deduct my time and expenses of two trips to Texas to prepare the bees plus the wear and tear and loss of being in shipment, the final question becomes what will I have to work with when these bees come back to Texas?

So far, instead of having surplus bees to sell, I have been buying bees, spending approximately $10,000 for bees to fill some of my equipment. Even so, I believe we will be running 1,000 to 1,500 fewer colonies this year. That is 1500 hives with a possible 100 pound honey crop at 85 cents a pound, gives me another net loss of $127,500. I truly felt that we had done everything right this year. When you wake up at 2:00 in the morning and lie there wondering what did I do wrong? And then you talk to another beekeeper who has done the same thing and is not having the problems that we are, it will just about drive you nuts.

There are things that we need. We need more beekeeping research. We need money today to analyze the samples that have been taken for these USDA and these university labs, today we need that money. We don't need it next year. Next year we might not have any bees. We don't know. We need more research. We need more scientists. We need an effective and efficient technology transfer of what the scientists find out and how we can get it into our bees.

You know, a farmer has all the tools that we don't see. He has an agronomist, he has a soil sampler, he has all these things. Do you think that farmer can make the crop that he makes today if he didn't have those tools? We don't have those tools. We need those tools.

I would like to conclude with a personal comment. This is a tough business. It is one that takes you away from home a lot, just like you here in D.C. We are a small industry, scattered across the country. If we are going to have a viable honey bee industry, we must have dedicated people who are willing to go the distance. But even dedicated people need assistance from time to time. I have been deep in debt from when my dad died. I will not put myself in that position again. Other facts are the banks have forever been cutting our lending because of defaults on other beekeeping practices.

The median age of a beekeeper is over 50. A lot of them are on the brink of hanging it up. There is a glimmer of hope that we could, in some manner, improve the lot of beekeepers, the atmosphere in this industry would and could be greatly improved and we would see new, younger beekeepers moving in. I certainly would have chosen a better way to celebrate our company's 60th anniversary in the honey bee business.

Again, I thank you for the opportunity to give my views of the Colony Collapse Disorder and what effect it is having on my business and those of my fellow beekeepers. Thank you.

[The prepared statement of Mr. Ellingson appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you, Mr. Ellingson. Compelling testimony. Appreciate it very much. I am going to ask the committee's indulgence at this point and ask Mr. Doan to speak next. Ms. Gillibrand needs to leave for another engagement and so I am going to have you testify next so she can hear your testimony.

STATEMENT OF JIM DOAN, COMMERCIAL BEEKEEPER

Mr. DOAN. Well, thank you, Mr. Chairman Cardoza and also Congresswoman Gillibrand. It is a real honor to be here today.

My name is James Doan. I live in western New York with my wife and two children. I own and operated 4,300 hives of honeybees in the fall of 2006; that is what we started out with. Currently, I have 1,900 hives of bees left of the original 4,300. Those same hives we normally will rent out for pollination in western New York to do fruit and vegetable pollination. The hives are then transported down to Florida for the winter, where we do honey and also pollination down there.

I consider this testimony a privilege and an honor to speak with you today concerning the seriousness and devastating loss of our honeybees here in the United States, but more importantly how I feel it is going to affect the infrastructure of agriculture here in the United States.

In my business hive management is everything. My overall system has changed very little in the last 20 years, with the exception of treating hive pest management. However, the overall health of the bees has always been considered good and profitable. Starting in the spring of 2006, we began to see a change in our hive health. Not only was I seeing this, but many other beekeepers in western New York were seeing the same things.

Typical scenario was the honeybees were not expanding in number and not making any honey. And finally, an empty hive or even in some cases, honey left behind. Yes, we had weather conditions in the Northeast in the fall of 2006 that were wet and cold, and many counties in New York were declared disasters. However, in the Northeast we have had wet falls before and still made honey.

Honeybee losses across New York State this winter, right now, are being reported at 50 percent or more, with some operations reporting as high a loss as 80 percent. Because of the current cold weather, many beekeepers have yet to fully inspect their bees in New York, so the number of hive losses could escalate. To recoup these losses, a purchase of new hives or honeybee packages will have to be made.

However, the breeders who sell these items have little or none which to sell. One breeder I spoke to could not deliver a package to me until May 15. That is late for apple pollination. I believe the availability of honeybees for pollination services this spring in New York will be very close, due to the reports still coming in from many area beekeepers.

New York State inspection officials, when they inspected my bees for mites, found zero to little mites, both in New York and in Florida in 2005 and 2006, so I do not consider the Colony Collapse Disorder due totally to mites or other pests living within the hives.

So what is it, then? Hot, cold, water, drought? We have had all these conditions in the past, but never with all these consequences, and not every beekeeper throughout the country had the same type of conditions, yet everyone is still losing honeybees. This problem does seem not to be in one region and we have to include Canada in our discussion. So what is different? I don't know, but pesticides at sublethal doses need to be looked at.

We have chemicals being used today that are different than materials in the past. In France, in May of 2004, the seed treatment GAUCHO was removed for use because number one, and I quote, from the report from Duquesne and Pastor University report, "The results of the examination on the risks of seed treatment GAUCHO was alarming. The treatment of seeds by GAUCHO is a significant risk to honeybees in several stages of life. The consumption of contaminated pollen can lead to an increased mortality in care-taking bees."

GAUCHO contains the active ingredient Imiclacloprid. Materials with Imiclacloprid in them, in the last couple years, are labeled for use in just about every fruit and vegetable that I pollinate. Could this be the problem? I don't know. However, in France, the year before GAUCHO was taken off the market one-third of the bees in their country died. They have not reported any significant losses since the removal of that product from the market.

I firmly believe we need extensive additional research that confirms what this Colony Collapse Disorder is and any further repercussions that may come from this. We need this now. I know that Penn State University is working hard on this problem, as other honeybee labs across the country are also doing. However, the equipment being used is antiquated. Our industry needs government research dollars now.

The economic impact on my operation alone will cost me over $200,000 just to replace the honeybees that I have currently lost. I do not know if I even will have enough bees to cover my pollination contracts in New York. This also has impacted my income from honey production and my pollination service for the reduction from this lack of bees.

The United States is looking at the potential loss of the pillar in agriculture. Agriculture in the whole United States is dependent on honeybees. If we cannot survive as a beekeeping industry in this country, then there will be no agriculture community here in this country. If this Colony Collapse Disorder is allowed to continue, we could be looking at 100 percent dependency on foreign countries for feeding the American public. In my opinion, this real possibility is unacceptable.

In conclusion, I strongly urge that my government officials, by funding for honeybee research, that we also look at getting made public the crop insurance for beekeepers and finally, I ask for help in recouping our losses from this problem, since we do not have crop insurance. I thank you for your time and support for our industry.

[The prepared statement of Mr. Doan appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you, Mr. Doan. Mr. Brandi. By the way, I am going to ask the witnesses to make sure that your microphones are directly in front of you so that the transcriptionist can receive your testimony. Thank you.

STATEMENT OF GENE BRANDI, LEGISLATIVE CHAIRMAN, CALIFORNIA STATE BEEKEEPERS ASSOCIATION

Mr. BRANDI. Thank you. Good morning, Chairman Cardoza and distinguished members of the subcommittee. My name is Gene Brandi and I have owned and operated a commercial beekeeping business headquartered in Los Banos, California, for the past 30 years. I serve as the Legislative Chairman of the California State Beekeepers Association and appreciate this opportunity to inform the subcommittee of some severe difficulties facing the beekeeping industry and the effect these problems have on the ability of honey bees to adequately pollinate the Nation's crops.

Honey bees are a critical component of the Nation's agricultural economy. The pollination work of honey bees increases the yield and quality of U.S. crops by approximately $15 billion annually, including over $6 billion in California. When I started working with bees in the 1970s, it was not uncommon for winter colony losses to be five percent or less. Since the mid to late 1980s, our Nation's bee industry has been experiencing an increase in winter colony mortality and in recent years the problem has become severe. This winter, beekeepers throughout much of the country are experiencing from 25 to more than 75 percent colony mortality.

Approximately 40 percent of my 2,000 colonies are currently dead and this is the greatest winter colony mortality I have ever experienced in my 30 years of beekeeping. I have already lost nearly $60,000 in almond pollination income compared to last year, when I had a more tolerable but still costly 20 percent winter loss. I will also lose at least $20,000 in income from the sale of bulk bees this spring, in addition to an unknown quantity in lost honey production.

The cost to restock my 800 dead colonies this year will be approximately $48,000. We are just beginning to restock our dead hives with bees from our surviving colonies and this weakens the surviving colonies for a few weeks until they can rebuild their populations. I will purchase new queen bees and it should take about two months for the newly restocked colonies to build up adequate bee populations to be considered commercially viable.

Even though my loss is substantial, other beekeepers throughout the country have suffered much greater losses. Beekeepers who lost over 50 percent of their colonies will have difficulty making up their losses from their own operations, as I plan to do.

What is causing colony collapse disorder? There are many problems facing the bee industry today that make it difficult to keep honey bees healthy and CCD may very well be caused by a combination of these and perhaps other factors. Poor nutrition, mites, diseases and exposure to certain pesticides are serious issues that affect the ability of honey bees to survive and thrive.

Good nutrition is critical to overall colony health. An adequate supply of nutritious natural pollen and nectar for as much of the year as possible is the best way to keep bees nutritionally healthy. California, in particular, is a difficult place to find good locations where bees can safely and successfully be placed when they are not needed for crop pollination, given the shrinking availability of bee pasture due to urbanization and other issues. This year the lack of rainfall in California will make it especially difficult, since the available sources of natural food will be greatly reduced. Bees that are nutritionally stressed are more susceptible to diseases, parasites and other problems.

It has been known for many years that exposure to certain pesticides can kill adult bees. Lesser known is the fact that some pesticides can also kill or deform immature bees, the brood, adversely affect queen and drone viability or may cause bees to lose their member, which prevents them from flying back to the hive. The U.S. Environmental Protection Agency currently requires that pesticides be assessed only for adult bee toxicity.

It would be very beneficial in trying to resolve the CCD problem if pesticides were also assessed for their ability to cause additional adverse affects on bees. Additionally, it is also important that EPA require enforceable label language on those products that are known to be harmful to honey bees so that they are not applied to blooming plants that are visited by bees.

It would be very beneficial for USDA–ARS to have a honey bee toxicologist who could independently test pesticides for acute and residual bee toxicity, the ability to damage brood, effect on queen and drone viability and the potential for causing memory disorders or other sub-lethal adverse effects on bees.

The University of California, Davis campus used to be home to one of the premier honey bee research facilities in the Nation, with three Professor of Apiculture conducting studies in honey bee behavior, honey bee physiology and honey bee genetics. The UC Extension Apiculturist, based in Davis, continues to serve the industry well, but he is the only bee person remaining on the campus. Other than that, the UC Davis facility is not currently being used for honey bee research, as there are no longer any active professors of apiculture on the campus.

This facility is strategically located in the heart of California's Central Valley, the area of our Nation that uses the most bees for crop pollination. It is also located at the southern end of the Nation's largest bee breeding area which produces nearly one million queen bees annually. If a USDA–ARS honey bee research scientist or scientists could be stationed at UC Davis to establish a research partnership at this facility, it would be a great asset to the beekeeping industry and to the growers who need strong, healthy bee colonies to pollinate their crops.

The need for additional bee research is obvious. There are just too many unanswered questions that need to be addressed if the bee industry is to survive and perhaps thrive again. USDA–ARS honey bee research facilities in Beltsville, Baton Rouge, Weslaco and Tucson are conducting some good research at this point, but they need to do much more. These labs could all use additional funding in order to find solutions to our industry's many problems.

I appreciate the opportunity to present the information to you today on behalf of the bee industry and thank you for your concern about our industry and for those who depend upon a healthy bee industry to pollinate their crops.

[The prepared statement of Mr. Brandi appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you, Mr. Brandi. Compelling testimony, as well. Thank you, as well, for providing the committee with samples that you grow. Mr. Adee.

STATEMENT OF RICHARD ADEE, LEGISLATIVE COMMITTEE CHAIRMAN, AMERICAN HONEY PRODUCERS ASSOCIATION

Mr. ADEE. Chairman Cardoza, Members of the Subcommittee, on behalf of the American Honey Producers Association, I want to thank you for the opportunity to testify today about Colony Collapse Disorder or CCD. There is much we do not know about CCD. It is clear, however, that CCD is causing widespread damage to our industry. Beekeepers across the country are reporting collapsing colonies and staggering bee losses. Some are losing 90 percent of their bees. A few examples illustrate the terrible impact that CCD is having on America's beekeepers and our bees.

One migratory beekeeper, based in Mississippi, has only 220 of 1200 colonies remaining. A sixth generation Colorado beekeeper has lost 2800 of his 4,000 colonies. A Texas beekeeper, who normally sends 3,000 colonies to pollinate in Stanislaus County, California, could send only 1,000 this season and some of those were too weak to pollinate.

CCD also appears to be spreading. Just a few weeks ago, my own bees in California seemed to be strong and healthy. Since then, however, we are finding that these colonies have not been maintaining their populations. Our bees usually produce about 2.7 new bee colonies, called nucs, per colony. This season, the yield is only two nucs per colony. This is unprecedented in our 15 years in California and very disturbing.

As you know, CCD affects more than honey production. Over 90 crops depend on bees for pollination, including California almonds, New York apples, Florida oranges, Georgia peaches, North Carolina melons, Tennessee soy beans and Texas cotton. Bee pollination directly adds about $20 billion to U.S. farm output each year and supports about one-third of the human diet.

CCD should also be a loud wake-up call to all of us about other serious problems facing American beekeepers. Since the 1960s, the number of U.S. bee colonies has fallen by almost 50 percent. At the same time, the demand for pollination is increasing sharply. It is unclear where we will get the additional bees we need. U.S. bees are also a continued attack for a variety of serious mites and pests, including the Varroa, the Vampire Mite; Tracheal Mites and bacterial and fungal diseases.

Pests are also building resistance to the new treatments more quickly than in the past. Beekeepers worry about bee kills caused by the misuse of pesticides and about the affects of new GMO crops and agricultural treatments. Bees and beekeepers face other stresses caused by the almost constant movement of bees for polli-

nation by the need for much more intensive colony management and by unfairly traded imports.

We urge Congress to work closely with beekeepers, producers and research on an urgent basis to find the causes of CCD and to develop effective measures to stop it. We must also work together over the long-term to assure the survival and continued health of our vital beekeeping industry. Without these efforts, we worry that our industry will face an even bigger crisis, a problem some are calling ICD, or Industry Collapse Disorder.

We have a number of recommendations to address these serious issues. Strong federal support for new honey bee research is essential. Congress should provide at least $1 million in dedicated funding for CCD, which could be allocated to the ARS laboratories in Beltsville and Tucson, and to consider other funding for CCD research at the academic and private sectors. Funding must also be maintained and appropriately increased for the four current ARS honey bee labs. These labs do research that is critical for our industry survival.

The central role of bees must also be recognized in applying for environmental laws. Potential harm should be of paramount concern in regulating existing crop chemicals and new ones. At the same time, new treatments for CCD and other disorders need to be approved as quickly as possible, consistent with the protection of the environment and the public health.

To help U.S. beekeepers survive recent losses, Congress may want to consider one time loss payments for injured beekeepers. For the longer term, beekeepers should be able to protect themselves against losses of various kinds through Federal crop insurance. Congress has authorized crop insurance and it should strongly urge the USDA to implement such a program for beekeepers on an expedited basis.

Finally, in the 2007 Farm Bill, Congress will have other opportunities to help American beekeepers, including continuing and improving the current marketing program for honey. Mr. Chairman, we look forward to working with Congress to end CCD and to assure that our Nation's bee industry is strong. Thank you very much for holding this important hearing. I would be pleased to answer any questions that the members of the subcommittee may have.

[The prepared statement of Mr. Adee appears at the conclusion of the hearing.]

Mr. CARDOZA. Thank you, Mr. Adee. I want to begin the questioning by thanking you for your testimony. In particular, your testimony indicated that USDA's risk management agency had been contacted or contracted for development of a pilot program on honey bee insurance and that that has not happened yet. That was in 2005; it is now 2007. I would encourage USDA to get with the program here and move this program, because clearly it is needed for this industry now, not later.

I had a question for you, but we are very short of time because the votes have interceded and a number of the members of the committee have other functions that we have to deal with, other events that we have to be at, meetings we have to intend. So my next question is for the entire panel and please keep your answer

as short as possible, but as concise and to the point of the exact problem as you can possibly do.

Several of you have indicated and raised concerns over the impact of agricultural pesticides on honey bee populations and that was raised in almost every member's testimony. My experience is that farmers and ranchers are generally very wise users of pesticides, that they follow the labels, that they comply with the standards and still it seems that you think or you suspect that this is having an impact on bee populations. I would like for you each to discuss in greater detail your perspective on pesticide use and the potential impact that this might be having on this problem.

Mr. WENGER. Real quickly, I am also a licensed pest control operator, as well as an almond grower and I need to say that whenever we apply anything in the springtime, you are not applying any kind of pesticides that are killing agents, they are just fungicides in the almonds. The only time that we do come up in California against some problems is when we have an Alfalfa Weevil. But through the ag commissioners, we have to notify all beekeepers within a two-mile radius, as long as they register with the county ag commissioner, they have to register with the county ag commissioner, let them know where they are at.

We can go in and we can notify all the beekeepers through a phone call that we are going to be applying and tell them when we are going to do that, and we have to do that 48 hours in advance so that they can do something to protect those hives, if there is something to be done there. But also, from what I have been hearing talking to folks, it could be things that are happening during the growing season, especially a lot of the bees that we have in California come from out of state, so it might not be something that is happening while the bees are in the field.

Mr. CARDOZA. Thank you, Mr. Wenger.

Mr. ADEE. My experience in South Dakota is it basically follows your assessment of the aerial applicators, pesticide applicators. We have a great bunch of people working good with us, the same way in California, but part of the problem probably is and could be is that some of these pesticides working in combination, by themselves are not harmful to bees, but in combination are lethal and we have seen this with some of the treatments we have had in hive use, and some of the fungicides that they are putting on the trees. Neither one by themselves are not harmful, but in combination we have a lethal product, and so we just need more research. And I think the applicators are doing their best, the beekeepers are doing their best, but we are just having some problems in there.

Mr. CARDOZA. Mr. Doan, did you have a perspective?

Mr. DOAN. Yes, sir. Our concern is, at least on my part and when you read the evidence out of France, and I don't think my growers do it on purpose, but there are systemic pesticides that are being used and so they are coming through the plants, the bees are collecting it as pollen, bringing it back to the hive and then it is fed to the young and to the nurse bees. And if you read through what I have presented, you will find that the evidence indicates that there are disrupters of their orientation of all insects and that would lead me to believe that these bees are flying off and just are

not able to come back to those hives to find where they belong, and bees are social insects and they die on their own.

Mr. CARDOZA. You suspect this? We don't have empirical evidence to point to that?

Mr. DOAN. We don't have here. So far, there have not been any tests done to check for the pesticides in the pollen. The samples have been drawn, but as far as I know, there is no labs to run these tests at currently, or machinery.

Mr. CARDOZA. Mr. Brandi.

Mr. BRANDI. Certainly, in the San Joaquin Valley of California, we do have a lot of experience with pesticides and where bees are exposed to pesticides routinely throughout the year, depending upon the crops we happen to be on. But over the past 30 years, the applicators have become much more educated and aware of the value of bees and certainly are cognizant of that. I think it is more of a situation of the fact that we just don't know what certain chemicals will do to bees, sub-lethal or acutely or residually toxic. We used to have a person at UC Riverside that would independently test pesticides for bee toxicity. He retired in the early 1980s and has not been replaced. The fellow from Washington State University was the next independent tester of pesticides as they relate to bees and he retired back in the 1990s. So really, we have been kind of blind here for about the last 10 years and that is why I thought if the USDA had a bee toxicologist that could be hired on, it would be good, because we just don't know about, not only the residual effects of some of these chemicals, but the other sub-lethal effects that have been referred to here today as well. We just don't know. We are guinea pigs in the field.

Mr. CARDOZA. In my Healthy America Act, a number of members of this committee and a number of congressional members have been very concerned about the lack of research dollars that have been going into agriculture in the last few years. Thank you for highlighting that problem. Clearly, Mr. Wenger, in your testimony, you raised anecdotal correlation to declining research dollars and raising disease and pest problems, and so if you have any further comment, we are almost at the end of our time here, but I will give you the opportunity to comment on that.

Mr. WENGER. Well, I just think a lot of the times these problems just creep up on us slowly and we have noticed, even through the land grant universities, as we go into more and more areas of research, it seems like a lot of the basic ag research is where we are losing and today it is not so much that we need the research to how to produce a better almond or how to produce more almonds per acre, but it is these things like this with the bee research. How do we help with the air and the water issues? And so I think anything the Congress can do with the land grant universities especially, to encourage the continuation of support of agricultural research and applied research and the extension agents and how they get that out in the field, it would be very beneficial, not only to agriculture, but all those in America that depend upon American agriculture.

Mr. CARDOZA. Thank you, Paul. Mr. Etheridge.

Mr. ETHERIDGE. Thank you, Mr. Chairman. Mr. Brandi, let me ask you first. How long has CCD been an issue, that we have noticed it?

Mr. BRANDI. CCD was only named such just within the past few months, but we have noticed an increase in winter colony die-off for several years, but it has never been as severe as this year.

Mr. ETHERIDGE. Let me tell you why I am asking the question, because I am trying to get, and I don't expect you to give me a definitive answer when I ask you. So hopefully, we have got a few scholars in the audience and some of the USDA is still here, because we talked about pesticides a few minutes ago and we have been using pesticides for years, you know, to expand our crops and do other things, so you know, I want to be careful how we go there. I really wonder if it is a combination and I really wish I would have this chance to ask the USDA representative earlier. I wonder if it started regionally as we had droughts. You know, we have had severe droughts in some areas over the last number of years now, and in North Carolina it has been several years since we have had one, fortunately. The Midwest has really been in tough times, and the far west have had some severe droughts and even in some parts of the Southeast. You really wonder if this stress adds to those issues. I know we need to do some research on this, so let me move to another question and raise that.

You are a representative of industry and you have been at it a long time, as you have indicated, and as the industry comes together, is there a working relationship across the industry? I know we have beekeepers, but across the industry, of things they are doing to gather data so that we can share that data with our university representatives, as I raised the issue, if you remember, with the first panel, because they have got a lot people out there. We provide a lot of research dollars in a lot of areas, and if the industry is gathering data to share, it would be very helpful to have that data to be available. Or are we gathering data, or was it all anecdotal?

Mr. ADEE. At the present time, Dr. Bromenshank, up in Montana, has been doing a survey of the industry, just to see the depth of the problem and he has put together some very, very good information and I think it is going to be very useful information.

Mr. ETHERIDGE. Do you know when that might be completed?

Mr. ADEE. I think it is ongoing right now. Parts of it have been completed already. I have seen some of it, yes.

Mr. ETHERIDGE. Mr. Chairman, I think it would be helpful to this committee if once that survey is completed and the information has been consolidated, it would be very helpful to us to have that information.

Mr. CARDOZA. I will certainly make sure we get that.

Mr. ETHERIDGE. So we can at least share that.

Mr. CARDOZA. Yes, we will be certain to get that.

Mr. ETHERIDGE. As we make our decision, that would be very helpful.

Mr. CARDOZA. Yes.

Mr. ETHERIDGE. Thank you. Mr. Ellingson, you have been in business, as you have indicated earlier, a long time.

Mr. ELLINGSON. Yes, sir.

Mr. ETHERIDGE. You have a seen a lot of ups and downs and a lot of changes. Having grown up on a farm, I have some understanding of that. But I guess my question is, is we went through

the mites and other things and I think there is probably not a real good understanding on the part of the general public of how important bees are to productivity. Farmers know. Those people that are actually engaged in the specific commodities know. So hopefully this hearing, Mr. Chairman, will help start that process. I think my bigger question is, compared to the problems that we have faced in the industry, with beekeeping over the years, and you indicated in your earlier testimony the severity of this. How would you classify the current situation as it relates to previous challenges that have been faced by the industry?

Mr. ELLINGSON. I would say we are on the coast of catastrophic, to give a one-word answer. I would also say that, you know, we have gone through this using, you know, Dr. Marla Spivak's hygienic queen selection. You know, can we put in new frames? We have done all the things you are supposed to do right and we are still seeing this problem. Usually, if you have a problem, you know, if your combs are old, you replace them and you get new combs and things work well and hives turn around. If you have got Nosema, you feed Fumidil, those types of things. I have been doing all of these things; we are still having a problem. I asked a fellow beekeeper the other day when I went and bought some—I said, Darryl, what did you do last year when you had this big collapse compared to this year? He said nothing. I did everything. The same way I did it last year, I did it this year. And he has no answer, either, why his bees are okay this year.

Mr. ETHERIDGE. I think that is a good one for me to end on, unless someone else disagrees with that. Thank you, sir. Thank you, Mr. Chairman.

Mr. CARDOZA. Thank you, Mr. Etheridge. I want to make two points before we close here today. First of all, we have had a discussion on a number of things. We are going to follow this question, this mystery that we have in the bee industry and back to nature to completion. We are going to try and figure out what that is. We are going to advocate for more resources. Government's wheels turn oftentimes too slow. We are going to need private sector and the State departments of agriculture to work with USDA to try and help Congress get to the point where we can help you all deal with this situation. But you have the commitment from this committee that we are going to do everything within our power and follow the leads, like detectives, wherever they may go. It may be, as Mr. Doan indicates, that it could be a pesticide issue; it may not. We don't know that yet and I don't want to implicate anything before we know for certain what the true culprit is. But I think it is imperative that we do find out who that culprit is and what the culprit is, because this industry is too important to the country and to food production for us not to follow the leads and find out what is causing this problem.

I thank you all. I thank all of the witnesses for their testimony. I thank the members of the committee for their interest. Under the rules of the committee, the record of today's hearing will remain open for 10 days to receive additional material and supplementary written responses from the witnesses to any questions posed by members of the panel. This hearing of the Subcommittee on Horticulture and Organic Agriculture is hereby adjourned.

[Whereupon, at 12:18 p.m., the Subcommittee was adjourned.]

Subcommittee on Horticulture and Organic Agriculture
To Review the Colony Collapse Disorder in Honey Bee Colonies Across the U.S.
Thursday, March 29, 2007

OPENING STATEMENT
Chairman Dennis Cardoza

Thank you all for taking time from your very busy schedules to attend this important hearing to testify about the Honey Bee Colony Collapse Disorder. I want to mention that there was one witness from my colleague Kevin McCarthy's district who was unable to make it here today. Mr. Larry Starrh [*Star*], from Starrh and Starrh Farms needed to stay home and work the farm.

We can't blame him for putting his farm first. His testimony will be submitted for the record.

We are here today to hopefully shed some light on a troubling phenomenon. The purpose of this hearing is to examine the potential impact and possible causes of the Colony Collapse Disorder affecting Honey Bee Colonies across the U.S. Throughout the country, Honey Bee Colonies are used for large-scale pollination of many crops. The unprecedented disappearance has alarmed farmers and scientists, and could cost American agriculture millions in lost revenues.

The sudden and unexpected drop off of honey bee pollinators was first brought to my attention last year, when a number of almond growers in my home district in California's Central Valley began to complain about the rapidly increasing costs of bee hives. For those of you who are unfamiliar with the almond business—it is a billion dollar crop in California whose survival hinges on the pollination from honey bees during the crop's bloom cycle.

Growers were telling me that their honey bee hives were going for double—sometimes triple—what they had sold for just a year earlier. These farmers were concerned for a number of

reasons. First, as you would expect, this price spike created a significant and unanticipated financial strain. Secondly, and perhaps more relevant to today's discussion, my constituents were very worried that this situation represented more than just a blip on the radar screen. They were concerned that it was a harbinger of bigger problems to come.

Unfortunately – as we now know - their concerns were not unfounded. The 2006 honey bee population decline was not a blip on the screen, and was, in fact, a precursor to a larger national epidemic.

Only recently have leading pollinator researchers assigned a terminology for this phenomenon. Researchers and industry have now termed this dramatic and unprecedented decline Colony Collapse Disorder.

Much of the current research into this massive decline is being conducted by Pennsylvania State University and the University Of Illinois at Champaign-Urbana. I am pleased that we will be hearing from distinguished researchers from both of these fine institutions during the first panel.

We are very glad to have you, because it has become clear that we must focus more attention on this emerging crisis.

Colony losses occur when bees fail to return to their hives, which is very abnormal for honey bees. While some level of honey bee losses are not unusual, the suddenness and widespread nature of Colony Collapse Disorder is truly unprecedented.

Perhaps most disconcerting: no one seems to know exactly what is causing this phenomenon. Some theories include: parasites, mites or other pathogens, poor nutrition, and high stress levels

among adult bees, or a combination of these and other unknown factors.

I am deeply committed to raising awareness of Colony Collapse Disorder and its possible effects on American agriculture. Thousands of California farmers and beekeepers are dependant on honey bees for their livelihoods. If we do not move swiftly to get to the bottom of this, I fear we will have an even more dramatic problem on our hands.

We must also be smart in how we address this problem.

I read somewhere that some in the industry are looking for upwards of $300 million to combat colony collapse disorder. It is important to avoid the temptation to identify a potential problem and simply throw millions of dollars at it. Instead, through hearings like this one and future Congressional scrutiny, I am hopeful that we can identify exactly where limited research dollars will be most helpful in advancing our goal of preventing the further decline of the honey bee population.

To begin this closer examination of potential causes of and solutions to Colony Collapse Disorder, we have assembled two very

distinguished panels today. I want to take special note of the fact that we have not one, but two representatives from California's 18th Congressional District with us.

A good friend of mine, Paul Wenger, who grows almonds in Modesto, CA and is the First Vice President of the California Farm Bureau, will share his insight on the impact of Colony Collapse Disorder on California's almond industry. And finally, Gene Brandi—who is the Legislative Chairman of the California State Beekeeper Association, will speak from the beekeeper perspective.

With that, I now yield time to Ranking Member Neugebauer for his opening statement.

Opening Statement of
Agriculture Committee Chairman Collin C. Peterson
House Committee on Agriculture
Subcommittee on Horticulture and Organic Agriculture

Public Hearing to review of colony collapse disorder in honey bee colonies across the United States
March 29, 2007

Thank you, Chairman Cardoza for recognizing me to speak and for holding this hearing today. I also want to thank all of the witnesses for testifying here today.

Honey bees play an important role in the pollination of many food, fiber and seed products across the United States, and the recent unexplained decline in honey bee colonies is a cause for serious concern.

In my home state of Minnesota, we are the 6th largest producer of honey in the United States, producing 10.1 million pounds of honey valued at $10.5 million a year. In addition, bees from Minnesota travel to other states to help pollinate crops. I'm pleased that David Ellingson, a bee keeper from Ortonville, Minnesota could be here today to help us understand this problem and to help us identify what steps we should be taking to resolve the situation.

Chairman Cardoza, thank you again for holding this hearing today on this very important issue, and I look forward to the testimony from our witnesses here today.

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Subcommittee on Horticulture and Organic Agriculture
Hearing On Colony Collapse Disorder

Ranking Member Randy Neugebauer
Opening Statement
March 28, 2007

I thank Chairman Cardoza for calling today's hearing. After learning more about just how much the almond growers in his home state of California depend on honey bees for pollination, I understand his strong interest in this issue.

All of us in agriculture should have an interest in maintaining a sound supply of pollinators. Honey bee pollination results in many fruit, vegetable and nut crops, as well as forages and flowers. Pollination from honey bees increases yield and food quality and creates billions of dollars of crop value for farmers.

I was pleased to learn that almond producers in California had sufficient colonies for pollination for this year's crop, although costs were higher due to shorter supply. Beekeepers are now moving colonies to other states and other crops. However, we need to understand these new colony losses to help ensure bee colonies will be available for other areas and for next year's crops.

Even before this most recently reported decline in bee colonies, pests and diseases have had an impact on honey bees. Beekeepers, with the help of research, have been able to find ways to address many of these pests and diseases. As research into this new colony collapse continues, I have confidence that our innovative scientists and beekeepers can find the cause and a solution.

I appreciate the efforts of USDA's Agriculture Research Service to form the Colony Collapse Disorder Working Group. I encourage ARS and its university and state partners to work closely with the bee industry in this effort and to work together to coordinate research and disseminate findings. As the Working Group's plan is finalized, I ask that they keep our Subcommittee informed on their progress.

I look forward to learning more from the researchers, beekeepers and farmers here today. While they may not yet understand the cause of these colony losses, they do understand the importance of honey bee pollination to agriculture, and the Subcommittee benefits from their expertise.

Opening Statement of Ranking Member Bob Goodlatte
House Committee on Agriculture
Subcommittee on Horticulture and Organic Agriculture
Hearing to review colony collapse disorder in honey bee colonies across the United States
March 29, 2007

Mr. Chairman, thank you for having this hearing today to discuss ongoing research related to Colony Collapse Disorder – or CCD – which has been affecting our nation's honey bees. I think it is important that we are looking at the research aspect of this issue since there are still many questions about the recent disappearance of the adult bee population associated with CCD.

Over the past several years, the honey bee population has experienced a dramatic decline due to a variety of factors including loss of habitat, introduction of diseases and pests, such as the Varroa mite, and migratory stress. All of these factors have contributed to higher operating costs for the pollinator industry, as well as the producers who rely on a readily available supply of pollinator bees.

Pollination activities by honey bees add over $15 billion annually to the value of U.S. crops, including Virginia apples. With one-third of our food supply dependent upon pollination by honey bees, we need to have a solid understanding of CCD

and how to eradicate it. I commend researchers from the federal and state level as well as the industry and state departments of agriculture for coming together to form the CCD Working Group. I am hopeful this collective group of bee specialists can get to the bottom of this problem as quickly as possible.

I look forward to today's hearing and learning more about the research that is underway as well as research plans for the future. I am also interested in learning more about how CCD has affected beekeepers throughout the U.S. Even though CCD was first recognized in bee colonies along the East Coast, approximately 24 states throughout the nation have reported declining bee populations due to CCD.

I 'd like to thank our witnesses for their participation today. I look forward to their testimony, particularly as it relates to what we can or should do to combat CCD. Mr. Chairman, thank you for holding this hearing.

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Word Count: 327

STATEMENT OF DR. CAIRD REXROAD
ASSOCIATE ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

BEFORE THE
UNITED STATES HOUSE OF REPRESENTATIVES
AGRICULTURE COMMITTEE
SUBCOMMITTEE ON HORTICULTURE AND ORGANIC AGRICULTURE

OVERSIGHT HEARING—COLONY COLLAPSE DISORDER
1301 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, D.C.

MARCH 29, 2007

Mr. Chairman, Ranking Member Neugebauer, and Members of the Subcommittee, I am Dr. Caird Rexroad, Associate Administrator of the Agricultural Research Service (ARS). I am here today speaking on behalf of both ARS and the Cooperative State Research, Education, and Extension Service (CSREES), both of the Research, Education and Economics (REE) mission area of the United States Department of Agriculture (USDA). ARS is the primary intramural science research agency of USDA, operating a network of over 100 research laboratories across the nation on all aspects of agricultural science. CSREES is the primary extramural research agency of USDA and the Federal partner for the Cooperative Extension System. CSREES maintains wide ranging partnerships with over 130 colleges of agriculture, 59 agricultural experiment stations, and 57 cooperative extension services.

Thank you for the opportunity to appear before the Subcommittee today to present testimony about USDA efforts to address the problem of colony collapse disorder, known as CCD. This disorder, which has no recognizable underlying cause, is characterized by the sudden disappearance of a bee colony's population, with only a few bees remaining near the deserted hive. These outbreaks of unexplained colony collapse pose a threat to the pollination industry, the production of commercial honey, and production of at least 30% of our Nation's crops.

Mr. Chairman, in light of the significance of this threat, I am pleased to share with you USDA's current research efforts to investigate the cause of CCD. I will provide you with a brief overview of the disorder as well as a summary of our research and outreach efforts addressing the problem.

OVERVIEW OF COLONY COLLAPSE DISORDER

Beginning in October of 2006, beekeepers became alarmed that honey bee colonies were dying across the continental United States. Beekeepers reported unexplained losses of 30 to 90 percent, and the phenomenon typically involves the sudden loss of all but a few bees from a colony's populations, with only a laying queen and a small cluster of attendants remaining. After further investigation, researchers determined that outbreaks of CCD have probably been occurring for at least two to three years.

CCD poses a problem for many segments of the agricultural community, particularly the pollination industry and the many growers that depend on pollinating services. In total, bee pollination is responsible for $15 billion in added crop value, particularly for specialty crops such as almonds and other nuts, berries, fruits, and vegetables. The California almond crop alone requires 1.3 million colonies of bees, a need that is projected to grow significantly by 2010. Due to CCD, the bee industry is facing great difficulty meeting the demand of almond producers. If researchers are unable to solve the problem, and beekeepers are unable to meet demand for this and other crops, agriculture will be significantly impacted.

This could, indeed, be the perfect storm for pollination services. With invasive pests and diseases of bees increasing over the last two decades, we may have now reached a tipping point where the bee colony can no longer fight back. To make matters worse, this is occurring just as pollination needs, particularly for almonds, are increasing.

USDA RESEARCH ADDRESSING CCD

ARS and CSREES are both conducting and funding independent and collaborative research to determine what is causing the sudden disappearance of bee colonies. Presently, ARS is collaborating with Pennsylvania State University, the University of Illinois, North Carolina State University, the University of Montana, and the Pennsylvania and Florida Departments of Agriculture. These institutions have formed a Colony Collapse Disorder (CCD) Working Group. In conjunction with the ARS Customer Workshop on Bees, the CCD Working Group met with the bee industry and scientists on February 19, 2007, in Stuart, Florida, and developed a plan for determining the cause of colony collapse.

Immunosuppression and Bee Stress

Beekeepers experiencing CCD indicate that their colonies were under some form of stress at least two months before the first incident. Bees live in colonies, in societies, and depend on those societies to protect them. Unlike other insects that have greater ability to detoxify pesticides and resist pathogens, bees rely on their ability to rid the hive of sick bees or adjust temperature in order to control diseases. Stress can hinder this ability significantly, ruining the normal function of the bee colony. Eventually, stress can compromise bees' immune systems and leave them susceptible to disease, just as it can do to humans.

The CCD Working Group has sampled affected colonies at various locations and shared field research, and researchers found that there were a large number of disease-causing organisms present, particularly agents causing "stress-related" diseases (*Nosema*, European foulbrood, and others). Researchers therefore believe that, due to the magnitude of infectious agents being detected in adult bees, the immune systems of bees are becoming suppressed. This immunosuppression could be occurring for a number of reasons, and scientists suspect that some form of stress or combination of stresses, such as pathogens, limited or contaminated water supplies, pesticide application, the ordeal of being moved long distances during migratory beekeeping, or inadequate nutrition, may be working together to suppress the immune systems of bees and contributing to CCD.

ARS has a number of projects in place to improve the immune responses of bees and increase disease resistance. Work includes a genomics-based program in Beltsville, Maryland, and

Weslaco, Texas, to determine bee immunity and resistance to pathogens such as the American foulbrood bacterium and chalkbrood fungus. The results of this work will be incorporated into bee breeding work in Baton Rouge, Louisiana, where researchers have been working to develop a bee with increased resistance to the varroa mite and tracheal mite.

Next, I will discuss what we consider the top four causes of stress on bees, and what ARS is doing to counter these problems.

Varroa Mite

The number one suspect is the varroa mite, which invaded the United States in the 1980s, and has been linked to serious colony decline for the past few years. It is possible that by directly feeding on bee brood, varroa mites are playing a major role in CCD. Unfortunately, the mite has become resistant to many miticides. Now, the ARS Beltsville lab has found out that the mite not only kills bees by feeding on them, but also transmits pathogenic bee viruses. Therefore, the mite is almost certainly contributing to increased stress on bees.

During the past few years, USDA has put considerable energy into finding solutions to the varroa crisis, and progress has been made. The Beltsville lab has developed a screen insert that keeps mites from crawling back onto bees once they have dropped to the bottom of the hive; the Gainesville lab is in the process of developing a trap; and the Tucson lab has found a chemical, produced by the bees themselves and incorporated into beeswax, that kills the mites; this chemical is being developed into a control method. The Weslaco lab is developing other alternative miticides.

ARS researchers in Baton Rouge are conducting genetic research to locate resistance genes and breed bees with increased resistance to mites. Two lines of bees, the Russian bee and the SMR-trait bee, have already been found to have considerable resistance to the mite. With the completion of the bee genome sequencing project, ARS scientists are applying this achievement to improve honey bee breeding even further. Researchers will attempt to use marker-assisted breeding as one genome-based technique to breed a more resistant bee. Although marker-assisted breeding is not likely to replace field breeding, this method can be used to screen stock for specific traits, such as varroa mite resistance, prior to field-testing.

Work funded by CSREES through the National Research Initiative (NRI) is addressing suppression of varroa mite reproduction. There are a number of ongoing research projects at Land Grant Universities that are funded through the Hatch formula allocations to State Agricultural Experiment Station scientists. These projects include Integrated Pest Management (IPM) projects to establish treatment thresholds for the varroa mite; evaluate control methods for varroa, including genetic and cultural methods; and restore mite-resistant feral honey bee populations.

Pathogens

Another group of possible CCD-related stressors are various pathogens, such as viruses, spiroplasmas (bacteria without cell walls that are often parasitic in plants and arthropods), fungi, and others, that may be either killing bees directly or compromising their immune systems. *Nosema ceranae*, a microsporidian that causes diarrhea in bees, is suspected to be a possible

cause of CCD, because it was believed to have entered the Nation recently and coincided with the onset of CCD. Spain, another nation that has recently been affected by bee decline, reported that *Nosema* has risen in incidence from 10 to 90 percent from 2000 to 2004.

ARS scientists in Beltsville, Maryland, have recently probed our collection of bees at Beltsville and have evidence that this microbe has been in our country since at least 1995; therefore, we think it is less likely to be a cause of the recent CCD outbreak here. Also, colonies that die of Nosema normally contain some dead bees, an occurrence that has not been seen with CCD. Nevertheless, we need to investigate this organism to make sure that it is not causing the current crisis, particularly since Nosema infected bees have been shown to take cleansing flights – to rid their guts of the microbe – in temperatures as low as 4 degrees Celsius, which is cold enough to kill bees.

A second group of pathogens – bee viruses – can cause brain pathologies in bees and therefore might contribute to the immunosuppression suspected in CCD. At present, bees can be affected by at least 20 viruses, and scientists have probes for only a few. Organisms that infect the bee brain might cause brain damage that would make it hard for the bees to communicate the location of food or water sources by their dance language, or to find their way back to the hive after foraging.

For our next steps regarding our top two pathogen suspects, we need to determine how long Nosema has been in this country, and we need to develop better probes for viruses. Other unanswered questions include the role of the varroa mite in transmitting viruses and the seriousness of viral diseases in bees. Upon discovering these answers, we need to perform tests to see if we can replicate CCD using any of these suspected causes. And, if we identify a cause, we need to counter it – perhaps using fumigants for Nosema, or resistance breeding for viruses.

Regarding other pathogens, parasites, and depredators that could be contributing to CCD, ARS researchers at various locations will continue to research the tracheal mite, the small hive beetle, spiroplasmas, and fungi such as *Aspergillus*, to determine if these factors are contributors to CCD and to develop control methods for them to reduce overall bee stress.

In addition, Weslaco scientists are using the recently sequenced honey bee genome to investigate bee immunity to chalkbrood disease, caused by another fungus. To date, researchers at the lab have used the bee genome to find genes for Toll receptors that give immune cells the ability to produce chemicals to respond to and kill microbes. This work will help improve bees' defenses against a number of microbial pathogens.

Beltsville scientists are also studying bee immune responses and disease resistance, having recently discovered that it is possible to trigger bee immunity to the American foulbrood bacterium by feeding bee larvae a non-pathogenic bacterium. Researchers at this location have also identified a genetic screen that can be used to look for resistance.

A recent CSREES-NRI grant has funded ARS scientists to study genomic approaches to disease resistance in honey bees. Aspects of Hatch-funded research at Land Grant Universities include investigations on the control of the small hive beetle and on genetic and cultural methods to

control Nosema apis disease. University scientists are also investigating mechanisms of disease virulence, transmission, and epidemiology of honey bees.

Migratory Stress
Migratory stress is another stressor that may contribute to CCD; migration has increased due to increased demands on beekeepers for colonies for almond pollination, resulting in bee crowding and lack of hygiene, as well as forced mixing of old foragers and young nurse bees, which can spread disease. It is common for 10 percent of colonies to die after transportation, with losses of 30 percent possible after the pollination of some crops.

During the migration process, colonies can also become stressed due to splitting – the dividing of a colony into one or more new colonies. Older bees that are forced to act as nurse bees may be less effective at provisioning, and may carry increased pathogen loads. In addition, the use of contaminated equipment or old comb during splitting could expose bees to increased levels of pathogens or pesticides accumulating in comb wax.

ARS has recently begun investigating the effects of migratory stress. In 2005, the ARS location in Weslaco began to study whether and how hive movement affects the health of bees.

Pesticides
Finally, many pesticides are toxic to bees. Based on findings from the bee genome, it has become apparent that bees have very weak detoxifying systems for breaking down pesticides. Applications of pesticides such as the miticide coumaphos (used for controlling the varroa mite) can accumulate in hive wax, reducing worker longevity, and killing queens reared in that wax. In addition, even if not lethal to bees, some pesticides may increase the stress levels of bees, making colonies more susceptible to disease. And the neonicotinoid insecticide imidacloprid has been shown to impair neurological function in bees. If so, foraging bees, which rely on memory to locate food and water and find their way back to the hive, might be particularly vulnerable.

We hypothesize, therefore, that factors that stress bees or impair bee brain function may be linked to bee disappearance in CCD.

ARS and our university partners plan to expand on these findings to study the effect of pesticides on bee brains, and to test the effects of pesticides on bees in the apiary. ARS is now participating with the CCD Working Group to organize a program that will further investigate the effects of pesticide exposure on bees under field conditions. We need field studies to determine if pesticides in this category are harming bees in the field, not only during acute exposure, but also at sublethal dose levels. Are they disrupting bee learning or the colony's social harmony?

ARS Areawide Integrated Pest Management (IPM) Project and Bee Nutrition and Health
While we continue to look for the cause of CCD, ARS also intends to test current technologies in an attempt to produce healthy bees, no matter what stress they are under. This will be done through our Areawide Integrated Pest Management (IPM) Project, a project to investigate almonds in California and other crops elsewhere, which will focus on migratory beekeeping. This bee project, which would study varroa management, would also address other bee parasites,

diseases, and predators such as the small hive beetle, which feeds on hive stores of honey and pollen. Significantly, however, it focuses on bee health by improving their nutrition, as we have achieved through the development of supplemental diets at Tucson. Poor nutrition, due to overcrowding of bee colonies, pollination of crops with low nutritional value, or lack of pollen or nectar, has been associated with poor bee health and is a suspected contributor to CCD. Even well-provisioned colonies may be weak coming out of the winter, so we have sugars and pollen substitutes that help them increase their numbers before bloom. This is particularly important for pollination of almonds, which bloom early in the season.

In 2006, we tested the Areawide concept for bee health and showed that the winter feeding of protein is beneficial to bees, but that colonies already in a weakened state before winter do not grow sufficiently to meet pollination standards for almonds. The entire Areawide Project will incorporate additional studies that simulate poor nutritional conditions for bees in the summer and fall and incorporate corrective management practices.

CSREES-NRI has funded key research on the impact of plastic combs on recruitment, communication, and honey production, as well as on the commercial development of a synthetic pheromone to increase foraging and pollination efficiency. A new multi-state research project supported by CSREES will collaborate with the CCD Working Group to address CCD and other apiary problems.

OUTREACH AND EXTENSION

ARS conducts outreach to key stakeholders through workshops such as the Customer Workshop on Bees and through regularly scheduled programmatic review processes that involve diverse stakeholder groups. CSREES provides significant funding for extension programs related to beekeeping, pollinators, and honey production. Currently, extension entomologists with responsibilities for apiculture are active in 21 states. These programs are funded in part by formula-based allocations through the Smith-Lever Act, in addition to state and county-based funding.

FUTURE RESEARCH AND OUTREACH PLANS

To date, research indicates that there are a few common factors shared by beekeepers experiencing CCD, but no common environmental agents or chemicals standing out as causative. In an effort to solve this problem, ARS will work to continue and expand its research to address this problem. In the future, the Agency will involve researchers from all ARS laboratories in the CCD Working Group. ARS will also be coordinating the development of a 5-year Strategic Plan with the Cooperative State Research, Education, and Extension Service, university researchers, the bee industry, and growers, to develop and implement research projects to investigate and solve the problem.

In particular, researchers will be capitalizing on the recently released honey bee genome to investigate those areas listed above and many others related to bee health. Both ARS' intramural and CSREES' extramural programs have been instrumental in supporting this accomplishment. The use of this genomic information will have great applications in improving honey bee breeding and management. As an initial step, university researchers are preparing to submit a proposal to the CSREES Critical and Emerging Pests and Diseases Program to use microarray

hybridization assays to identify genes associated with CCD. Samples of bees from healthy and declining colonies have already been collected through the auspices of the CCD Working Group and the American Beekeeping Federation.

Mr. Chairman, ARS and CSREES, in collaboration with other USDA agencies and private institutions, conduct and fund much ongoing research that addresses the paradigm surrounding CCD. We will continue to work to improve bee health and prevent colony collapse. These efforts will be critical in checking CCD as it causes damages to beekeepers, the pollination industry, and agricultural producers across the United States.

The USDA REE mission area, through both ARS and CSREES, is pleased to conduct and fund research and provide leadership in this effort to solve the mystery of colony collapse disorder. We thank you for the opportunity to share our research with you. Mr. Chairman, this concludes my remarks. I would be pleased to answer any questions at this time.

Introduction

Chairman Cardoza and Members of the Subcommittee on Horticulture and Organic Agriculture,

Thank you for the opportunity to appear before you today representing the researchers in the Colony Collapse Disorder Working group. I am a Professor of Entomology at Pennsylvania State University and have over 25 years experience in insect physiology, pathology, molecular biology and evolution. In addition, I have active experience in disease biology through involvement in biodefense issues in agriculture. For the last 10 years, I have conducted extensive research on the interaction of honey bees with varroa mites and bee diseases, focusing on viral diseases. In honey bees, Dr. Nancy Ostiguy and I have been examining viral disease incidence as correlated with honey bee colony deaths in association with varroa mites. My expertise is a reason why beekeepers approached me in November 2006 with colonies deaths having unique symptoms. These were the first recognized instances of Colony Collapse Disorder.

The Colony Collapse Disorder Working Group is collaboration among researchers from Penn State University, the Pennsylvania Department of Agriculture (PDA), the USDA-ARS, the Florida Department of Agriculture and Consumer Services, North Carolina State University, the University of Illinois, the University of Delaware, and others. In addition, experts from Bee Alert, Inc., Montana, have joined in the study. The goals of the CCD Working Group are to 1) identify potential causal factors common to CCD colonies and not associated with strong, healthy bee colonies, 2) determine how such factors can underlie CCD by experimentally reproducing CCD symptoms, and 3) devise preventative measures to disrupt CCD and ensure strong colonies for pollination.

As you know and have heard in the testimony by the USDA-ARS, honey bees are essential for the pollination of over 90 fruit and vegetable crops worldwide. The economic worth of the honey bee is valued at more than $14.6 billion in the U.S. In Pennsylvania alone, honey bees and pollination are worth $65 million annually through fruit crops, forage, and bee products (most notably honey). In addition to agricultural crops, honey bees also pollinate many native plants in the ecosystem. Populations of honey bees are in jeopardy due to the 1988 introduction of varroa mites, recognized previously as a major threat to bee colonies in the U.S. Down from a peak of 80,000 colonies in 1982, an estimated 38,500 colonies in September 2006 are being managed in the Commonwealth of Pennsylvania. Recently, increased deaths in bee colonies with unique symptoms (termed Colony Collapse Disorder (CCD)) seriously threaten the ability of the bee industry to meet the diverse pollination needs of fruit and vegetable producers within the State and across the United States. These symptoms have now been reported in 24 states across the continental United States and in two Canadian provinces.

In Pennsylvania since 1930, bee colonies have regularly been inspected for disease; and thus, Pennsylvania provides a good database to monitor changes in incidences of bee diseases. To determine the scope of CCD, Dennis vanEnglesdorp, the State Apiarist with the Pennsylvania Department of Agriculture, has conducted recent surveys of Pennsylvania beekeepers that reveal a significant number of colonies collapsing with

CCD (responding beekeepers represent 43%, or 17,376, of all Pennsylvania colonies). Beekeepers suffering from CCD managed a total of 8,953 colonies last September and lost an average of 73% of their hives (ranging from 55 to 100%), as compared to beekeepers not experiencing CCD, who lost an average of 25% of their colonies (ranging from 18-31%). Of significance, those reporting CCD own a quarter of all colonies in Pennsylvania. These losses translate into limited pollination resources for Pennsylvania and increased costs to both growers and consumers. In Pennsylvania, the current cost of pollination has increased by 50% and may increase even more as the 2007 season progresses.

The exact impact of CCD across the United States is difficult to gauge since essential data on the number of bee keepers, number of colonies, and death rates are not measured. A preliminary nationwide survey, initiated last month by the Apiary Inspectors of America, suggests that a 17 % loss of colonies is considered normal, which is astonishing, given that one would be hard pressed to find another agricultural commodity sustaining losses of this magnitude on a regular basis. This same survey also found that approximately one-quarter of responding beekeepers suffered CCD. Obtaining an accurate, annual survey of bee colonies in the United States is critical to ensure the health of American agriculture and to help monitor the status of pollinators as a whole.

Originally, CCD collapses were reported primarily by commercial migratory bee keepers who move their colonies from one area to another. More recently, it is clear that non-migratory beekeepers are also experiencing CCD. Of particular note, several queen breeders/packagers have experienced severe CCD symptoms in their operations. This causes particular alarm since many bee keepers depend upon these operations for new bee colonies and these losses translate into fewer bee colonies being replaced or started anew this year. It is now clear that CCD is a problem facing all bee keepers; it will have a major impact.

Brief Summary of CCD symptoms

As you have heard, CCD is associated with unique symptoms, not seen in normal collapses associated with varroa mites and honey bee viruses or in colony deaths due to winter kill. The uniqueness of these symptoms has been recognized by members of the CCD working group (Jeff Pettis, USDA-ARS; Dennis vanEnglesdorp, Pennsylvania Department of Agriculture; Jerry Hayes, Florida Department of Agriculture) who have been actively involved in field diagnosis of bee diseases and colony deaths for numerous years and who are recognized as international experts.

In CCD, the bee colony proceeds rapidly from a strong colony with many individuals to a colony with few or no surviving bees. Queens are found in collapsing colonies with a few young adult bees, lots of brood, and more than adequate food resources. No dead adult bees are found in the colony or outside in proximity to the colony. A unique aspect of CCD is that there is a significant delay in robbing of the dead colony by bees from other colonies or invasion by pest insects such as waxworm moths or small hive beetles; this suggests the presence of a deterrent chemical or toxin in the hive.

In colonies experiencing CCD, we have found that individual bees are infected with an extremely high number of different disease organisms. However, we have found little evidence of parasitization by varroa or tracheal mites. Many of these known bee diseases are commonly associated with stress in bees. Of particular note, we have found all adult bees in CCD colonies are infected with fungal infections. These findings may indicate that the bees are being immunosuppressed, but none of the organisms found in these bees can be attributed as the primary culprits in CCD.

Of special concern, we have found species like *Aspergillus* and *Mucor* among the fungi in CCD colonies. These fungi were previously reported to be bee pathogens in the 1930's and are associated with toxin production; however, since that time, these fungi have been rarely of concern in bee colonies. Determining the role of these fungi in CCD is important not only in terms of solving the mystery of CCD but also in determining how these fungi are related to fungal species that infect vertebrates, including humans. Fortunately, at Penn State University, we have world-recognized experts in fungal identification and fungal toxins; these researchers have teamed with us to address this concern.

The CCD working group has made collections of bees and hive products (wax, honey, and pollen stores) from more than 100 CCD and non-CCD colonies sampled from operations across the country. These samples are being stored in a central location and available to all CCD researchers. In addition to examining these bees and colonies, we have surveyed beekeepers both with and without CCD; these surveys detail the operational practices, operational histories, and environmental conditions experienced by affected and non-affected colonies. These surveys have allowed us to exclude several factors as primary causes of CCD. Based upon these data, we have focused upon three hypotheses underlying CCD, as follows:

1) Are new or reemerging pathogens responsible for CCD?
2) Are environmental chemicals causing the immunosuppression of bees and triggering CCD?
3) Is a combination of stressors (e.g., varroa mites, diseases, nutritional stress) interacting to weaken bee colonies and allowing stress-related pathogens such as fungi to cause final collapse?

Research Foci Addressing CCD

These hypotheses are being addressed simultaneously via extensive collaboration among members of the CCD Working Group. We are sharing specimens, have agreed to share data, and are actively working toward resolving the causes of CCD. Funding to date has been provided by several beekeeper organizations, the National Honey Board, USDA, PDA, Penn State, and the Department of Defense (through SBIR funding to Bee Alert, Inc.); we greatly appreciate this funding for allowing us to begin addressing CCD.

A summary of our activities follows.

Are there new or reemerging pathogens responsible for CCD?

It has become clear in recent years that many pathogens have the ability to impair the immune defenses of their hosts. Among the known bee pathogens in CCD bees, none have been identified as having immunosuppressive abilities. We have identified several routes of entry into the United States that may have permitted the inadvertent introduction of new pathogens. In collaboration with Dr. Ian Lipkin and associates at Columbia University and the Northeast Biodefense Center, we at Penn State are identifying the microbes and viruses associated with CCD colonies. We predict that any pathogens that may be linked to CCD will be found in multiple operations having CCD and will not be present in colonies lacking CCD. In this analysis, we will probably isolate many new organisms not previously known to be associated with bees. Determining which microbes are important and linked to CCD will require extensive study. We will also need to investigate new methods to control or disrupt infections by these pathogens.

These studies are being performed in collaboration with Drs. Jay Evans and Jeff Pettis at USDA-ARS and with Drs. May Berenbaum and Gene Robinson at the University of Illinois. These collaborations are utilizing the newly developed knowledge of honey bee genomics and molecular physiology, to let the bees themselves tell us how they are being impacted and what are the most likely causal factors underlying CCD by asking what genes are being turned on and off in the bees. We expect that these analyses will reveal how the bees are responding to potential pathogens, environmental toxins, or other stressors.

Are environmental chemicals causing the immunosuppression of bees and triggering CCD?

It is recognized that environmental toxins or pesticides can impair the immune systems of animals. In insects, sub-lethal effects of insecticides are being increasingly recognized as stressors that may impair immune defenses. Our surveys to date have failed to identify common chemicals or pesticides being used in the various beekeeping operations experiencing CCD. Bee Alert, Inc. is asking whether any environmental chemicals are present in CCD colonies by analyzing volatile chemicals in hives. At Penn State, international experts in environmental chemistry and toxicology (Drs. Chris Mullin, Ralph Mumma and others) are helping to direct the chemical analyses of the hive products. Wax, honey, and pollen stores will be analyzed for pesticides and other toxic compounds. Of particular concern are pesticides being widely used to control insect pests in agriculture, urban environments, and animal systems. Among these are the neonicotinoids, a class of pesticides that have been extensively adopted for pest management. This class of pesticides is recognized as having extremely low toxicity in humans and other vertebrates and as highly effective in controlling insect pests; however, these chemicals are known to be highly toxic to honey bees and other pollinators. Some research has suggested that these systemic pesticides can translocate or move through plants to become localized in pollen and nectar at concentrations that may affect bees. Research is warranted to address the effects on the bees and other pollinators of these compounds at the concentrations found in pollen and honey made from nectar collected by the bees. It is essential to determine whether these pesticides play a role as a causal factor in the CCD symptoms.

Is a combination of stresses working together to weaken bee colonies and allowing stress-pathogens to cause final collapse?
Several working group members (USDA-ARS, PDA, North Carolina State University, and Penn State) are collaborating to ask what stresses are encountered by bee colonies that are part of migratory operations. Recently, we are beginning to learn from migratory bee keepers that multiple stressors impact their operations and cause significant losses of honey bee colonies. Gaining this baseline information is important in determining how bees are being impacted and how these stresses can be eliminated to ensure adequate pollination of crops.

Finally, the CCD working group recognizes the importance of trying to breed honey bees that are more resistant to diseases and the impacts of parasites such as varroa mites. In addition, we anticipate that different genetic strains will respond differently to various stresses. Researchers at North Carolina State, University of Illinois and Texas A&M are beginning to ask how genetic diversity in bee populations correlates with CCD and resistance traits. Developing new genetic strains of bees for commercial production may be essential to the future of beekeeping.

Closing Remarks
Mr. Chairman and Members of the Subcommittee, I thank you again for inviting me to review the Colony Collapse Disorder affecting honey bees and to highlight some the ongoing activities and research of the CCD working group. It is clear that we are facing several challenges in unraveling the causes of CCD and in developing preventative measures to ensure the health of bees and the pollination industry. I would be happy to answer any questions you may have concerning this serious threat to American agriculture.

Committee on Agriculture
U.S. House of Representatives
Required Witness Disclosure Form

House Rules* require nongovernmental witnesses to disclose the amount and source of Federal grants received since October 1, 2004.

Name: Dr. Diana L. Cox-Foster

Address: Dept. Entomology, 501 ASI Bldg, Penn State Univ., University Park, PA 16802

Telephone: 814-865-1022

Organization you represent (if any): College of Agricultural Sciences, Pennsylvania State University, University Park, PA

1. **Please list any federal grants or contracts (including subgrants and subcontracts) you have received since October 1, 2004, as well as the source and the amount of each grant or contract. House Rules do NOT require disclosure of federal payments to individuals, such as Social Security or Medicare benefits, farm program payments, or assistance to agricultural producers:**

Source: Genetic engineering of entomophathogenic nematode for suppression of insect cellular immune response. USDA-CSREES, NRICGP **Amount:** $ 298,800

Source: Genetic and biochemical regulation of luteovirus transmission in aphids, USDA-CSREES, NRICGP **Amount:** $ 107,864

Source: Twenty four hour fumigation of colonies with formic and acetic acid for the control of Varroa mites, small hive beetle, honey bee tracheal mites, and honey bee viruses. The National Honey Board **Amount:** $33,677

2. **If you are appearing on behalf of an organization, please list any federal grants or contracts (including subgrants and subcontracts) the organization has received since October 1, 2004, as well as the source and the amount of each grant or contract:**

Source: Total Federal Grants for FY 04/05 – FY 05/06 (approximate) USDA, DCED, DCNR, DOE, DOD, DEP, DOH, DMVA, DPW, DOT **Amount:** $47,414,638

Please check here if this form is NOT applicable to you: _____

Signature: _____

* Rule XI, clause 2(g)(4) of the U.S. House of Representatives provides: *Each committee shall, to the greatest extent practicable, require witnesses who appear before it to submit in advance written statements of proposed testimony and to limit their initial presentations to the committee to brief summaries thereof. In the case of a witness appearing in a nongovernmental capacity, a written statement of proposed testimony shall include a curriculum vitae and a disclosure of the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by the witness or by any entity represented by the witness.*

PLEASE ATTACH DISCLOSURE FORM TO EACH COPY OF TESTIMONY.

Colony Collapse Disorder and Pollinator Decline

Statement of May R. Berenbaum

Professor and Head, Department of Entomology

University of Illinois Urbana-Champaign

and

Chair, Committee on the Status of Pollinators in North America

The National Academies

before the

Subcommittee on Horticulture and Organic Agriculture

Committee on Agriculture

U.S. House of Representatives

March 29, 2007

Good morning, Mr. Chairman and members of the Subcommittee; thank you for the opportunity to talk to you about colony collapse disorder and related issues affecting American agriculture. My name is May Berenbaum and I am Swanlund Professor and Head of the Department of Entomology at the University of Illinois at Urbana-Champaign. I recently served as chair of the National Research Council Committee on the Status of Pollinators in North America; I also currently serve on the Council of the National Academy of Sciences and am former chair of the NRC Board on Agriculture and Natural Resources.

Background to Colony Collapse Disorder—Committee on the Status of Pollinators in North America

The principal focus of this hearing is the sudden inexplicable disappearance of millions of honey bees across the nation, a phenomenon called, for want of an identified cause, colony collapse disorder (CCD). To understand the magnitude and potential impacts of this problem, however, it is important to place it into the broader context of pollinator decline in general. Pollination is the process by which pollen grains are transferred to receptive female floral parts to bring about fertilization. Because they are for the most part firmly rooted in the ground, approximately 3/4 of the 250,000 + species of flowering plants on the planet rely on mobile animal partners—pollinators—to carry out this vital process. Over the past two decades, concern has grown around the world about apparent reductions in the abundance of pollinators of all descriptions, with declines reported on no fewer than four continents. During this same time

period in the U.S., the western honey bee *Apis mellifera*, the world's premier managed pollinator species, experienced dramatic population declines, primarily as a result of the accidental introduction in the 1980s of two bloodsucking parasitic mites. Between 1947 and 2005, colony numbers nationwide declined by over 40%, from 5.9 million to 2.4 million. These losses have occurred as demand for pollination services has soared for a number of fruit, nut and vegetable crops, most notably for almonds. The NRC, the research arm of the National Academies of Science, is chartered to provide independent objective analysis and advice on scientific matters of national importance. Thus, with funding from the US Department of Agriculture, the US Geological Survey, and The National Academy of Sciences itself, the National Research Council's Board on Life Sciences and Board on Agriculture and Natural Resources jointly convened an ad hoc committee to document the status of pollinating animals in North America.

The committee was charged with determining whether, and to what degree, pollinators are experiencing significant declines, identifying causes of such declines, and detailing the consequences of pollinator declines in both agricultural and natural ecosystems. The committee was also asked to make recommendations on research and monitoring needs and on conservation or restoration steps to prevent, slow, or reverse potential decline. The committee addressed their charge by compiling and analyzing published literature and evaluating expert testimony to determine the current state of knowledge on pollinator status, to identify knowledge gaps, and to establish priorities for closing these gaps.

The Committee, comprising a group of 15 members from the U.S., Canada, and Mexico with expertise encompassing ecology, population biology, ethology, genetics, botany, entomology, systematics, agricultural economics, apiculture and conservation biology, quickly ascertained that there is an extraordinary paucity of reliable data on pollinator populations. This

dearth surprisingly applies even to the honey bee, a species that has been semi-domesticated and managed for thousands of years. Honey bees are in effect six-legged livestock that both manufacture agricultural commodities—honey and wax—and, more importantly, contribute agricultural services—pollination. Close to 100 crop species in the U.S. rely to some degree on pollination services provided by this one species—collectively, these crops make up approximately 1/3 of the U.S. diet, including the majority of high-value crops that contribute to healthy diets. Although economists differ in calculating the exact dollar value of honey bee pollination to American agriculture, virtually all estimates are in the range of billions of dollars. It is difficult in fact to think of any other multi-billion-dollar agricultural enterprise that is so casually monitored.

Despite the enormous importance of the honey bee, methods for estimating the availability of bees for pollination services are outdated and disturbingly inadequate. Since 1947, the National Agricultural Statistics Service has conducted an annual survey of honey bees, but the focus of data collection has been honey production and not pollination services; moreover, this assessment excludes hobbyist beekeepers with fewer than five colonies, does not take into account colony movement between states, and does not include assessments of the general health and vigor of the bees. Every 5 years, NASS conducts a census that covers all farming operations with honey bees, including the 30% that do not produce honey, but this census also does not assess pollination activities or colony health. Thus, the magnitude of decline in honey bee abundance and efficacy, despite six decades of data collection, is difficult to assess with precision.

That colony health is not regularly assessed is a serious deficiency. Bees in America have been beset of late; colony collapse disorder is just the most recent of a seemingly unrelenting

series of devastating problems for the beekeeping industry. Introduced pests and parasites, microbial diseases, pesticide drift, and competition with Africanized bees have all contributed to reductions in colony numbers since NASS assessments began. Exacerbating the shortages created by the decline in numbers is the steadily increasing demand for pollination services. Shortages were sufficiently acute that, in 2005, for the first time since passage of the Honeybee Act of 1922, honey bees were imported from outside the U.S., primarily to meet the needs of the $2 billion almond crop. Importing bees, although necessary to meet the demand for pollination, is an inherently risky enterprise in that it increases the chances of introducing new pests and parasites. Even before CCD came to light, our committee estimated that, if honey bee numbers continue to decline at the rates documented from 1989 to 1996, managed honey bees will cease to exist by 2035. Historically, feral, or "wild," honey bees have provided pollination services to both natural and managed plant communities but no system is in place for monitoring their numbers. Some evidence suggests that parasite infestations have all but eliminated feral colonies in some areas, yet in the absence of systematic monitoring there is no certainty as to their distribution or abundance.

Potential impacts of pollinator decline on U.S. agriculture

Why should reductions in the availability of one species of insect (one that can inflict a painful sting to boot) be a concern of Congress? Even the complete disappearance of honey bees would not fundamentally jeopardize food supplies in terms of calories because grains—the world's primary sources of dietary energy—do not depend upon animal pollinators. However, supplies of animal-pollinated foods—most fruit, vegetable, and nut crops, which provide the bulk of vitamins and other necessary nutrients in our diets—may well be dramatically affected. Among the most conspicuous demonstrable consequences of honey bee declines in agriculture

are the rising costs of producing bees and hence rising costs for honey bee rentals, contributing in turn to rising prices for crops and reductions in consumer welfare. Honey bee declines can reduce crop quality as well as yield. Rising production costs combined with declining yields may lead economically marginal producers to switch to crops independent of pollinators or to leave the industry altogether. Even before the advent of CCD, financial impacts of honey bee shortages have materialized; varroa mites are estimated to have increased honey bee colony rental fees by $30 million annually. Because bee pollination contributes to so many different sectors of the agricultural economy, including the beef and dairy industries (via pollination of clover and other hay and forage crops), disruption of the honey bee supply will likely reverberate across the entire country. Free markets work well only when good information is available and, without information on how to manage CCD, beekeepers will not be able to keep their bees alive. If honey bees die in numbers large enough to compromise pollination, markets will respond, but may do so in ways that are detrimental to the overall economy. Possible outcomes include greater imports of bees from abroad (with associated risks of importing new pests), higher prices of nuts, fruits and vegetables, reduced exports of major commodities, and increased imports of cheaper fruits and vegetables from foreign markets where CCD is not a problem, all of which will likely exacerbate the record U.S. trade deficit.

Short-term and long-term recommendations for honey bees

To address the problems in assessing honey bee decline, our committee recommended changes in data collection methodologies to take into account colony use (i.e., honey production or pollination) and colony seasonal losses. Moreover, our report recommended increased investment to encourage innovative approaches to protecting honey bee health and improving

genetic stocks of bees. Investment in honey bee research has hardly been commensurate with the economic importance of this species. Certain elements of contemporary apiculture have remained essentially unchanged for the past century; in part, the lack of innovation reflects the relatively low priority accorded to honey bee research in the agricultural sector. Appropriate investment requires minimally restoring lost positions in ARS for bee scientists.

The Committee concluded its deliberations before Colony Collapse Disorder came to light. That honey bees are experiencing losses on an unprecedented scale, however, was essentially predicted by the report—over-reliance on one managed non-native species is inherently unstable. CCD has accelerated the rate of colony loss, and beekeepers as well as growers need immediate relief. In view of the urgency of this new problem, support in the form of new extramural funds would have the desirable effect of rapidly expanding the now limited pool of investigators addressing the gaps in knowledge of honey bee biology. Competitive funds offered through the USDA National Research Initiative (NRI) provide an ideal mechanism for bringing new methods, new approaches, and new investigators into bee biology. In particular, completion of the honey bee genome in October 2006 provides extraordinarily powerful new tools for diagnosing problems, including CCD, and developing new management strategies. At the moment, many investigators in the Colony Collapse Disorder working group are donating their own time and money to solve this problem; such altruism, although befitting the social behavior of the honey bee, is not sustainable long-term.

The 2002 Farm Bill is set to expire September 30 2007 and proposed 2007 legislation identifies specialty crops as a high priority for research; many, if not most, of these specialty crops depend heavily upon insect pollination, and pollinator sustainability

should be a conspicuous component of such research. At present NRI represents a tiny fraction of research funding within USDA; in comparison with the proposed $1.38 billion intramural ARS budget, only $180 million is assigned to the Cooperative State Research, Education and Extension Service (CSREES) for competitive grants through NRI. Altogether, only 10% of USDA funding is competitive. No fewer than three NRC reports attest to the value of competitive programs such as NRI in generating high-quality basic and mission-oriented research (the 1989 study proposing the creation of NRI, *Investing in the National Research Initiative: A Proposal to Strengthen the Agricultural, Food and Environmental System*, the 1994 study *Investing in the National Research Initiative: An Update of the Competitive Grants Program of the U.S. Department of Agriculture* and the 2000 report *National Research Initiative: A Vital Competitive Grants Program in Food, Fiber, and Natural Resources Research*). As well, a permanent surveillance program for parasites and diseases of the honey bee is clearly in the best interests of the nation; such a survey could prevent the introduction of new pests and bring the U.S. into compliance with international trade agreements. The request from APHIS for a National Honey Bee Pest Survey, declined last year, is well worth reconsidering in the light of CCD.

Wild pollinators—putting pollen in more than one basket

It is an unfortunate consequence of benign indifference to the precarious nature of an overwhelming reliance on a single species that few alternative actively managed species are currently available for use. And despite evidence of their efficacy as crop pollinators, wild species are not being exploited to any significant extent. While efforts to monitor honey bees are inadequate, efforts to monitor the status of wild pollinators in North America are essentially nonexistent. Wild pollinators contribute in important ways to crop pollination; in fact, pollination

by native bees was recently estimated to be worth 3 billion dollars annually in the US. In the Central Valley of California, for example, a wide variety of native bees meet part or all of the crop pollination requirements for the region. Collectively, native bees are more versatile than the honey bee; some species, including mason bees and bumble bees, are active when conditions are unsuitable for honey bees, and others are capable of buzz-pollination—vibrating the flower to induce it to release pollen—and thereby can service crops such as tomatoes, cranberries and tomatoes more efficiently. Yet the status of wild pollinators is essentially undocumented for all but the most charismatic species. There is reliable evidence that some North American pollinator species have gone extinct, become locally extirpated, or have declined in number. At least two bumble bee species, one of which is a crop pollinator, could face imminent extinction, and several other pollinators have declined significantly. For some species, there is no evidence of population decline because their populations have never been monitored over time; there is seldom a historical baseline with which contemporary data can be compared.

The committee noted that, while systematic, thorough monitoring programs in Europe have revealed dramatic declines in native pollinator abundance and diversity, there are no comparable North American programs. The European experience demonstrates that monitoring is needed to document changes in pollinator status. Additional recommendations for long-term pollination sustainability include discovery surveys supported by the U.S. Geological Survey, the Fish and Wildlife Service, and other agencies responsible for natural resource protection, to identify potential new pollinators. As well, because of the importance of pollination as an ecosystem service in both agricultural and natural ecosystems, federal funding agencies should recognize pollination as a cross-cutting theme in their competitive grant programs and work

together to integrate research that ranges from the genomics of honey bees and the systematics and ecology of wild pollinators.

Conserving America's pollinators will require economic incentives. Upcoming discussions of the Farm Bill provide an opportunity to address this need. Through the Farm Bill, the federal government has an opportunity to encourage state-level Natural Resources Conservation Service (NRCS) offices to promote scientifically tested and approved pollinator-friendly practices for farmers participating in USDA cost share programs (the Wildlife Habitat Incentives Program and the Environmental Quality Incentives Program) and land retirement programs (the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program, and the Conservation Security Program (CSP)). CRP should explicitly incorporate pollinator habitat in the environmental-benefits index used to evaluate land parcel proposals and CSP should incorporate the value of pollinator habitat development into its determination of the stewardship tiers that are the basis for federal payments. USDA cost-sharing, land retirement, and production stewardship programs should be available to producers of all commodities that depend on pollinators. The Xerces Society For Invertebrate Conservation (of which I am President) has been working with the Natural Resource Conservation Service to incorporate native pollinators into Farm Bill programs at both the National and State level and offers its time and expertise to congressional staffers on language for the Farm Bill and its programs to accomplish this goal.

Pollination reserves and the American quality of life

Insuring the safety and security of our national food supply is an explicit national priority. Although it is generally discussed in the context of vulnerability to attack and disruption from beyond our borders, food security may well face a greater threat from within our

borders--the overly optimistic deep-seated conviction that pollination resources will always be available. The honey bee was critical to the success of the earliest European colonists of the New World--English immigrant William Blackstone's efforts to grow apple trees in New England in 1623, e.g., were unsuccessful until honey bees were also brought over to provide the necessary pollination. Four centuries later, American farmers remain dependent upon this insect to produce their crops. Beyond agriculture, pollinators are crucial to maintaining the quality of American life. They serve as keystone species in most terrestrial ecosystems in that the services they provide allow most plants to reproduce and maintain genetic diversity. These plants in turn provide food and shelter for animals; fruits and seeds produced by insect pollination are a major part of the diet of approximately 25 percent of birds and of mammals ranging from red-backed voles to grizzly bears. In some areas, pollinator-supported plant communities prevent erosion by binding the soil—thereby conserving an important resource and keeping creeks clean for aquatic life.

Phalanxes of economists devote many hours to estimating and calculating our energy reserves but there has been no comparable effort to calculate our pollination reserves. Human technological innovation has not, in most cases, replaced or even improved upon animal pollinators and is unlikely to do so in the immediate future. "The birds and the bees" remain an essential fact of life; as long as plants depend on pollinators, so will people and it behooves us to shepherd them wisely.

Reference

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STATEMENT OF THE
CALIFORNIA FARM BUREAU FEDERATION (CFBF)
Before the
U.S. HOUSE AGRICULTURE SUBCOMMITTEE
ON HORTICULTURE AND ORGANIC AGRICULTURE

Presented by
Paul J. Wenger, 1st Vice President
California Farm Bureau Federation

Thursday, March 29, 2007

My name is Paul Wenger. I am a 3rd generation farmer growing almonds and walnuts in Stanislaus County, just outside Modesto, California. My sons are actively involved in our farm operation so I look forward to a long future of our family working on the land.

I'm also the first vice president of the California Farm Bureau, a position that keeps me in close contact with farmers and ranchers throughout our state.

The California Farm Bureau is the state's largest general farm organization, representing more than 90,000 member families. We represent producers of all commodities and all sizes of operation. This forces us to take a broad view of what's important and how what might affect one commodity will impact another. That is certainly the case with the topic of today's hearing.

I appreciate the opportunity to address this committee. I commend Chairman Cardoza and the committee for taking time to review an issue that is very critical to us.

I have to admit that in addition to my Farm Bureau duties, I have a personal interest as well. As an almond grower and someone who pays $130 per hive to pollinate my crop, I am personally concerned about the health of the bee industry.

Bees are the unsung heroes of our state's important almond industry that has an annual farm value of more than $2.5 billion. Each year, in February and early March our almond trees require honey bees-more than one million colonies to produce a crop. Bees come to California from all over the United States. This demand for bee colonies feeds into what is a national network of beekeepers. Each year, as growers we worry about the supply of bees and what the weather is like during the critical pollination period. Our crop fortunes rise or fall on what happens. The size of our state's almond industry has been steadily rising from 400,000 acres in 1985 to nearly 600,000 bearing acres today. An additional 100,000 acres will come into production in the next few years.

The growth and success of our almond industry has served as a safety valve for our state's agricultural industry. When prices faltered in cotton, peaches, citrus, many of those acres moved into almonds. Almonds give us a way to maintain or increase our revenue per acre and it is done with fewer workers, another critical issue for California.

Almonds are almost unique to California. We are the dominant and nearly sole producer of almonds in the United States and around the world. Our state combines a special climate and infrastructure to maintain this dominance in an important value-added product. I'm sure that countries such as China, Spain or parts of South America would very much like to share in this market. So far we've been able to retain our dominance, but a healthy and productive bee industry will be key to our continued success.

While almonds may be the single biggest commodity to benefit from bees, it's not the only one. There are scores of other crops that also have a crucial or strongly beneficial reliance on bees. The list includes melons, cherries, avocados, Bartlett pears, bushberries, kiwi, many apple varieties, cucumbers, plums, prunes, pumpkin, squash, ornamental plants, and dozens of vegetable and flower seeds. Bees are critical to our alfalfa and Ladino clover seed industries. Alfalfa seed drives the hay industry that supports a $4.5 billion dollar dairy industry. Beyond production agriculture, bees play an important role in home gardens and other indigenous plants so critical to birds and other wildlife.

We rely on bees foremost as pollinators, but California also has a thriving queen bee industry that supplies nearly a million queen bee packages to beekeepers around the country to revitalize their colonies. We produce more than 20 million pounds of honey annually. In 2005, the California honey bee industry generated $176 million in direct revenue, while the value of crops pollinated exceeded $6 billion and many associated jobs.

While the role of bees grows in importance, the research and technical support side of beekeeping has declined. I know you can't always make a direct correlation between loss of research dollars and growing disease and pest problems, but it has to be more than a coincidence that both are occurring. We need answers to the parasitic mites and colony collapse problems, but the health issue and the state of the industry is an even broader concern than that.

Through attrition, we are losing apiculture expertise at the professorial, research, and extension levels throughout the United States. We are losing this infrastructure at a time when it is vital to the ability to respond to major bee health concerns.

Let me provide some examples: attrition has severely impacted the bee research program at the University of California, Davis, with the loss of key researchers. Mr. Brandi will describe this in greater detail, but I want at least to point out that the California Farm Bureau has urged U.C. Davis to appoint faculty in apiculture in the Department of Entomology and to ensure that a specialist position is filled upon the retirement of the current statewide apiculture specialist.

When it comes to research there is a growing concern in the farm community over the dwindling support for production agriculture by the land grant universities. This is a trend that seems to exist across the board, including apicultural research

Stepped up efforts on the part of the U.S. Department of Agriculture- Agricultural Research Service (ARS) on current health problems and other issues are vital. Over several years, we have expressed to Congress our support for the four USDA-ARS bee labs. We join the American Farm Bureau Federation in supporting research at these regionally located bee research centers to find solutions. Just this past September, we urged USDA to expedite its research effort to produce effective treatments controlling honey bee mites.

Research will be the key to overcoming the current problems. I would urge this committee to spearhead Congressional action to restore the honey bee industry to full health.

Thank you for the time and attention you are devoting to this important issue.

TESTIMONY OF
DAVID ELLINGSON
ELLINGSON'S, INC.
ORTONVILLE, MINNESOTA

FOR THE COMMITTEE ON AGRICULTURE
SUBCOMMITTEE ON
HORTRICULTURE AND ORGANIC AGRICULTURE
Hearing on Colony Collapse Disorder in Honey Bee Colonies

U.S. HOUSE OF REPRESENTATIVES

MARCH 29, 2007

Chairman Cardoza and Members of the Subcommittee:

My name is David Ellingson. I live in Ortonville, Minnesota, where I operate 3700 colonies of honey bees for pollination and honey production. I ship my bees to both California and Texas for parts of the year. I also operate a business that processes beeswax for beekeepers.

First, I want to express the thanks of our entire industry for the concern you are showing for our problems by holding this hearing – and my personal appreciation for being invited to tell you my story.

I have been in beekeeping all my life, having followed my father in the business. Over those years, like any other farmers, we have seen our share of ups and downs, but I am now experiencing the lowest point of my beekeeping life.

Beekeeping became considerably more difficult in the late 1980s with the arrival of parasitic mites. Keeping our bees alive over the winter and productive in the summer became more costly and required much more attention.

For many years, we have wintered a portion our bees in Texas, where the milder climate and earlier spring allows us to get a jump-start in the spring compared to Minnesota. Looking back over the years, I see we have had to increase the number of hives brought

down each year to make up our numbers for the summer. Thirty-plus years ago we could depend on having a 5-1 split. That is by hauling 800 hives to Texas, we were able to split those colonies and make 4000 hives. These days, we are hauling 2000 colonies south, but with what has become normal losses of 20-30%, we come out of winter with the same number of colonies as we went in. This shows that we are doubling our costs for the same return in numbers.

Now comes the winter of 2006-2007. We hauled 2000 hives to Texas in the fall. We went through the colonies feeding corn syrup and pollen substitute as usual. The queens were starting to lay eggs for new young bees. My observations at that time were:
1. The colonies were strong and mite counts were very low.
2. There were good amounts of food stores for the bees.
3. I felt that following the good honey crop and fall in Minnesota that my bees were looking as good as I had seen in a long time.
4. I even felt that we would have some surplus bees to sell to other beekeepers.

We went back to Texas on Jan. 5 to sort out the best colonies to ship to California to rent out for almond pollination. I found:
1. More hives than normal without bees. These hives still had food stores, meaning the colonies didn't starve to death.
2. The percentage of small clusters was higher than expected. I now know that many of those colonies also were dying.

We selected 808 hives and shipped them to California. By Jan. 25, our beekeeper-partner in California reported that one-third of those colonies were gone and another one-third were too weak to rent to fulfill our contract specifications. We then shipped out 400 more hives to fill the contract, since the others were not good enough to pass inspection. Within two weeks of delivery, 50 of these colonies had disappeared. These too left behind plenty of food stores.

My loss on pollination revenues by the bees not going into the almonds is in excess of $60,000 plus freight that had to be paid without regard to the condition of the bees (nearly $20,000). The second load, which should have been worth more because there were more bees in those hives, should bring in $26,250. So, overall, I should expect to have a net profit of $6,600. Now, to deduct the time and expense of two trips to Texas to prepare the bees for shipment, plus the wear and tear on equipment, etc., and the final question becomes: What will I have to work with when the bees come back to California?

So far, instead of having surplus bees to sell, I have been buying bees, spending approximately $10,000 for bees to fill some of my equipment. Even so, I believe we will be running 1000 to 1500 fewer colonies this year. We will probably have a 60% loss.

That's 1500 hives with a possible 100-lb. honey crop at 85 cents/lb. gives me another $127,500 loss of potential income.

I truly felt that we had done everything right this year. But, then you wake up at 2 in the morning and lie there wondering, what did I do wrong? And then you talk to a fellow beekeeper who doesn't seem to be having these problems even though he managed his bees the same as you; it will drive you nuts.

The causes and solutions to this Colony Collapse Disorder are elusive, but some things are becoming clear.

• We need more beekeeping research. We are having a problem keeping our bees alive, and we all need to get something done right now to solve this problem. We have appealed to USDA for redirection of funds for more immediate research, both at USDA labs and at universities. A request from the Subcommittee might encourage USDA to look harder for available funds.

• We need more research long term. The American Beekeeping Federation, where I am past president, has been asking for dramatic increases in funding for both USDA and university honey bee research. The ARS bee labs have been working on shoestring budgets for years; flat budgets coupled with inflation leave fewer dollars for actual research each year. The labs are leaving authorized positions unfilled to leave money for the remaining scientists to work with.

All the beekeeping scientists at the Universities do what they can with the limited funds. In Minnesota, the Minnesota Honey Producers sell honey at the State Fair to raise funds to help with research at the University. Beekeeping research is being carried on at a handful of other universities to help resolve some of our problems and we applaud them for that.

But more is needed! More scientists, more ways of detecting what is going on with the honey bees. This industry will not grow and be a viable part of the agricultural system if we do not get ahead of this.

•We are seeing the need for more effective and efficient technology transfer of the scientists' findings to the beekeeper in the field. Unless the knowledge is passed on, it is useless. We feel the industry could benefit from a national beekeeping extension program, operated in concert with one of the agricultural colleges.

•This crisis has shown how little we really know about honey bee biology, about interactions between honey bees and the newer pesticides, and about our industry itself.

We are appreciative of the annual USDA-NASS honey production survey, but we need more information, particularly on pollination activities – how many colonies are involved in pollination, how much revenue this produces.

•This crisis has also underscored the need for a national honey bee diseases and pests survey. If we know what is out there, that we are going to have to deal with, we can more likely be proactive instead of reactive.

•For several years, in cooperation with a couple of private companies, our industry has been exploring the development of a crop insurance program for beekeepers to help them get through the years of bad weather and other natural disasters. This development process could use a nudge.

•Of course, losses such as we are now seeing could not have been foreseen. Many beekeepers are facing financial ruin from these unprecedented losses. Perhaps the Subcommittee could explore some means of providing some form of relief that would allow those beekeepers to maintain their businesses and rebuild their colony numbers.

•We are a small industry that provides a very big service. In 2000, a Cornell University study determined that honey bees benefit the country's major crops by about $15 billion per year. Surely this would total much more today. It has been said that the honey bee contributes one-third of the American diet.

You also have to add the pollination benefit to gardeners, ornamental plantings, and environmental plants to get the true picture of honey bees' benefit to the country. And, you have to factor in the loss of natural pollinators to urbanization, mechanized farming practices, and pesticide use to gain an appreciation of the importance of having honey bees for pollination.

Those beekeepers who rent out their colonies to pollinate are, of course, paid for their services, but there are also many bee colonies that never earn any pollination rentals, even though they provide pollination to myriad crops and other plants. Traditionally, beekeepers have looked to the honey crop and the honey price support programs to provide a safety net for their businesses. Today, though, pollination has likely eclipsed honey production in revenues to beekeepers. Perhaps the time has arrived to supplement the honey marketing loan program with a program that provides a conservation payment of some sort for beekeepers – a payment that enables them to maintain vigorous, healthy colonies ready to provide the necessary pollination services.

Mr. Chairman, I understand that others in the industry may want to offer their own perspectives on Colony Collapse Disorder and the state of the U.S. beekeeping industry. I

hope that their written statements will be welcomed for the record.

I would like to conclude with a personal comment.

This is a tough business; one that takes you away from home a lot -- just like you here in D.C. We are a small industry, scattered across the country. If we are going to have a viable honey bee industry, we must have dedicated people who are willing to go the distance. But even dedicated people need assistance from time to time.

I have been deep in debt from when my dad died. I will not put myself in that position again. The other fact is the bank that we have been at forever has cut their lending way back because of their experience with loan defaults from beekeepers who have bad crops and bad luck.

The median age of beekeepers is over 50. A lot of them are on the brink of hanging it up. If there is a glimmer of hope that we could, in some manner, improve the lot of beekeepers, the atmosphere of this industry would and could be greatly improved and we would see new, younger beekeepers moving in.

I would certainly have chosen a better way to celebrate our company's 60th anniversary in the honey bee business.

Again, I thank you for the opportunity to give my views of the Colony Collapse Disorder and what effect it is having on my beekeeping business and those of my fellow beekeepers.

David Ellingson
President, Ellingson's Inc.
Past President, American Beekeeping Federation
Past President, Minnesota Honey Producers
Ortonville, Minnesota

California State Beekeepers Association Inc.

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March 29, 2007

The Honorable Dennis Cardoza, Chairman
Subcommittee on Horticulture and Organic Agriculture
435 Cannon House Office Building
Washington, DC 20515

Re: Colony Collapse Disorder

Chairman Cardoza and Members of the Subcommittee:

My name is Gene Brandi, and I have owned and operated a commercial beekeeping business headquartered in Los Banos, California, for thirty years. I serve as the Legislative Chairman of the California State Beekeepers Association and appreciate this opportunity to inform the subcommittee of some severe difficulties facing the beekeeping industry and the effect these problems have on the ability of honey bees to adequately pollinate the nation's crops.

Honey bees are a critical component of the nation's agricultural economy. The pollination work of honey bees increases the yield and quality of United States crops by approximately $15 billion annually, including over $6 billion in California. The California almond crop alone is worth over $2 billion and is dependent on nearly 1.4 million honey bee colonies from across the nation to set this crop. Alfalfa seed, apple, avocado, blueberry, cherry, cranberry, cucumber, kiwi, melons, pear, plum, safflower, sunflower, vegetable seeds, zucchini, and many other crops grown throughout the nation also must have an adequate number of healthy bee colonies for pollination in order to set commercially viable crops.

According to the National Agricultural Statistics Service the number of commercially managed honey producing colonies in the U.S. has declined from approximately 3.4 million in 1989 to less than 2.5 million in 2005. These are "peak season" (late spring or early summer) colony numbers and do not reflect the severe winter losses (dead bee colonies) incurred in recent years.

When I started working with bees in the 1970's it was not uncommon for winter losses to be 5% or less. Since the mid to late 1980's our nation's bee industry has been experiencing an increase in winter colony mortality and in recent years the problem has become severe. This winter beekeepers throughout much of the country are experiencing from 25% to more than 75% colony mortality.

Approximately 40% of my 2,000 colonies are currently dead and this is the greatest winter colony mortality I have ever experienced in my 30 years of beekeeping. I have already lost nearly $60,000 in almond pollination income compared to last year when I had a more tolerable, but still costly 20% winter loss. I will also lose at least $20,000 income from the sale of bulk bees this spring in addition to an unknown quantity in lost honey production. The cost to restock my 800 dead out colonies this year will be approximately $48,000. We are just beginning to restock our dead hives with bees from our surviving colonies, thus weakening our surviving colonies for a few weeks until they can rebuild their populations. I will purchase new queen bees and it should take about two months for the newly restocked colonies to build up adequate bee populations to be considered commercially viable colonies again.

Even though my loss is substantial, other beekeepers throughout the country have suffered much greater losses. Beekeepers who lost over 50% of their colonies will have difficulty making up their losses from their own colonies as I plan to do.

The California almond industry is the largest user of bees for pollination anywhere in the world, and there were barely enough colonies available to pollinate the recently concluded bloom this year. Given that the almond industry requires approximately 1.4 million colonies of honey bees, and there are a little less than half a million colonies in California (during peak season), the remainder of the required bees have been brought in from many other states throughout the nation for a number of years. Were it not for the greater number bee colonies brought in by beekeepers from other states, and the tens of thousands of packaged bees imported from Australia, there would have been a definite shortage of bees for almond pollination this year. With almond acreage increasing every year, the need for an ever larger bee supply is critical.

Unfortunately bees are needed for almond pollination in late winter which is the exact time of year when colony populations are at their lowest and winter bee losses are at their highest.

What is causing Colony Collapse Disorder? There are many problems facing the bee industry today that make it difficult to keep honey bees healthy and CCD may very well be caused by a combination of these and perhaps other factors. Poor nutrition, mites, diseases (viral, bacterial, fungal), and exposure to certain pesticides are serious issues that affect the ability of honey bees to survive and thrive. There is also concern that some genetically modified crops may be producing pollen and/or nectar that is problematic for the bees.

Good nutrition is critical to overall colony health. An adequate supply of nutritious natural pollen and nectar for as much of the year as possible is the best way to keep bees nutritionally healthy. California in particular is a difficult place to find good locations where bees can safely and successfully be placed when they are not needed for crop pollination, given the shrinking availability of bee pasture due to urbanization and other issues. This year the lack of rainfall in California will make it especially difficult since the available sources of natural food will be greatly reduced. Bees that are nutritionally stressed are more susceptible to diseases, parasites, and other problems.

It has been known for many years that exposure to certain pesticides can kill adult bees. Lesser known is the fact that some pesticides can also kill or deform immature bees (brood), adversely affect queen and drone viability, or may cause bees to lose their memory which prevents them from flying back to their hive. The U.S. Environmental Protection Agency currently requires that pesticides be assessed only for adult bee toxicity. It would be very beneficial in trying to resolve the CCD problem if pesticides were also assessed for their ability to cause any additional adverse effects on bees. Additionally, it is important that EPA require enforceable label language on those products that are known to be harmful to honey bees so that they are not applied to blooming plants that are visited by bees.

It would be very beneficial for USDA-ARS to have a honey bee toxicologist who could independently test pesticides for acute and residual bee toxicity, the ability to damage brood, effect on queen and drone viability, potential for causing memory disorders or other sub-lethal adverse effects on honey bees.

The University of California, Davis campus used to be home to one of the premier honey bee research facilities in the nation, with three Professors of Apiculture conducting studies in honey bee behavior, honey bee physiology, and honey bee genetics. The UC Extension Apiculturist, based in Davis, continues to serve the industry well (and conducts some research periodically), but he is the only honey bee person remaining on the campus. Other than that, the UC Davis facility is not currently being used for honey bee research as there are no longer any active professors of apiculture on the campus. This facility is strategically located in the heart of California's Central Valley, the area of our nation that uses the most bees for crop pollination. It is also located at the southern end of the nation's largest bee breeding area which produces nearly one million queen bees annually. If a USDA-ARS honey bee research scientist (or scientists) could be stationed at UC Davis to establish a research partnership at this facility, it would be a great asset to the beekeeping industry and to the growers who need strong, healthy bee colonies to pollinate their crops.

The need for additional bee research is obvious. There are just too many unanswered questions that need to be addressed if the bee industry is to survive and perhaps thrive again. USDA-ARS honey bee research facilities in Beltsville, Baton Rouge, Weslaco, and Tucson are conducting some good research at this point, but they need to do much more. These labs could all use additional funding in order to find solutions to our industry's many problems.

I appreciate the opportunity to present this information to you today and I thank you for your interest and concern about the general welfare of the beekeeping industry and those who depend upon strong, healthy bee colonies to pollinate their crops.

Sincerely,

Gene Brandi

Testimony of James E. Doan
Given to the U.S. House of Representatives
Committee on Agriculture
Subcommittee on Horticulture and Organic Agriculture

March 29, 2007

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Doan Family Farms

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March 22, 2007

U.S. House of Representatives
Committee on Agriculture
Subcommittee on Horticulture and Organic Agriculture
Room 1301, Longworth House Office Building
Washington, DC 20515-6001

Dear Sir or Madam:

My name is James Doan. I live in western New York State with my wife and two children. I owned and operated 4,300 hives of honeybees in the fall of 2006 for honey production. Currently I have about 1,900 hives left of the original 4,300. These same hives are also rented out in the surrounding western New York Agriculture community for fruit and vegetable pollination. The hives are then also transported down to central Florida in the winter months for the same jobs of Honey production and pollination services.

I consider this testimony a privilege, and I am honored to speak before you today too voice my concerns regarding the serious and devastation loss of my honey bees here in the United States, but more importantly how I feel it is effecting the infrastructure of Agriculture.

In my business hive management is everything. My overall system has changed little over the past twenty some years now, with the exception of treatments for hive pest management. However, the overall health of my beehives has always been consistent for being good profitable hives.

Starting in the spring of 2006 I began seeing a change in hive health. Not only was I seeing this, but many other beekeepers in western New York also saw the same. Typical scenario was that the honeybees were not expanding in numbers, and not making honey. Then finally an empty hive, with even in some instances some honey left behind.

Yes, weather conditions in the northeast in the fall of 2006 were wet and cold, with many counties in New York State declaring a disaster. However, in the northeast we have had wet fall weather before and still our fall honey productions were moderate.

Honeybee losses across New York State this winter are being reported at fifty percent or more, and some operations are reporting high as eighty percent losses. Because of the current cold weather many beekeepers have yet to fully inspect their hives, so the number of hive losses could escalate. To recoup their losses, a purchase of new hives or honeybee packages will have to be made. However, the breeders who sell these items have little to none in which to sell. The one breeder I spoke to could not deliver packages to me until May 15, to late for apple pollination. I believe the availability of honeybees for pollination services this spring in New York will be close, due to reports still coming in from area beekeepers.

New York State inspections officials when inspecting my hives in both states of New York and Florida showed low to zero mite counts in 2005 and 2006. So I believe that this Colony Collapse Disorder is not due to mite and other pest problems in my hives.

So what is it then, hot, cold, water, and drought??? We have had all of these conditions in the past but never with these consequences, and not every beekeeper throughout the country at the same time having honeybee losses. This problem does not seem to be in one region or another but everywhere including Canada. So what is different??? I do not know, but pesticides at sub-lethal dosages do need to be looked at. We have chemicals being used today that are different than materials in the past. In France, in May of 2004 the seed treatment GAUCHO was removed from use because of number one, "The results of the examination on the risks of the seeds treatment GAUCHO are alarming. The treatment of seeds by GAUCHO is a significant risk to honeybees in several stages of life." "The consumption of contaminated pollen can lead to an increased mortality of care-taking-bees." GAUCHO'S contains the active substance Imiclacloprid. Materials with Imiclacloprid in them in the last couple of years are labeled for use on just about every fruit and vegetable that I pollinate. Could this be the problem??? I do not know. However in France the year before GAUCHO was taken off the market one third of the honeybees in France died. They have not reported any significant losses since.

I firmly believe we need extensive additional research that confirms what this Colony Collapse Disorder is, and any future repercussions. We need this now!!!
I know that Pennsylvania State University is working hard on this problem, as other honeybee labs across this country, which is excellent. However, the equipment being used is antiquated. Our industry needs government research dollars now! The economic impact on my operation is that it will cost me over $200,000.00 to replace the honeybees that I have currently lost. I do not know if I will even have enough bees in New York State too cover our pollination contracts. This also has impacted my income from honey production and pollination service by the reduction from the lack of bees.

The United States is looking at the potential loss of a pillar in Agriculture. Agriculture in the whole United States is dependant on honeybees. If we cannot survive as a beekeeping industry here in this country, there will not be an agriculture community here in the US, period.

If this Colony Collapse Disorder is allowed to continue, you could be looking at a 100% dependency on foreign countries for feeding the American public. In my opinion this possible reality is unacceptable.

In conclusion I strongly urge you as my governmental officials to recommend funding for Honeybee research. I also would like to ask for your support in make public crop insurance for beekeepers. Finally, I ask for help in recouping our losses from this problem since we do not have crop insurance.

Thank you for your time and support for our industry.

Regards,

James E. Doan

Health Supreme by Sepp Hasslberger

Networking For A Better Future - News and perspectives you may not find in the media

November 26, 2003

Millions of bees dead - Bayer's Gaucho blamed

Categories
Environment

Synthetic honey and GMO bees - Part II

A French governmental report confirms suspicions of a mass poisoning of bees involving hundreds of thousands of colonies of honey bees. According to the report of the French Scientific and Technical Committee, Bayer's seed treatment GAUCHO pesticide is to blame - at least in part.

Earlier this year, I published an article by French journalist Michel Dogna, who had investigated the ecological catastrophe and pointed a finger at Bayer's toxic product. His article - Synthetic honey and GMO bees? - can be found here.

Coalition against Bayer-Dangers, as well as French and German beekepers' unions are calling for an immediate ban of the pesticide.

France: Governmental report claims BAYER-pesticide GAUCHO responsible for bee-deaths

Coalition against Bayer-Dangers is calling for a ban

November 25th, 2003

The report on bee-deaths, published by the French Comité Scientifique et Technique (CST), shows that the use of the pesticide GAUCHO is jointly responsible for the death of hundreds of thousands of bee colonies. Environmental activists and beekeeper unions are calling for a ban on the agricultural toxin.

The summary of the report states: "The results of the examination on the risks of the seeds-treatment GAUCHO are alarming. The treatment of seeds by GAUCHO is a significant risk to bees in several stages of life." The 108-page report was made by order of the agricultural ministry of France by the universities of Caen and Metz as well as by the Pasteur Institute.

The use of GAUCHO on sunflowers was prohibited in France four years ago because of the high risk to bees. However after this step, the bee-deaths did not decrease noticeably - beekeepers are blaming this on the extensive use of agricultural toxins in maize cultivation. The concluding-report of the CST agrees, stating: "Concerning the treatment of maize-seeds by GAUCHO, the results are as alarming as with sunflowers. The consumption of contaminated pollen can lead to an increased mortality of care-taking-bees, which can explain the persisting bee-deaths even after the ban of the treatment on sunflowers".

The pesticide GAUCHO (containing the active substance Imidacloprid) is produced by the German BAYER-group. With an annual turnover of more than 500 million Euro this is the groupÂ´s top selling agricultural agent. Critics assume that the high sales figures are the reason why the company is contesting a ban on its use.

The thesis, as stated by bee institutes, that infestation by Varroa mites was responsible for the bee deaths, appears to be an excuse, according to Fridolin Brandt of the Coalition against Bayer-Dangers: "We have been concerned with Varroa mites since 1977, and for decades they haven't been a danger. It is the extensive use of pesticides and the accompanying weakening of the bees which is leading to the bee-deaths." Brandt has been a full-time beekeeper for more than 30 years.

Maurice Mary, spokesman of the French beekeepers union Union National d'Apiculteurs (UNAF): "Since the first application of GAUCHO we have had great losses in the harvest of sunflower honey. Since the agent is

staying in the soil up to three years, even untreated plants can contain a concentration which is lethal for bees." The UNAF representing about 50.000 beekeepers is calling for a total ban of GAUCHO, following the presentation of the CST report.

The German beekeepers united in the Deutsche Berufsimkerbund (DBIB) and the Coalition against Bayer-Dangers are also calling for a ban on its use. In Germany, Imidacloprid is used mainly in the production of rape, sugar beet and maize. The situation in German agriculture is comparable to the French: In the past years almost half of the bee-colonies have died, which led to a loss of output of several thousand tonnes of honey per year. Furthermore, because bees do the most pollination, there are also losses of output on apples, pears and rape.

We would be pleased to send to you the 108-page report of the Comité Scientifique et Technique (in French) and a statement by the Coordination des Apiculteurs de France (in English)

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See also more recent (Feb. 2004) articles:

France bans use of six Fipronil insecticides PARIS, Feb 23 (Reuters) - France said on Monday it would ban the use of six insecticides containing Fipronil, an active ingredient notably used in the Regent TS insecticide produced by BASF Agro , because it is suspected of killing bees. Fipronil was marketed under the trade name Regent for use against major pests on a wide range of field and horticultural crops but it is also marketed under other names for insecticides against fleas, ticks or mites (Reuters AlertNet, UK).

Bayer shares fall on insecticide, Roche bid worries

French ban pesticides sold in Australia

Update May 2004:

26 May 2004 - France suspends use of Gaucho insecticide for corn

French Agriculture Minister Herve Gaymard on Tuesday announced it planned to stop use of the Gaucho pesticide to treat corn seeds until it is reviewed by the European Commission in 2006.

In January last year, Gaymard had already extended for three years suspension of the use of Gaucho, a chemical produced by the German chemicals and pharmaceuticals giant Bayer, for treatment of sunflower seeds.

Gaucho, like another pesticide Regent TS produced by German chemicals giant BASF, has been accused by French bee-keepers of causing a high mortality rate among bees. Sales of Regent TS was suspended in France last February.

An agriculture ministry report deemed that the government's decision to give farmers till June to use up their remaining stocks of pesticide was much less costly that destroying the crop seeds already sprayed. But the national association of bee-keepers says massive damage is being done to bee populations, which are crucial to plant pollination.

Subisidiaries of Bayer and BASF, which sold Regent TS, are under criminal investigation in France for selling an agricultural product that is toxic to humans or animals. (sourche: AFP)

French beekeepers say about 90 billion of their insects have been killed over the last 10 years by a pesticide.

The chemical, used on crops including maize and sunflowers, damages the bees' sense of direction so they become lost. It is used in the UK on several crops, though not in exactly the way it is used in France, and British beekeepers have been urged to be on their guard. UK apiarists say the value of bees to the agricultural economy is immense, and they fear bees are becoming rarer.

The chemical implicated in the loss of French bees is imidacloprid, marketed under a variety of names including Gaucho. It is slowly released in the plants, protecting them against insect attack by destroying their ability to find their way.

A London newspaper, the Observer, reported: "Almost immediately after the chemicals were introduced 10 years ago, beekeepers reported that their bees were becoming disoriented and dying.

Used in UK

"Within a few years honey production in south-west France fell by 60%. According to the chairman of the national beekeepers' association, Jean-Marie Sirvins, a third of the country's 1.5 million registered hives disappeared. "As a result, France has had to import up to 24,000 tons of honey annually." The pesticide companies say their products are not responsible for killing the bees.

There are no reports of any ill effects from applications of imidacloprid in the UK, where it is licensed for use on beet. There are restrictions on its use when the plants are in flower, or for spraying the foliage. But Richard Jones, the director of the International Bee Research Association, told BBC News Online: "Beekeepers here have to be on the alert.

More needed

"The verroa mite, which feeds on the bees' blood, arrived from mainland Europe, and we know that bees' nests can travel a long way on container ships.

"People hear about bees and think only about honey, but it's the other side of the problem that's worrying. "They add billions of pounds to the value of the agricultural economy every year because of their work in pollinating crops like apples.

"We don't have enough bees in the UK, and we have very few feral bees. Every time a hedgerow is destroyed, that means the loss of nesting places for bumblebees."

By Alex Kirby, 1 March 2004
BBC News Online environment correspondent

From: Coalition against BAYER-dangers
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- - -

Where Have all the Honey Bees Gone?

by Robert Cohen

(The amazing story of dairy industry culpability)

> *"If the bee disappeared off the surface of the globe, then man would only have four years left to live."* - Albert Einstein

This from the Penn State Agriculture Magazine, Spring 1998:

"In the spring of 1993, entomologist Maryann Frazier encountered a mystery. 'Beekeepers began calling to report that they had no bees in their colonies,' she recalls...They had seen bees making flights in February, but by April, there were no bees. What happened to them?'

Frazier's investigation into the reasons the bees disappeared continues today. If she and her colleagues can't unravel the mystery of why bee colonies are dying, beekeepers, fruit and vegetable growers, and consumers all are likely to feel the consequences."

I live in New Jersey, America's Garden State. Believe it or not, we have a state insect, the honey bee. Honey bees pollinate crops. It's actually a big business. Pollinators travel America, leasing their bees to crop growers. Beekeepers keep the honey. During World War II, there were over 6 million commercial beehives in America. By the mid-1980s, that number had dropped to 4 million. Today, there are 2.5 million remaining.

America's honey bees are disappearing, and those who best know bees have a number of theories, but no one conclusive reason. The one universally accepted fact is that bees are in trouble.

Could an aspirin manufacturer be the cause of the bee's demise? The Bayer Aspirin Company may be giving our environment an incurable migraine headache.

My first hint came from an ad in the April 10, 2006 issue of Hoard's Dairyman. There, on page 270, a full color advertisement proclaims:

> *"Bayer supplies the technology to fix the milking machine on the right."*

On the right side of the ad is an enlarged photo of a most grotesque fly with large red eyes and appendages containing end-to-end cactus-like spurs.

In smaller text, Bayer informs prospective customers:

> *"Bayer understands how much profit flies suck out of your entire operation. That's why we developed QuickBayt Pour-On insecticide...put the high-tech tools from Bayer to work."* (Bayer was part of the IG Farben Conglomerate, and no, I will not be getting into that controversy here...)

I began to search the Internet for the secret ingredients to Bayer's miracle fly solution. Gobs and gobs of this high-tech gunk are slathered onto dairy cow's bodies. What's in QuickBayt that makes life so very dangerous for the honey bee?

Imidacloprid.

Imidacloprid is a widely used insecticide that has environmentalists extremely concerned. Apparently, scientists have known for many years the impact that imidacloprid has on wildlife. Here are some of the recognized hazards of using imidacloprid:

> Imidacloprid has raised concerns because of its possible impact on bee populations...it is also acutely toxic to earthworms...
>
> Imidacloprid has raised concerns because it causes eggshell thinning in endangered bird species...it is highly toxic to sparrows, quails, canaries, and pigeons...
>
> Imidacloprid can be toxic to humans, causing epileptic seizures, diarrhea, and lack of coordination...
>
> Imidacloprid is extremely toxic at low concentrations to some species of aquatic fish and crustaceans...

Can food be contaminated with imidacloprid? You tell me whether this is comedy or tragedy at work. Neither the United States Department of Agriculture nor the Food and Drug Administration includes imidacloprid in their food monitoring programs.

Two European studies have shown that vegetables tested with imidacloprid were contaminated, one week after exposure.

It seems clear that imidacloprid use on dairy farms should be closely monitored by regulatory agencies. The Bayer Company is making lots of money on this drug, but the true cost might become America's newest headache. My advice to FDA and USDA regulators who refuse to regulate: Take two imidacloprids and call me in the morning.

> *"Even bees, the little almsmen of spring bowers, know there is richest juice in poison-flowers."*
> - John Keats

Robert Cohen
http://www.notmilk.com

See also:

July 2006: Bee, flower diversity falls sharply in Europe: study
The diversity of bees and the flowers they pollinate has fallen drastically in Britain and the Netherlands over the last 25 years, a study said.

February 2007: Mystery killer silencing honeybees
Something is killing the nation's honeybees. Dave Hackenberg of central Pennsylvania had 3,000 hives and figures he has lost all but about 800 of them. In labs at Pennsylvania State University, the Pennsylvania Department of Agriculture, and elsewhere in the nation, researchers have been stunned by the number of calls about the mysterious losses.

Mystery ailment strikes honeybees
A mysterious illness is killing tens of thousands of honeybee colonies across the country, threatening honey production, the livelihood of beekeepers and possibly crops that need bees for pollination. Researchers are scrambling to find the cause of the ailment, called Colony Collapse Disorder. Reports of unusual colony deaths have come from at least 22 states.

posted by **Sepp Hasslberger** on **Wednesday November 26** 2003
updated on **Monday February 12** 2007

URL of this article:
http://www.newmediaexplorer.org/sepp/2003/11/26/millions_of_bees_dead_bayers_gaucho_blamed.htm

Related Articles

Pesticides too harmful to use in any form, doctors warn
""The review found consistent evidence of the health risks to patients with exposure to pesticides," the study said, naming brain cancer, prostate cancer, kidney cancer, pancreatic cancer and leukemia among many other acute illnesses. As well, the college found consistent links between parents' exposure to certain agricultural pesticides at their jobs and effects on a growing fetus ranging from damage to death. The risks, they concluded, can come even from... [read more]
April 29, 2004 - Chris Gupta

Mosquito control or bio warfare?
Steve Tvedten has been campaigning to raise awareness on the dangers of using the "registered" POISONS - toxic pesitcides and chemical weedkillers - for years. Steve's site (thebestcontrol) advocates safe and far more effective - unregistered - alternatives to the government and corporate mandated "terminator" approach - biowarfare rather than an intelligent way of handling a problem. If we complain about health problems but ignore our poisonous environment, we should... [read more]
September 07, 2003 - Sepp Hasslberger

Synthetic honey and GMO bees?
France - 2 July 2003 In a harrowing article, Michel Dogna, health journalist from France, sounds the alarm about what may be one of the biggest ecological catastrophes developing right under our own eyes - and no one seems to be watching. Image credit: Sepp 5 July 2003 As the bees are being decimated by a toxic seed coating agent, our entire food supply is threatened. Plants need bees for... [read more]
July 02, 2003 - Sepp Hasslberger

wreaking havoc in our biosphere
Pesticides have become a way of life, but really they are poisoning not only the intended victims - mostly mosquitos - but other insects we consider beneficial - as well as animals and ultimately ourselves. The "chemical way" clearly shows its limitations. Beyond Pesticides has a report on this. Communities across the country are stopping their use of pesticides and adopting preventive strategies that manage mosquito breeding areas and educate... [read more]

What do Growers need to do?

- Know the pesticides you are using and their toxicity to bees (do not depend on outside sources)
- READ the LABEL AND FOLLOW THE LABEL DIRECTIONS
- Never use neonicotinoid pesticides on blooming crops
- Blooming time varies depending on varieties: bees pollinating one variety may be at risk while another is being treated
- Protect water sources from contamination by pesticides

What is the status of neonicotinoid insecticide registrations and what are the hazard issues these insecticides present to bees?

Neonicotinoids

Chemical	Brand Names	1st Registered (mo./yr.)	Current Uses
imidacloprid	Confidor, Merit, Admire, Legend, Provado, Encore, Gaucho, Premise	3/1994	blueberries, citrus, cranberries, strawberries, pecans, stone fruits, cotton, corn, melons, vegetables, forestry, ornamentals, turf, and others
thiamoxetham	Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship	12/2000	apple, pecan, stone fruits, melons, peppers, cotton, corn, and others
acetamiprid	Pristine, Tristar, Assail, Intruder, Adjust	3/2002	grapes, citrus, canola (seed treatment) citrus, pone fruits, leafy vegetables, ornamentals, and others
clothianidin	Poncho, Titan, Clutch, Belay, Arena	6/2003	corn (seed treatment) and canola (seed treatment) with others pending
thiacloprid	Calypso	9/2003	apples, pears, cotton, and others
dinotefuran	Dinotefuran	not applicable	none - some pending

Neonicotinoids' Toxicity to Honeybees

Chemical	Brand Names	Acute Contact LD_{50} (µg ai/bee) Tech	Acute Oral LD_{50} (µg ai/bee) Tech	RT_{25} (hours) at Rate of Application (lb ai/A) TEP
thiamethoxam	Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship	0.024 highly toxic	0.005 highly toxic	conditional registration study pending
clothianidin	Poncho, Titan, Clutch, Belay, Arena	0.0439 highly toxic	0.0037 highly toxic	117 hrs. at 0.07 lb ai/A 180 hrs. at 0.13 lb ai/A 512 hrs. at 0.2 lb ai/A
* imidacloprid	Confidor, Merit, Admire, Legend, Provado, Encore, Gaucho, Premise	0.078 highly toxic	0.0039 highly toxic	8 hrs.at 0.5 lb ai/A
acetamiprid	Pristine, Tristar, Assail, Intruder, Adjust	8.1 moderately toxic	15.1 slightly toxic	study submitted was invalid new study pending
thiacloprid	Calypso	17.32 practically nontoxic	17.32 slightly toxic	< 2 hrs. at 0.18 lb ai/A

(14)

Honeybee Acute Contact Toxicity Categories:[1]

[1]Atkins, E.L. et al. *Reducing Pesticide Hazards to Honey Bees*.(1981). Univ. of California. Division of Agricultural Science . Leaflet 2883.

- If the LD_{50} is less than 2 μg a.i./bee, then the test substance is highly toxic.

  If the LD_{50} is 2 to less than 11 μg a.i./bee, then the test substance is moderately toxic.

  If the LD_{50} is 11 μg a.i./bee or greater, then the test substance is practically nontoxic

RT_{25}

RT_{25} is the residual time required to reduce the activity of the test material and bring bee mortality down to 25% in cage test exposures to field-weathered spray deposits (Mayer and Johansen, 1990).

- The time period determined by this toxicity value is the time EPA expects the test material will remain toxic to bees in the field.

The toxicity time results from the residual exposure of the test material on vegetation at an expressed rate of application (lb ai/A).

Bayer CropScience World

OUR PRODUCTS

Imidacloprid

(Akteur®, Amigo®, Baytan® Secur, Chinook®, El Hombre®, Escocet®, Gaucho®, Blé, Gaucho® CS, Gaucho® Maïs/ero, Gaucho® MZ, Gaucho® Orge, Gaucho® Prin T, Gaucho® MT, Gaucho® XT, Genesis®, Faibel®, Ferial® Blé, Ferial® Orge, Impri Manta® Plus, Monceren® Extra, Monceren® G, Monceren® GT, Montur®, Prestige M, Raxil® Secur®, Seed-one®, Sibutol® Secur, Yunta®, Zorro®FS 236,3)

Product Category

Seed treatment insecticide and seed treatment insecticide/fungicide combination

please see also

Mode of Action

Nicotine Acetylcholine receptor agonist / antagonist

Crops

Cereals, corn, potato, pastures, sunflowers, sugar beet and sunflowers

Registrations in (status 2005)

in over 100 countries worldwide

Pest Spectrum

Aphids, fruit fly, leafhoppers, scale, [illegible], thrips, white fly, [illegible] (including flea beetle and [illegible]), [illegible] weevils and various fungal dis

Main Formulations

FS: Gaucho (imidacloprid [illegible])
FS: Imprime (imidacloprid [illegible])
FS: Chinook (imidacloprid 100 + [illegible])
FS: Montur (imidacloprid 150 + [illegible])
FS: Gaucho Blé (imidacloprid [illegible])
FS: Gaucho Orge (imidacloprid 350 + [illegible] 10 g a.i./l)
FS: Prestige (imidacloprid 145 + [illegible])
FS: Baytan Secur (imidacloprid [illegible] + tebuconazole 125 + tubeufiazole 15 g a.i./l)
FS: Raxil Secur (imidacloprid [illegible] + tebuconazole 20 + triazoxide 20 g a.i./l)
WS: Gaucho (imidacloprid 700 g a.i./l)

Formulation Categories

FS = Flowable concentrate for seed treatment
WS = Water dispersible powder for slurry treatment

Trademark Rights

® a registered trademark of the Bayer Group

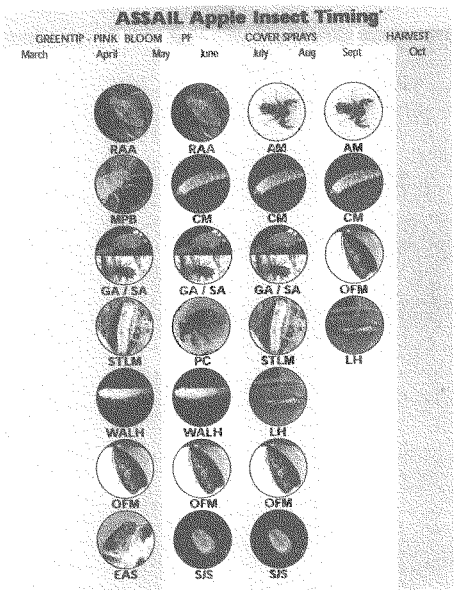
FREEDOM. FLEXIBILITY. CONFIDENCE.

ASSAIL® INSECTICIDE. THE PROTECTION YOU NEED AGAINST KEY APPLE PESTS AT BLOOM.

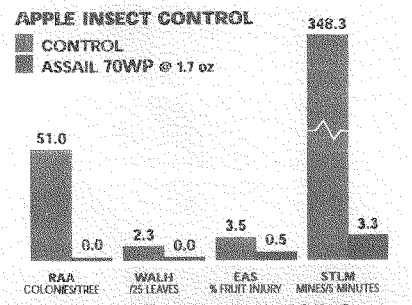
With Assail insecticide, apple growers now have an effective way to control a wide variety of destructive pests in early season. In addition to a pink or petal fall application, at bloom it also delivers outstanding control of rosy apple aphids, Campylomma, Oriental fruit moth, leafhoppers, leafminers and European apple sawfly. And since Assail can be sprayed at bloom (when bees are not foraging) you have a wider window of flexibility. This makes Assail ideal if rising temperatures cause trees to move quickly from pink to bloom. Assail also exhibits excellent control on internal feeders that show up later, such as codling moth, Oriental fruit moth and apple maggot. Making it a great alternative to organophosphates.

Assail provides new flexibility and freedom for apple growers throughout the season. As a reduced risk pesticide it also brings new sensitivity to orchard environments and workers. Assail has a quick 12-hour re-entry interval (REI) and a short 7-day pre-harvest interval (PHI).

cerexagri



RAA=Rosy Apple Aphid **MPB**=Mullein Plant Bug **GA**=Green Aphid
SA=Spirea Aphid **CM**=Codling Moth **WALH**=White Apple Leafhopper
PC=Plum Curculio **OFM**=Oriental Fruit Moth
EAS=European Apple Sawfly **STLM**=Spotted Tentiform Leafminer
SJS=San Jose Scale **AM**=Apple Maggot **LH**=Leafhopper
*Phenology chart is a general representation of the Eastern apple market.



Dr. Henry Hogmire, WVU Full season research trial: Cultivar: Rome. Results may vary due to application techniques, cultural practices and environmental conditions.

Bloom Spray

Assail's low level of oral and dermal toxicity to bees sets it apart from competitive materials, allowing it to be applied after sunset when the bees are not actively foraging. This bloom spray provides excellent control of early season pests like aphids and Campylomma. In addition, it will give you early control of Oriental fruit moth*, since university research has shown that Assail is active on both adults and eggs.

Multiple Pest Control

Assail not only offers control of key pests like rosy apple aphid, Oriental fruit moth and codling moth, but it also controls many other pests, such as mealybug, leafhoppers, leafminers, apple maggot, plum curculio, European apple sawfly, Japanese beetle and Campylomma (with suppression of San Jose scale). That gives Assail one of the most unique pest-control spectrums of all apple insecticides.

Neonicotinoid Chemistry

Assail's active ingredient is acetamiprid, which interrupts the insect's nervous system and suppresses its feeding reflex. This unique mode of action also makes Assail highly effective against hard-to-control pests, such as codling moth, rosy apple aphid, Oriental fruit moth and apple maggot.

Protects Underside of Leaves

Assail has systemic translaminar activity, which allows it to move throughout the leaf, top to bottom – protecting both sprayed and unsprayed sides from insect damage. Now you can control feeding insects, even in places your spray didn't reach.

Excellent Rainfastness

Because Assail is quickly absorbed into the plant tissue, you get rapid protection from wash-off due to rain. This means new peace of mind, knowing your orchard is protected, rain or shine.

Residual Protection

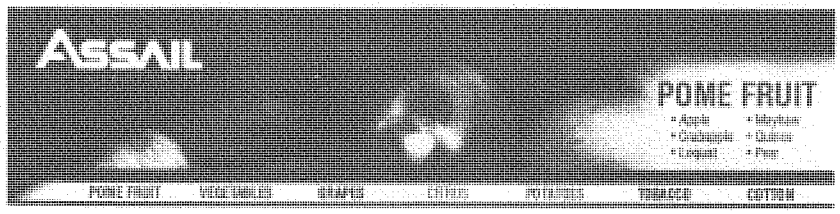
The systemic activity of Assail also brings extended residual activity, which means less chance of "protection gaps" in your spray program.

*If Oriental fruit moth is your primary target, the use of oil is highly recommended.

For the name and address of the Assail insecticide distributor nearest you, call Cerexagri at 800-438-6071.

ASSAIL
INSECTICIDE

www.cerexagri.com



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Finally, there's an insecticide for our time. Assail® hammers major destructive apple and pear pests without apology, including codling moth and oriental fruit moth, while bringing excellent flexibility to your orchard. You can apply Assail® any time during the season, even during bloom (when bees are not active). Trials conducted by universities in major pome fruit producing states show Assail is an effective reduced risk alternative to Organophosphates for codling moth and oriental fruit moth control.

Assail® Delivers
- Outstanding control of internal worms (codling moth, oriental fruit moth and apple maggot)
- Control of key primary and secondary pests
- Flexibility during bloom applications
- Long residual
- 12-hour REI (allows you to get back in for thinning)
- Systemic protection (great rainfastness)
- 7-day PHI (protecting your crop through harvest)

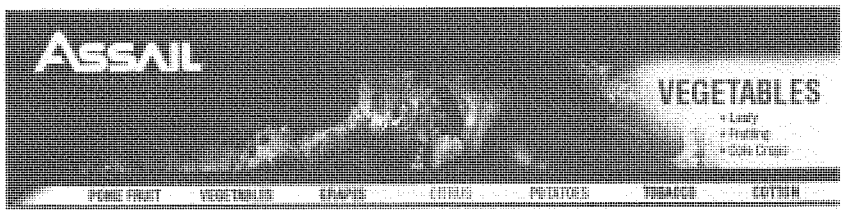
The unique chemistry of Assail® penetrates leaves and snuffs out insects where they feed and breed. In addition, Assail® is an EPA-designated reduced-risk product with advantages like a short 12-hour re-entry, 7-day PHI and long residual. It's no wonder why Assail® is fast becoming the leading choice for pome fruit growers. A new day has dawned. It's the Age of Assail®!

Assail vs. Competition

Pests controlled:

Aphids
Codling Moth
Oriental Fruit Moth
Rosy Apple Aphid
Leafminers
Leafhoppers
Apple Maggot
Campylomma
European Apple Sawfly
San Jose Scale (suppression)
Pear Psylla
Japanese Beetle
Mealybug
Plum Curculio

TOPSIN® M
PENNCOZEB®
CUPROFIX® DISPERSS®
MANEB
MICROTHIOL® DISPERSS®
ZIRAM



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Vegetable growers have a zero-tolerance policy when it comes to aphids. Assail® insecticide zeros in and drops 'em dead! You'll get outstanding control of extra troublesome aphids and other pests that suck and chew, reducing your vegetables' market value. Assail's translaminar systemic activity penetrates the leaf tissue to reach the underside where key pests feed and breed. Assail® hammers them with its unique contact, ingestion and ovicidal activity. Plus, its rainfast residual control helps keep down next generation insects, while its 12-hour REI allows workers to get back into fields quickly so you can maximize crop profitability.

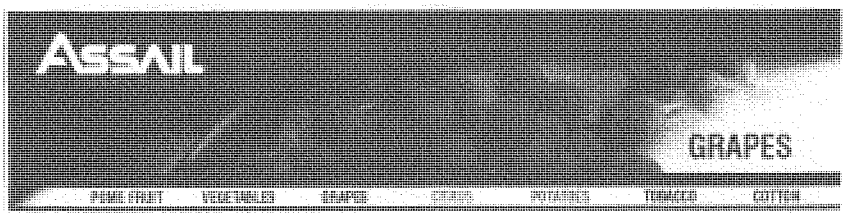
Assail® Delivers
•Long residual
•12-hour REI
•Systemic protection
•Great rainfastness
•7-day PHI

In addition to outstanding control, Assail® is an EPA-designated reduced-risk product. You enjoy 7-day PHI and no rotational crop plant-back restrictions. It's no wonder why Assail® is fast becoming the leading insecticide choice for vegetable growers. It's the most effective way to keep your bottom line, and your vegetables, beautiful!

Pests controlled:

Aphids
Colorado Potato Beetle
Lettuce Aphid
Sweet Potato Whitefly
Silver Leaf Whitefly
Pepper Weevil*
Swede Midge*
Thrips*
* Not registered for use in CA

TOPSIN® M
MANEB
CUPROFIX® DISPERSS®
PENNCOZEB®
MICROTHIOL® DISPERSS®
ZIRAM



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Stop those sucking insects from attacking your vineyard - and keep them down for a long time! Assail® insecticide gives you quick knockdown (by contact or ingestion) and effective control of leafhoppers (grape and variegated), aphids and glassy-winged sharpshooters. With its translaminar systemic activity, Assail® quickly penetrates leaf tissue to reach both sides of the leaf - especially underneath where insects feed and breed. It also moves up the leaf toward new growth.

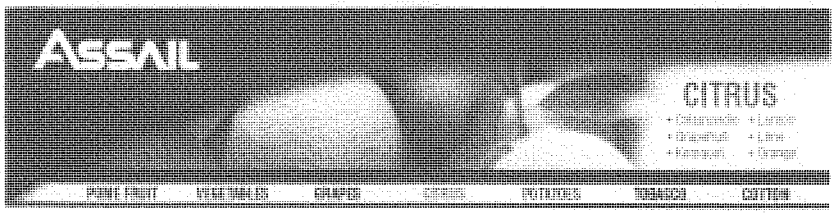
Assail® Delivers
•Long residual
•12-hour REI
•Systemic protection
•Great rainfastness
•7-day PHI

Assail® nails insects - from emerging nymphs to adults. Plus, with its short 12-hour REI, your workers can get back into vineyards quickly without those annoying insects buzzing around. In addition to outstanding control, Assail is an EPA-designated reduced-risk product - ideal for managing harmful insects in an IPM program. With billions of suckers born every minute, you need the fast-acting, longer-lasting protection of Assail®!

Pests controlled:

Aphids
Leafhoppers
Glassy-winged Sharpshooter
Mealybug
Phylloxera (aerial form only)*
Banded Grape Bug*
Rose Chafer*
Japanese Beetle*
* East of the Rocky Mountains Only

TOPSIN® M
MANEB
CUPROFIX® DISPERSS®
PENNCOZEB®
MICROTHIOL® DISPERSS®
KRYOCIDE®
ZIRAM



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Bring the proven, broad-spectrum systemic protection of Assail® Insecticide to your citrus crops. Assail® successfully knocks down your toughest sucking and chewing pests in three ways - with contact, ingestion and ovicidal control.

Key pests like aphids and citrus leafminers are squeezed out by the systemic , translaminar action that reaches the underside of leaves where they feed and breed. Plus, Assail® brings other benefits to your groves, including short REI, 7 day PHI and long residual control for maximum protection.

Assail® Delivers
•Long residual
•12-hour REI
•Systemic protection
•Great rainfastness
•7-day PHI

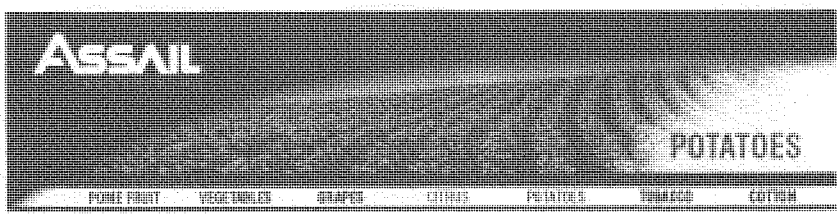
What's more, the unique neonicotinoid chemistry of Assail® is kinder to key beneficials - like bees. And, with no bloom restrictions*, Assail® offers the flexibility and freedom to spray at almost any time throughout the season (when bees are not foraging). Squeeze out those nasty sucking and chewing pests for good. Spray Assail® for fast-acting, long-lasting control!

*Due to state regulations, it cannot be applied any time during bloom in California.

Pests controlled:

Aphids
Citrus Thrips
Citrus Leafminers
Caribbean Black Scale
Glassy-winged Sharpshooters
Red Scale
Citricola Scale

CUPROFIX® DISPERSS®
KAYOCIDE®
MICROTHIOL® DISPERSS®



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Now, there's an insecticide that mashes your worst potato pests. Assail® Insecticide gives Colorado potato beetle, aphids and leafhoppers a pounding they won't forget. In addition, Assail® offers ovicidal control of European corn borer.

It's fast-acting and long-lasting. Offering outstanding foliar control, Assail® is quickly absorbed into leaves and stems to reduce wash-off due to rain and overhead irrigation. You'll enjoy a new peace of mind, knowing your fields are protected rain or shine. Plus, Assail® delivers short 12-hour REI and 7-day PHI with no rotational plant-back restrictions.

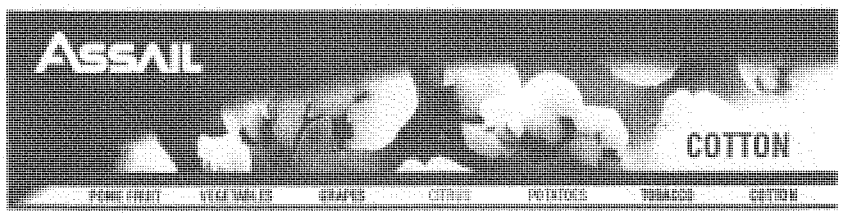
Assail® Delivers
•Long residual
•12-hour REI
•Translaminar and locally systemic protection
•Great rainfastness
•7-day PHI
•No rotational plant-back restrictions

Assail® Insecticide's broad-spectrum control pounds away on all generations of pests for maximum effectiveness. Its unique ovicidal activity even works on insects like the European corn borer during the egg phase, when they are most vulnerable, so fewer larvae hatch. Get the worst of your potato pests. Mash 'em with Assail® Insecticide!

Pests controlled:

Aphids
Colorado Potato Beetle
Flea Beetle
Leafhoppers
European Corn Borer

CUPROFIX® DISPERSS®
MANEB
MICROTHIOL® DISPERSS®
PENNCAP-M®
PENNCOZEB®
TOPSIN® M



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For use in California, Florida, Georgia, North Carolina, South Carolina and Virginia only.

Cotton pests are coming to vacation in your fields. Welcome them with a one-way ticket to paradise: a spray of Assail® insecticide.

Assail® insecticide is a broad-spectrum insecticide that effectively controls aphids, whiteflies, lygus, fleahoppers, thrips and cotton bollworm. Translaminar activity helps Assail® penetrate to the underside of plant leaves where cotton pests feed and breed. Once absorbed into the leaves, it provides excellent residual control through contact and ingestion. See the **product label** for a list of states currently registered for the use of Assail® insecticide on cotton.

Assail® Insecticide Delivers
- Outstanding control of primary cotton pests - aphids and whiteflies - and secondary pests such as fleahoppers, thrips and lygus
- Translaminar activity to control pests on the underside of leaves
- Long residual

Assail® insecticide is an excellent alternative to organophosphates and other chemistries for whiteflies and aphids. Plus, controlling both these insects helps reduce your risk of sticky cotton. Assail® also suppresses lygus. Though its unique neonicotinoid chemistry is tough on pests, Assail® is gentler on beneficial insects. So it's excellent for an IPM-friendly spray program. As an EPA-designated reduced-risk product, Assail® has less handling and application restrictions.

Punch your cotton pests a one-way ticket to paradise with the fast-acting, long-lasting protection of Assail® insecticide.

Pests controlled:

Aphids
Whiteflies
Lygus
Fleahoppers
Thrips
Cotton bollworm*

* For ovicidal use

MICROTHIOL® DISPERSS®
PENNCAP-M®
PENNCOZEB®

Clothianidin Field Studies

- These field studies evaluated the effects to small honeybee colonies hived on clothianidin rapeseed treated and untreated (control) plots.
- Colonies were placed on the treated and untreated plots during the rape bloom stage about two months after the rape crops were planted.

Clothianidin Field Study Results

- The studies showed clothianidin residue levels in various bee related commodities as a result clothianidin's seed treatment use to canola (rape) seeds.
- Residues of clothianidin ranged from 1.0 ☞g ai/kg (ppb) found in the nectar sampled from beehives and rape flowers to 8.6 ☞g ai/kg (ppb) from nectar sampled from forage bees honey stomachs.
- The studies found residues of clothianidin in forage bees, rape flowers, pollen taken from foraging bees and pollen from beehives.
- Although these studies found residues of clothianidin in many samples collected, none of the studies showed adverse effects to the exposed bees when compared with the controls. The studies checked features such as bee mortality, foraging (nectar or pollen) behavior, and honey production for effects.

EPA Required Field Testing for Clothianidin

- To evaluate two complete life cycles (~130 days) including egg, larvae, adult stages, and mortality of the honey bee colony;
- To evaluate the exposure and effects to the queen during these life cycles;
- To provide clothianidin residue analysis of the stored nectar, honey, and pollen at the beginning of the study, at periodic time intervals during the study and at the end of the study; and
- To include replicated data with statistical comparison to controls.

Honeybee Acute Oral Toxicity Categories[1]

[1]1985. International Commission for Bee Botany Third Symposium on the "Harmonization of methods for testing the toxicity of pesticides to bees".

(29)

- LD_{50} > 100 µg a.i./bee — Virtually non-toxic
- LD_{50} is 10-100 µg a.i./bee — Slightly toxic
- LD_{50} is 1- <10 µg a.i./bee — Moderately toxic
- LD_{50} < 1.0 µg a.i./bee — Highly toxic

Clothianidin Seed Treatment Uses

- EPA classified 6 honeybee field studies as Supplemental.
- EPA did not require the studies.
- The registrant voluntarily filed the studies complying with a European Union directive (91/414/EEC).
- EPA reviewed these studies under EPA's guideline 141-5 (Field-Testing for Pollinators) and classified them as Supplemental because the registrant conducted the studies without a prior agreed on protocol between the registrant and the Agency as required by guideline 141-5.

Neonicotinoids' Class

- The neonicotinoids, are a new class of synthetic insecticides.
- The neonicotinoids join the chlorinated hydrocarbons, organophosphorus compounds, methylcarbamates, and pyrethroids to make up the five principal types of active ingredients, all of which are neuroactive insecticides (Tomizawa and Casida, 2003).

Clothianidin Field Study Limitations

(32)

- The bee observation period was brief (<30 days).
- The studies failed to use repetitions in the treatments and controls.

Clothianidin Field Study Status

- 6/2003 – Clothianidin issued Conditional Registration
- 11/2003 - Registrant submitted draft protocol
- 3/2004 - EPA reviewed and proposed changes to draft protocol

References

- Mayer, D. and C. Johansen. 1990. Pollinator Protection: A Bee & Pesticide Handbook. Wicwas Press. Cheshire, CT .
- Tomizawa, M. and J. Casida. 2003. Selective Toxicity of neonicotinoids attributable to specificity of insect and mammalian nicotinic receptors. Annu. Rev. Entomol. 2003. 48: 339-364.

Statement of the
American Honey Producers Association, Inc.
for the
Subcommittee on Horticulture and Organic Agriculture
Committee on Agriculture
United States House of Representatives
Washington, D.C.

March 29, 2007

Chairman Cardoza and Members of the Subcommittee, my name is Richard Adee and I am a third-generation beekeeper from Bruce, South Dakota. My daughter and two sons are also actively involved in the honey business. I am a Past President and the current Chairman of the Legislative Committee of the American Honey Producers Association ("AHPA"). The AHPA is a national organization of commercial beekeepers actively engaged in honey production and agricultural pollination throughout the country.

We appreciate this opportunity to report to the Subcommittee on the serious damage that our members and others in the industry are suffering from Colony Collapse Disorder ("CCD"), a new, highly destructive and still mysterious condition. We also wish to highlight the very serious implications of CCD and other threats for critical segments of the larger agricultural economy. Finally, we offer a number of suggestions for addressing CCD and other threats to modern beekeepers and those who rely on bees for critical pollination.

Despite the tremendous work being done by the researchers here today and many other dedicated scientists, there is much we still do not know about CCD and its causes. However, based on reports from beekeepers throughout the country, it is becoming increasingly apparent that CCD poses a serious and, perhaps, unprecedented threat to America's bee colonies. For beekeepers, bee losses are a harsh fact of life. Beekeepers often face serious bee losses from a variety of causes. However, the losses apparently related to CCD are much more widespread and severe, with some beekeepers reporting the disappearance or destruction of 90 percent of their bees. Given the importance of commercial bee pollination to wide segments of U.S. agriculture, it is imperative that beekeepers, producers, researchers and the government continue to work together on an urgent basis to develop measures to combat CCD. CCD and other serious threats to U.S. bee colonies should also be a wake-up call to all of us – one that leads to longer-term programs, strategies and solutions to assure the continued health of both our bees and our vital beekeeping sector.

I. The Importance of Honey Bees to U.S. Agriculture

The severe threat posed by CCD extends far beyond the production of honey itself. The destruction of bee populations has the potential to impact production of the more than 90 food, fiber, and seed crops that depend on honey bees for pollination. In particular, the fruits, vegetables and nuts that are cornerstones of a balanced and healthy diet are especially dependent on continued access to honey bee pollination. Honey bee pollination is vital for the production of such diverse crops as almonds, apples, oranges, melons, broccoli, tangerines, cranberries, strawberries, vegetables, alfalfa, soybeans, sunflower, and cotton, among others. In fact, honey bees pollinate about one-third of the food in the human diet. USDA has estimated that improved crop yields and crop quality attributable to honey bee pollination alone are valued at some $20 billion annually.

The importance of this pollination to contemporary agriculture cannot be understated – the value of pollinated crops is vastly greater than the total value of honey and wax produced by honey bees. The scale of commercial pollination is also vast. Each year more than 140 billion honey bees representing 2 million colonies are employed by U.S. beekeepers across and around the country to pollinate a wide range of important crops.

The critical role of honey bees —and of the U.S. honey producers who supply honey bees for pollination—is illustrated by the pollination of California's almond crop, which is that state's largest agricultural export. California grows 100 percent of the nation's almond crop and supplies 80 percent of the world's almonds. Each year, honey bees are transported from all over the nation to pollinate California almonds, which is the largest single crop requiring honey bees for pollination. Currently, more than one million honey bee hives are needed to pollinate the 600,000 acres of almond groves that line California's Central Valley. That means nearly half of all the managed honey-producing colonies in the U.S. are involved in pollinating almonds in California during February and early March. As with other agricultural products, having enough bees to pollinate the almond crop can mean the difference between a good crop and disaster. As *OnEarth* magazine noted recently, the fate and continued success of California's almond crop rests "on the slender back of the embattled honey bee."

Many other U.S. agriculture producers rely on extensive honey bee pollination. A Maine blueberry grower recently put it quite succinctly—"without bees in May, there are no blueberries in August." Additionally, avocados — a $363 million crop in California — receive more than 90 percent of their pollination from the honey bee. Studies on the effect of pollination of cotton by honey bees show an increase of 17 to 19 percent in the yield of seed cotton, as compared to a cotton crop that is not pollinated by honey bees. The cattle and farm-raised catfish industries also benefit from honey bee pollination, as pollination is important for growing alfalfa, which is fodder for cattle and farm-raised fish.

In short, the bee pollination is vital to important crops nationwide, including California almonds, New York apples, Florida oranges, Georgia peaches, North Carolina melons, Tennessee soybeans and Texas cotton, cucumbers and cantaloupe.

The ability of U.S. beekeepers to provide these essential pollination services at reasonable cost depends directly on their ability to produce honey and beeswax and sell these important products at fair prices. U.S. beekeepers produce an average of 200 million pounds of honey annually in the United States, the sales of which are essential to assure the continued survival of many beekeeping operations. Without strong sales and good prices for honey, many beekeepers will simply be unable to continue in business. This, in turn, will reduce the supply and increase the price of honey bee pollination. Additionally, the production of honey is necessary to assure the good health of bees that pollinate other crops, such as almonds, that are not good sources of honey.

II. Trends and Threats in the Beekeeping Sector

In evaluating the perils posed by CCD, it is also important for Congress to recognize other continuing trends and threats facing the U.S. beekeeping sector.

Over the past 40 years, the number of U.S. bee colonies has fallen by almost 50 percent – from 4.6 million colonies in 1966 to 2.392 million in 2006. Under current conditions, it is anticipated that the number of bee colonies will, at best, remain stagnant. At the same time, the demand for commercial pollination services has been increasing exponentially. For example, in the early 1990s, only a relatively limited number of out-of-state beekeepers traveled to California to pollinate the almond crop. Today, well over 1 million of the nation's 2 million commercial bee colonies are used for almond pollination. The California Almond Board estimates that, by 2012, substantial increases in almond acreage will require over 2 million hives for pollination – *an amount equivalent to the number of all current commercial bee colonies.* In short, fewer and fewer bees are available to pollinate ever increasing crop volumes.

Since 1984, the health of U.S. bee colonies has also been under continued attack from mites and pests for which appropriate controls must constantly be developed. For example, the pinhead-sized Varroa "Vampire" mite is systematically destroying bee colonies and, in recent years, has been considered the most serious threat to honey bees. In addition, tracheal mites destroy bee colonies by clogging the bees' breathing tubes, blocking the flow of oxygen and eventually killing the infested bees. Additional losses are caused by a honey bee bacterial disease and a honey bee fungal disease. These pests and diseases, especially Varroa mites and the bacterium causing American foulbrood, are now resistant to chemical controls in many regions of the country. Further, pests are building resistance to newly-developed chemicals more quickly than in the past, thereby limiting the longevity of new chemical controls.

In 2006, losses caused by these pests and mites and other recent problems required U.S. beekeepers to import honey bees from other countries (namely, New Zealand and Australia) for pollination services. This marked the first time since 1922 that honey bees were imported into the U.S. for pollination, underscoring the fragile state of the U.S. honey industry.

Beekeepers must also operate in an increasingly complex ecological and agricultural environment. The improper use of agricultural pesticides has long been responsible for bee kills nationwide. These bee kills have been increasing in frequency and damage in recent years. Beekeepers also worry about the effects on bees of new genetically modified crops and new and more complex agricultural chemicals, which must be studied thoroughly to make sure that they do not pose the risk of further compounding existing man-made threats to bee colonies.

These developments and trends are placing increasing demands on commercial bee colonies and the beekeepers who manage them. Many commercial bee colonies are in almost constant motion, crisscrossing the country to pollinate a vast array of crops. While this mobility is a boon to agricultural producers who need pollination, it places increased stresses on the bees and exposes them to additional threats and increasingly subjects beekeepers to the vagaries of such factors as energy costs and crop cycles. Additionally, commercial bee colonies must be managed much more intensively than in the past, requiring greater effort and vigilance

throughout the year in the monitoring, treatment and feeding of bees. These efforts are time-consuming and expensive, but are absolutely essential if U.S. agriculture is to have the pollination that it increasingly requires.

III. Beekeeper Experience with CCD

Within the past year, CCD has emerged as a new, additional and potentially grave threat to America's beekeepers.

As chronicled in several recent news accounts, including reports from the New York Times, CNN, ABC News and AP, the sudden and unexplained death of bees in colonies has been reported in 22 states. Often, most of the adult bees in a colony mysteriously disappear, and soon the colony completely collapses.

The AHPA has been receiving many reports of collapsing colonies and staggering bee losses from beekeepers throughout the country. There does not appear to be a discernible pattern to these losses. Loss reports have come to us from both large-scale and smaller beekeepers, and from beekeepers who transport their colonies extensively as well as those who keep their colonies at one location. One beekeeper may experience pervasive colony collapse, while neighboring beekeepers report no such losses. Additionally, CCD-related losses have been experienced by beekeepers with colonies under stress from pests and other factors, as well as by those who have strong colonies and vigilantly employ state-of-the-art management practices, including syrup and protein feeding and mite controls.

The experiences of a number of individual beekeepers demonstrate the extent to which CCD is decimating beekeeping operations and poses a threat to the U.S. beekeeping sector as a whole. These are a few of many examples:

- A highly respected beekeeping operation in Ohio that usually provides excellent bees to larger operations for pollination has reported that all but 100 of its 800 colonies have been decimated, and that the remaining colonies are not strong enough for pollination in California.

- A Missouri beekeeper has reported that only 104 of its 700 colonies were still alive. Of the remaining colonies, only 71 were strong enough for pollination.

- A shipment of 1900 bee colonies from South Dakota was inspected in California on February 1st and found to be very strong. A mere two weeks later, almost one-quarter of these bees were below pollination strength.

- The Mississippi State apiarist reports that one migratory beekeeper based in Mississippi has only 220 of 1200 colonies remaining.

- A sixth-generation Colorado beekeeper reports that he has lost 2800 of his 4000 colonies.

- A Texas beekeeper who normally sends 3000 colonies to pollinate in Stanislaus County, California could send only 1000 this season, and some of those colonies were too weak to pollinate at expected levels.

- A Kansas beekeeper who pollinates in the same area had only 1650 hives remaining from a June 2006 peak of 4400, and has had serious problems in obtaining healthy bees from other beekeepers.

We anticipate that these distressing reports will continue, as beekeepers in the Northeastern states begin to evaluate their colonies after the Winter months.

When I was invited to testify before the Subcommittee a few weeks ago, I anticipated that I would be reporting on the devastating losses that many of our *other* members have been experiencing. At that point, my own bee colonies, which have been in the California Central Valley for almond pollination, appeared to be strong and healthy. However, within the past two to three weeks, evaluation of our California bee colonies has revealed that they are not maintaining their bee populations at anywhere near historic levels. In each of our 15 previous years in California, colonies transported from California to Mississippi for breeding purposes yielded approximately 2.7 new bee colonies, known as nucs. This season, the yield appears to be only 2 nucs per colony. Rather than growing substantially, as they always have done, our colonies in California seem to be declining. This is unprecedented and very troubling to me. For one group of 1400 colonies, for example, our hives are at only three-quarters of their usual strength. For these colonies, we have had to discount our usual pollination fee from $140 to $100 per colony, to reflect the fact that the almond growers whom we service are not obtaining expected pollination levels. All this has occurred despite the fact that we paid great attention to the proper feeding and treatment of these bee colonies.

Modern beekeepers are highly attentive to the condition of their bees and can usually pinpoint the causes for colony losses. However, beekeepers are baffled by these latest serious bee losses. A great many theories have been offered. Some have suggested that the stress from this almost constant movement of bee colonies for pollination, combined with the additional stress of pollinating crops, such as almonds, that provide little honey to the bees, may be a contributing factor to CCD. Many others believe that continuing infestations of the highly destructive Varroa mite, combined with other pathogens and viruses carried by these mites, may be the primary cause of CCD. Still others suggest that CCD may result from an unknown fungal pathogen. Additionally, other beekeepers suspect that new classes of pesticides, possibly in combination with increasing and serious misuse of other commonly used agricultural chemicals, may be a cause of CCD. Research has shown that some new chemicals can impair the memory and brain metabolism of bees and that the chemicals can be present in the pollen of certain crops at levels high enough to threaten bees. It has also been suggested that CCD may be related to the introduction of foreign bees for pollination for the first time in 85 years. Finally, many beekeepers believe that recent unprecedented losses are caused by some combination of these and possibly other factors.

In short, the unexplained and severe losses apparently caused by CCD represent a new and serious challenge to the American beekeeping sector. It is imperative that this threat be

addressed before it begins to thin even further the already dwindling ranks of US. beekeepers and creates potentially serious problems for U.S. agriculture.

IV Proposals

The AHPA urges Congress to work closely with beekeepers, agricultural producers, researchers and others on an urgent basis to find the causes of CCD and to develop effective measures to address this new and serious threat. At the same time, we also believe that it is critical that these sectors also work together over the long term on a broader range of issues to assure the continued health of our honey bees and our beekeeping sector. Because bee pollination adds some $20 billion to U.S. agricultural output each year, these efforts are vital for both U.S. agriculture and U.S. consumers.

We offer a number of proposals to address these long- and short-term needs.

A. Federal Support for Additional and Sustained Research

Strong Federal support for honey bee research is necessary to unravel the mysteries of CCD and to assure that there are strong and sufficient bee colonies to address the growing pollination demands of U.S. agriculture. The honey bee industry itself is too small to support the cost of the needed research, particularly given the depressed state of honey prices. Further, there are no funds, facilities, or personnel elsewhere available in the private sector for this purpose. Accordingly, the beekeeping industry is dependent on research from public sources for the scientific answers to these threats.

Since the honey bee industry is comprised of small family-owned businesses, it relies heavily on USDA's Agricultural Research Service ("ARS") for needed research and development. The four ARS Honey Bee Research Laboratories provide the first line of defense against exotic parasite mites, Africanized bees, and brood diseases. Equally, the laboratories are prepared to respond to new pests, pathogens and other conditions as they arise, such as CCD, that pose very serious and growing threats to the viability and productivity of honey bees and the many crops they pollinate.

To address the near-term challenges of CCD, the AHPA has requested that Congress provide dedicated funding of at least $1 million for additional ARS research. Such funding could be allocated to the ARS laboratories at Beltsville, Maryland, and Tucson, Arizona, both of which are well situated for this additional and important work. Additionally, the Federal Government should seek ways to support the important work of bee researchers in the academic and private sectors. We recommend, for example, that funding be considered for the University of California at Davis, because it has particular expertise in honey bee research and is in close proximity to the almond groves of the California Central Valley. Such cooperative efforts could better analyze the relationship between CCD, pollination and other stress factors. A joint effort involving UC Davis would also take advantage of the fact that, in February of each year, almost the entire honey bee industry has its bees in California for pollination purposes. Additionally, innovative research on CCD by small business enterprises and U.S. Army labs might also be worthy of support.

To assure the long-term survival of a healthy honey bee sector, Congress should also assure sustained funding for honey bee research at adequate levels. As in past years, the Administration's proposed FY 2008 budget proposes to eliminate certain funding for ARS that it did not request but that the Congress has previously provided in the appropriations process. Maintaining this funding is vital to honey bee research. Consequently, the AHPA requests that, in addition to new funds for CCD research, Congress at least maintain the funding for the ARS Honey Bee Research Laboratories at Baton Rouge, Louisiana; Weslaco, Texas; Tucson, Arizona; Beltsville, Maryland; and the ARS Wild Bee Research Laboratory at Logan, Utah. We also support increased funding for honey bee genome research at the ARS laboratory in Baton Rouge, as proposed before by the Administration.

The importance of this ongoing research is illustrated by the sequencing of the honey bee genome at Baylor University. This research has opened the door to marker-assisted bee breeding, which offers targeted and highly effective solutions to the many problems facing modern beekeepers. Marker-assisted breeding would permit the rapid screening of potential breeders for specific DNA sequences that underlie specific desirable honey bee traits. Marker-facilitated selection offers the first real opportunity to transform the U.S. beekeeping industry from one that has been dependent upon a growing number of expensive pesticides and antibiotics into an industry that is largely free of chemical treatments. These breeding techniques would also be a powerful new weapon in the beekeeper's continuing fight against a wide array of threatening conditions and pests.

Finally, Congress should also encourage expanded research into the effects of existing and new agricultural chemicals and products on honey bees. Honey bees operate in a highly complex ecosystem. As noted above, they play a critical role in assuring strong yields for many important fruit, vegetable, seed and fiber crops. It is important to make sure that agricultural chemicals and products intended to promote crop yields through, among other things, the systemic control of plant pests, do not inadvertently have the opposite effect through adverse effects on pollinating bees.

The requested funding levels for these vital ARS research activities (currently amounting to less than $10 million annually) are a wise and prudent investment for both U.S. agriculture and U.S. consumers. These funds will help address the current threat posed by CCD and provide vital long-term research support for U.S. beekeepers. By helping to assure a good supply of healthy bees for pollination, this research will benefit wide segments of U.S. agriculture as well as U.S. consumers of fruits, vegetables and other food products.

B. Greater Consideration of Bees in Environmental Enforcement and Regulation

U.S. beekeepers support a balanced approach to the environment and environmental regulation. We depend on chemical and antibiotic treatments to control mites and diseases that can rapidly decimate hives. We also understand that farmers similarly may need to employ pesticides and other treatments to protect crops. As concerned citizens who make our living in the outdoors, we particularly appreciate the critical importance of protecting the overall

environment. In balancing these and other environmental considerations, we urge the government at all levels to give full and proper consideration to the essential role of bees in both the ecosystem and the farm economy.

Many of our members report that bee kills caused by the misuse of existing agricultural chemicals are increasing in frequency and severity. There is widespread concern that the EPA and state departments of agriculture are giving bees the short shrift in their regulatory and enforcement activities. In view of the importance of bees to the environment and agriculture, Congress should seek to assure that bees are properly protected through better information and education for farmers, crop sprayers and others and, if necessary, through the strong enforcement of existing law and regulation. Similarly, potential harm to bees should be a paramount concern in the regulatory approval of new agricultural chemicals and products.

As noted above, bee pests are building resistance to new hive treatments more quickly than in the past. As a result, it is also vital for beekeepers that new treatments be developed and approved for use by the Environmental Protection Agency and other regulators at both the State and Federal levels as quickly as possible, consistent with protection of the environment and the public health. Given the central role of bee pollination in U.S. agriculture, Congress should explore whether there are avenues to hasten the approval of safe and effective new treatments that are currently under development. In particular, once the cause or causes of CCD are determined, any new treatments for that disorder should be given priority consideration.

C. Additional Technical Support for Beekeepers

As noted previously, modern beekeeping requires much more intensive management than in earlier times. Only a decade ago, it was common for beekeepers to have considerable downtime after the conclusion of the August pollination season and to arrive in California the following January after having done only limited work with their colonies. Today, things are much more intensive. Maintaining healthy colonies requires almost constant monitoring and close attention to feeding and treatment throughout the year. Most larger commercial beekeepers understand this new reality and are adept at these methods. However, many smaller beekeepers do not have the resources or experience needed to manage their colonies so intensively. To address this gap in information and resources, Congress should consider devoting further resources to assist smaller beekeepers in this regard. For example, it might be very helpful to some beekeepers to establish teams of expert consultants that could advise beekeepers on new management methods and help them prepare – particularly in September, October and November – for the long pollination season. Dedicated support for such outreach by the extension services of the various State universities might be one approach to providing this help.

D. Crop Insurance for Honey Producers

As detailed above, beekeepers throughout the country have suffered devastating losses, apparently from CCD, over the past year. Many of these are highly skilled beekeepers whose families have been beekeepers for generations. If these producers stop beekeeping operations, it is unlikely that they will be replaced. At a time of ever-growing demand for commercial pollination, U.S. agriculture can ill afford a further contraction of the beekeeping sector.

To help U.S. beekeepers survive these devastating losses, Congress may wish to consider, on a one-time basis, some form of loss payment for beekeepers whose operations have been seriously impacted by CCD and other recent conditions, including recent droughts. These payments could be limited in scope and duration, but, if made, should be sufficient to permit beekeepers who have suffered significant losses to reestablish their beekeeping operations. Such payments could be a prudent investment by Congress in a sector that is vital to U.S. agricultural production.

Over the longer term, Congress must assure that honey producers can protect themselves against losses of various kinds on a shared-risk basis through a program of Federal crop insurance. Congress recognized the importance of crop insurance for honey producers when it included in the Agricultural Risk Protection Act of 2000 (P.L. 106-224) specific language regarding the development of pilot coverage to protect honey producers against destruction of bees by use of pesticides. (Section 523(a)(3)(B)). We also understand that, in 2005, the USDA's Risk Management Agency funded a contract for developing a pilot program for insuring honey producers from losses of various kinds. However, no such program has yet been submitted for approval by the Federal Crop Insurance Corporation Board.

Congress should strongly urge the USDA to establish a crop insurance program for beekeepers on an expedited basis. Such a program would provide a sustained and stable safety net for the beekeeping sector and would be a far preferable and less expensive alternative to seeking to compensate beekeepers on a crisis-by-crisis basis. USDA already provides crop insurance to over 100 crops, including many crops pollinated by bees. It makes no sense to insure these crops, while not implementing authorized coverage for the beekeepers on whom so many of these crops depend.

E. Other Measures to Support the Nation's Beekeepers

In the context of the upcoming 2007 Farm Bill and elsewhere, Congress will have the opportunity to take other important steps to ensure the long-term health of America's bees and the beekeeping industry.

One essential step will be to continue the current marketing loan program for honey. This important program has helped ensure the survival of many beekeeping operations, at minimal cost to the Federal Government. Congress should also consider appropriate changes in the applicable loan rate, extension of the loan term (from nine to twelve months), and a possible reseal provision, all to improve the effectiveness of this program.

In addition, Congress should look at ways to ensure that American consumers can choose to support the domestic beekeeping sector by purchasing real U.S. honey. Current country-of origin labeling requirements for honey are subject to considerable abuse and make it difficult for consumers to know when they are purchasing American honey. Congress should consider common-sense modifications to these origin labeling rules. Similarly, there ought to be a clear standard of identity for honey, so that consumers can know when they are buying real honey, as opposed to sugar-laden blends of "pretender" honey. A proposed standard of identity for honey

has been before the Food and Drug Administration for over a year, and Congress should encourage the FDA to issue the standard.

Finally, Congress can take various steps to recognize and support the irreplaceable role that honey bees play in the larger ecosystem. It has been suggested, for example, that a program of non-trade-distorting "Green Payments" might be an effective means of encouraging further environmentally beneficial practices by our beekeepers. Additionally, Congress must assure that the EPA and other regulators fully recognize, in all their regulatory and enforcement activities, the paramount importance of bees to both the environment and large segments of the agricultural economy.

IV. Conclusion

On behalf of the AHPA and our 750 beekeeper members nationwide, I would like to thank the Subcommittee for your committed efforts to find the causes of and solutions for CCD. We look forward to working with Congress, agricultural producers and the research community to address this serious threat to America's bee colonies. We also strongly urge the Subcommittee and the Congress to take continuing and sustained steps over the longer term to help assure that our nation's beekeeping sector is on a strong footing.

CCD should be a loud wake-up call to all of us. Just as beekeepers must continually be vigilant against pests and other threats, all of us must continue to be on guard against threats to the vital beekeeping industry. By beginning this renewed effort now, we can prevent further serious damage of our beekeepers, to the producers of fruits, vegetables and other important crops, and to U.S. consumers who rely on these crops for sustenance and good health.

Thank you very much for your interest in these important issues and for your consideration of our industry's views. I would be pleased to answer any questions that the members of the Subcommittee may have.

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March 27, 2007

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Submitted to the House Agriculture Subcommittee on Horticulture and Organic Agriculture, U.S. House of Representatives

Mr. Chairman and Members of the Subcommittee, my name is Laurie Davies Adams, and I am Executive Director of the Coevolution Institute (CoE).
CoE commends the Subcommittee on Horticulture and Organic Agriculture for holding this timely hearing on a vital topic of national significance to "*review the colony collapse disorder (CCD) in honey bee colonies across the United States.*" CoE is pleased to submit these comments for the hearing record.

In brief, we don't know enough yet about this massive loss of honey bee colonies to be able to conclude responsibly about its extent, cause(s) or remedy. We also don't know what the impact is on agriculture and, if any, on native pollinators. Even as efforts are appropriately focused on how to address the CCD and meet farmers' vital pollinator needs, this alerts us to the simple but significant fact that **we can no longer take honey bees and other animal pollinators for granted**. As a major National Academy of Sciences report recommends, we must improve our scientific understanding, increase awareness about the amazing world of pollinators and their importance to our food supply and healthy ecosystems, and take action to protect pollinators and their habitat. We do know that forces like habitat destruction, improper use of pesticides, invasive species and global warming are placing our pollinator world at risk. Here are some actions that can be taken now, even as we work to address CCD and its impacts on honey bee colonies:

- Farmers can incorporate practical conservation practices now to sustain and enhance pollinators and their habitat.
- Congress can help now by strengthening the Conservation, Research and other titles of the 2007 Farm Bill in targeted ways to provide farmers and ranchers with improved pollinator assistance.
- Federal agencies and other stakeholders can help now by increasing and focusing the pollinator component of research and conservation programs, coordinating their efforts and collaborating closely with the ag community and other managers of our natural resources.
- CoE/NAPPC pledges to help now by continuing to facilitate collaborative efforts for the benefit of pollinators and pollinator habitats and the agriculture systems and ecosystems that depend upon them.
- All Americans can help now with pollinator-friendly practices in their own back yards.
- Importation of non-native bees should be avoided, absent effective protocols.

INTEREST OF COEVOLUTION INSTITUTE

The mission of CoE is to catalyze stewardship of biodiversity. CoE places a high priority on efforts to protect and enhance animal pollinators (*invertebrates, birds and mammals*) and their habitats in both working and wild lands. More information about CoE may be accessed at www.coevolution.org.

CoE is a strong advocate of a collaborative, science-based approach. CoE is honored to have a number of beneficial pollinator partnership efforts ongoing through management of the North American Pollinator Protection Campaign (NAPPC), a tri-national, public-private collaboration of scientific researchers, managers and other employees of state and federal agencies, private industry and conservation and environmental groups dedicated to ensuring sustainable populations of pollinating invertebrates, birds and mammals throughout the United States, Canada and Mexico. NAPPC's voluntary participants from nearly 140 entities are working together to:

- Promote awareness and scientific understanding of pollinators;
- Gather, organize and disseminate information about pollinators;
- Provide a forum to identify and discuss pollinator issues; and
- Promote projects, initiatives and activities that enhance pollinators.

Since its founding in 1999, NAPPC has been an instrumental cooperative conservation force in focusing attention on the importance of pollinators and the need to protect them throughout North America. More information about NAPPC and its collaborative efforts can be found at www.nappc.org. Information for those interested in pollinators can also be found at another CoE/NAPPC website www.pollinator.com dedicated to the Pollinator Partnership, a cooperative conservation outreach program.

COLONY COLLAPSE DISORDER

Based on information available to date, the consensus among NAPPC collaborators is that we don't know enough yet about this massive loss of honey bee colonies to be able to conclude responsibly what is causing the problem. We also don't know yet what the impact is, if any, on native pollinators. According to Dr. Stephen Buchmann, NAPPC International Coordinator, beekeepers in 26 states (and now occurrences in Europe) are reporting catastrophic losses. Possibly similar to "disappearing disease" of past decades, CCD may be caused by a convergence of factors (mites, viruses, bee diseases, pesticides and other environmental stresses) which may have weakened bees' immune systems.

Immediate funding for objective, rigorous science is needed to address this problem as well as an assessment of the entire pollination network. That's the only way to address CCD and also prevent future, potentially even more serious, problems. As an investigative strategy is developed, CoE would recommend including controlled research that involves native bees and some of the suspected causes of CCD in order to analyze the impact that certain factors (neonicotinoids, for example) may have on non-*Apis mellifera* bees. This is especially important to determine if sub-lethal effects from new classes of pesticides are affecting the navigational abilities of bees. CoE's current position is posted at http://www.nappc.org, and any additional information on colony collapse disorder will be posted as it becomes available.

Our NAPPC listserv has been an important tool in which scientists, natural resource managers, agency officials and other stakeholders can exchange and debate information on CCD and dialog about possible causes, extent of problems, implications for agriculture and healthy ecosystems, and potential remedies.

ACTION OPTIONS RE CCD & HONEY BEES

CoE believes it is appropriate to seek answers from key stakeholders to a number of questions. Responses this Subcommittee receives could be key in determining the fate of our pollinating partners—honey bees as well as other native and managed pollinators.

- What are USDA and other researchers able say about the CCD threat, and what actions are they recommending to address the threat?

- If researchers don't have the answers now, what is being done to get the answers; and how long will it take? Spring and pollinator season are fast approaching!
- What can agricultural producers do in terms of pest management and conservation practices to help keep honey bee colonies viable?
- How concerned should agriculture, and indeed consumers, be about the sufficiency and sustainability of our pollinating partners and their role in helping to produce our food?
- What are the economic and nutritional implications for producers and our food supply if the losses prove to be as great as feared?
- What other pollinator options exist for producers?
- How important are native pollinating species in pollinating agricultural crops—both managed and wild? Studies have demonstrated the potential for native pollinators to enhance the services of managed pollinators. More study is needed to determine if they help fill the gap that CCD may create. Can we work toward this in the near term? In the longer term?
- Is CCD impacting other managed pollinators and native pollinators?
- Pollinators are essential partners in healthy ecosystems. Game and other wildlife depend on pollinators for their food, directly and indirectly. What are the ecosystem implications of CCD?

IMPORTING POLLINATORS FROM OTHER NATIONS AND ECOREGIONS TO PROVIDE CROP POLLINATOR SERVICES CARRIES HIGH RISKS

If CCD proves to be a serious problem this year, CoE cautions against scrambling to fill the void by importing other managed non-native pollinator species from other countries or other eco-regions. If CCD proves to be a persistent problem, the pressure to allow such remedies could grow. We need to avoid compounding one problem by creating others that could make the situation far worse. Imported species intended for a good use can quickly become out-of-control ***invasive*** species (including pests and diseases the imported species may carry and introduce).

CoE has grave concerns about serious risks created by trans-boundary shipments of pollinators and is opposed to "importing" non-native species from other nations or other ecosystems. By trans-boundary, CoE regards both international political and bio-geographic boundaries as important. Ecosystems don't recognize political boundaries. As experiences have repeatedly demonstrated, longer term impacts could result that, while unintended, could be devastating and even irreversible in terms of introduced parasites and diseases and adverse impacts on native pollinators and agricultural systems and ecosystems.

Honey bees and production agriculture have already been adversely affected by the following:

- The international movement of European honey bees has resulted in the movement of their diseases around the world. Of particular concern have been the recent introduction and invasion of North America, including Mexico, by honey bee tracheal mites, and the more devastating Varroa mite.
- The transport of the African subspecies of the Western honey bee, *Apis mellifera scutellata* into the Americas. That introduction in Brazil in 1956, and the subsequent escape of those bees resulted in the invasion of tropical, subtropical, and warm temperate areas of the Americas with the so-called "killer bees," "assassin bees," or "Africanizadas." The disruption caused by that invasion has had serious adverse effects on the regions' bee keeping industries. Effects on natural ecosystems have not been well investigated, but, in places, it appears that the abundance (although not necessarily diversity) of native bees has declined, presumably through competition for food and nest-sites.

Additional examples are available involving trans-boundary shipments of managed bumble bees as pollinators. Again, while the examples provided are primarily trans-boundary across political jurisdictions, an ecosystem can be equally harmed by importation of a non-native species from another ecosystem within the same nation.

This problem and the demonstrated risks involved are so great that NAPPC collaborators teamed up last year and produced a "Bee Importation White Paper" focused on the risks and consequences of importing non-native bumble bees. The following excerpt captures what is at stake:

> "Non-native species introductions may have dramatic negative consequences. In the last century, invasive species of all types have cost the U.S. an estimated $137 billion in damages (Pimentel et al. 2000). Yet introductions of exotic plants and animals persist, partly because those who introduce exotic plants and animals may not fully understand or bear the consequences of their behavior (Perrings et al. 2002), which can be devastating on both economic and ecological scales." [p. 23]

The full report is available at http://www.pollinator.org/Resources/BEEIMPORTATION_AUG2006.pdf and includes a number of key recommendations. If trans-boundary shipments of pollinating species are considered, the greatest care must be undertaken in developing effective protocols to prevent such unintended consequences.

Based in part on that report's recommendations, CoE urges the following policy and protocols:

- Trans-boundary movement of pollinators should fall under the regulations and agencies that govern other beneficial organisms, such as biocontrol agents.
- Appropriate quarantine facilities should be established in recipient countries and zones to assure the health of the pollinators being moved in (for example, Australian quarantine facilities for European Honeybees).
- Veterinary, or equivalent, pollinator certifications of being disease-free should be established prior to shipment (for example, APHIS regulations for honeybees intended for shipment to U.S.).
- More information/research on diseases of pollinators other than Apis, especially bumble bees, is urgently required.
- A major initiative should be undertaken to consider the potential use ("domestication") of endemic species for local use in pollination, instead of primary reliance on introduction of exotic species.
- Sanitary inspection and certification should be established for the operation of pollinator rearing and husbandry facilities.
- Risk Assessments should take into consideration environmental risks, and potential agronomic benefits, prior to importation of any pollinator across international and biogeographic borders.

Until such protocols can be implemented, trans-boundary (international and biogeographic) movement of pollinators should be curtailed immediately, both in the U.S. and globally.

CCD IS A SIGNIFICANT WAKEUP CALL THAT WE MUST PAY ATTENTION TO THE WIDER WORLD OF POLLINATORS

The current CCD problem alerts us to the simple but significant fact that we can no longer take honey bees and other insect and animal pollinators for granted. We do know that forces like habitat destruction, improper use of pesticides, invasive species and global warming are placing our pollinator world at risk.

The National Academy of Sciences released a major report last October on the status and health of pollinators in North America that included a number of recommendations on research and conservation action. That report was released at a day-long Pollinator Symposium put together by CoE/NAPPC and hosted by USDA. In essence, the report recommends that we must improve our scientific understanding, increase awareness about the amazing world of pollinators and their importance to our food supply and healthy ecosystems, and take action to protect pollinators and their habitat.

Gleaning from recommendations in this report, CoE would urge the Subcommittee to help build a record by seeking answers to the following questions:

- What other threats do our pollinating partners—and the farmers and consumers who depend upon their services—face that we need to be paying attention to?
- What are researchers doing beyond honey bees? What are farmers doing? Many native pollinators can and do play significant pollinating roles, both as wild and managed inputs—for example,

managed bumble bees, leafcutter bees, alkali bees, and orchard bees a variety of field and greenhouse crops and tree fruit and nut crops.

- What research is USDA currently conducting on pollinators, and what is it telling us?
- Is USDA undertaking any additional research as a result of the NAS report?
- What research and conservation activities related to pollinators and pollinator conservation are being undertaken by other federal agencies?
- Are USDA and other agencies coordinating their pollinator activities? Can they do a better job and benefit pollinators and their respective missions?
- Does USDA need any additional authority or funding from the Congress to get the job done?
- What are producers doing to better manage their pesticide use to minimize impacts on honey bees and native pollinators?
- Are producers practicing any pollinator conservation measures, habitat or other?
- What role if any do producers see for native pollinators playing in pollinating their crops? Do producers see an increased potential for native pollinators?

PRACTICAL ACTIONS CAN BE TAKEN NOW

Even as efforts are appropriately focused on how to address CCD and its impact on managed honey bee colonies and to meet farmers' vital pollinator needs, there are practical steps that can be taken now that can provide near-term benefits and lay the foundation for longer-term solutions:

- Farmers can incorporate practical conservation practices now to sustain and enhance their pollinating partners to sustain and enhance pollinators and their habitat.
- Since ecosystems are interconnected, neighboring landowners—including homeowners in their own back yards—can help in simple but important ways to protect pollinators and provide habitat.
- Congress can help by strengthening the Conservation, Research and other titles of the 2007 Farm Bill in targeted ways to provide farmers and ranchers with the improved science and financial and technical assistance they need to implement effective conservation management practices. CoE will be submitting recommended changes to the 2007 Farm Bill in the near future for the Committee's consideration.
- Federal agencies and other stakeholders can help now by increasing and focusing the pollinator component of research and conservation programs, coordinating their efforts and collaborating closely with the ag community and other managers of our natural resources.
- CoE and many NAPPC partners pledge to help now by continuing to facilitate collaborative efforts for the benefit of pollinators and pollinator habitats and the agriculture systems and ecosystems that depend upon them.
- Indeed all Americans can help now with pollinator-friendly practices in their own back yards.

FARM BILL PROGRAMS CAN BE "POLLINATED" TO BETTER ADDRESS POLLINATOR NEEDS

CoE respectfully submits that existing farm bill conservation, forest management and other programs designed to work with and assist farm, ranch and forest land managers can be strengthened to better address managed and native pollinator needs by "pollinating" authorizing language in the next farm bill reauthorization through modest but significant language changes.

Conservation authorities and other selected programs under the farm bill can be highly effective in addressing factors which can contribute to pollinator declines including: habitat fragmentation, loss, and degradation causing a reduction of food sources and sites for mating, nesting, roosting, and migration; improper use of pesticides and herbicides; aggressive competition from non-native species; disease, predators, and parasites; climate change; and lack of floral diversity.

Effective pollinator protection practices often overlap and complement other conservation practices, particularly those designed to improve wildlife habitat, and vice versa. In other instances, a practice designed to achieve wildlife or other conservation practices could generate significant pollinator benefits by integrating modest enhancements.

CoE applauds pollinator awareness and pollinator conservation assistance actions already being taken under existing authorities and facilitated through the NAPPC collaboration, particularly by the Natural Resources Conservation Service (NRCS), the U.S. Forest Service (USFS), the Cooperative State Research, Extension and Education Service (CSREES) and the Agricultural Research Service (ARS) in USDA as well as the U.S. Fish and Wildlife Service (USFWS) and the National Park Service (NPS). We are also working closely with the Bureau of Land Management (BLM), the U. S. Dept. of State and the U. S. Department of Defense.

The focused objective of targeted modifications to authorizing language is to equip and direct USDA agencies to build on these early pollinator efforts and do better. Pollinators and agriculture deserve no less. This can be accomplished by inserting modest language changes as appropriate to ensure agencies have the direction and authority in implementing programs to (1) improve awareness about the importance of pollinators to agricultural producers and ecosystem health, and (2) work with farmers, ranchers and foresters in facilitating pollinator stewardship, protection and habitat conservation.

Candidate programs for such "pollinating" language include EQIP, the Conservation Reserve Program (CRP), the Conservation Security Program, the Wildlife Habitat Incentives Program, the Farm and Ranchlands Protection Program, the Grasslands Reserve Program, the Wetlands Reserve Program and the Watershed Rehabilitation Program, all capably operated by NRCS. Conservation assistance programs operated by USFS could be similarly augmented. The MOA between CoE and USFS identifies common ground in programs dealing with healthy forests, invasive species and resource valuation and use.

For example, in authorizing language for EQIP [P.L. 107-171, Subtitle D], additional direction and clarification of authority regarding pollinators could be provided through insertion of "or pollinators" at the end of Section 1240(b), (e)(2), so that it would read: "In determining the amount and rate of incentive payments, the Secretary may accord great significance to a practice that promotes residue, nutrient, pest invasive species, ~~or~~ air quality management**, or pollinator habitat and protection.**"

If this authority is complemented by conservation assistance providers making producers aware of pollinator needs and pollinator-friendly practices, it would be clear that the statutory authority and direction exists to provide EQIP incentive payments to help producers meet part of the costs of pollinator-friendly practices. Authorizing language making it clear that incorporating pollinator-friendly practices is an important component of criteria to be used in determining CSP payments represents another good example.

While the most obvious opportunities to improve pollinator stewardship are through USDA's conservation programs, CoE urges USDA to consider similar targeted opportunities in the research, forestry, commodity and other programs. Authorities for existing research, extension and education programs assuredly offer opportunities. Through a further exchange of ideas with USDA officials, other opportunities to productively "pollinate" programs could well be identified.

CoE would like to emphasize that this is NOT asking for *new* programs, but rather *enhancements* to existing programs as a pragmatic approach that can yield meaningful results with limited resources. Conservation programs can be highly effective in addressing factors which can contribute to pollinator declines including: habitat fragmentation, loss, and degradation causing a reduction of food sources and sites for mating, nesting, roosting, and migration; improper use of pesticides and herbicides; aggressive competition from non-native species; disease, predators, and parasites; climate change; and lack of floral

diversity. Effective pollinator protection practices often overlap and complement other conservation practices, particularly those designed to improve wildlife habitat, and vice versa. In other instances, a practice designed to achieve wildlife or other conservation practices could generate significant pollinator benefits by integrating modest enhancements.

POLLINATORS PLAY CRITICAL ROLE IN AGRICULTURE AND ARE AT RISK

Insect and other animal pollinators play a pivotal part in the production of an estimated one out of every three bites of food that humans eat and in the reproduction of at least 80 percent of flowering plants. The commodities produced with the help of animal pollinators generate significant income for agricultural producers. For example, domestic honeybees pollinate an estimated $14.6 billion worth of crops in the U.S. each year, produced on more than 2,000,000 acres. It is thus in the strong economic interest of both agricultural producers and the American consumer to help ensure a healthy, sustainable pollinator population.

Today, possible declines in the health and population of pollinators in North America and globally pose what could be a significant threat to the integrity of biodiversity, to global food webs, and to human health. A number of pollinator species are at risk. Due to several reported factors, the number of commercially managed honeybee colonies in the U.S. has declined from 5.9 million in the 1940's to 4.3 million in 1985 and 2.5 million in 1998. All indications are the problem has worsened in recent years. About 900,000 rented colonies are employed to pollinate 400,000 acres of just one major cash crop, almonds, grown in California. As one indication of the seriousness of this problem, the American Farm Bureau Federation re-activated its honey bee and apiary committee last year.

NATIONAL POLLINATOR WEEK JUNE 24-30, 2007

June 24-30, 2007 was designated as National Pollinator Week through action last fall by the U.S. Senate (S. Res. 580) and a proclamation by Secretary of Agriculture Mike Johanns. CoE/NAPPC is planning and facilitating a number of events in our Nation's capitol and at the local level throughout the country to celebrate and raise public awareness about our pollinating partners and the need to take actions that protect pollinators and their habitat. For example—

- On Monday, June 25, Dr. May Berenbaum, an internationally recognized entomologist and key witness at today's hearing, will be the featured speaker for the National Coalition for Food and Agricultural Research at a hill seminar in this hearing room, Dr. Berenbaum will be discussing research on the pollinator-agriculture connection.
- On Wednesday, June 27, a reception will be held at USDA honoring famed entomologist E. O. Wilson.
- On Friday, June 29, Secretary of Agriculture Johanns will preside over the first issue of a new pollination stamp series during a ceremony at USDA. The role of pollinators will be featured at the USDA farmer's market.

CoE would be pleased to facilitate efforts by this Subcommittee and Committee and the Congress to schedule other appropriate activities and events during National Pollinator Week and beyond.

CoE stands ready to work with this Subcommittee and interested stakeholders to help address the CCD and ensure that managed and wild pollinators are sustained and enhanced for the benefit of agriculture, consumers and healthy ecosystems.

Respectfully Submitted,

Laurie Davies Adams
Executive Director

March 29, 2007

Dear Agriculture Committee Members and Staff,

I would like to introduce myself to you and present you with my thoughts on Colony Collapse Disorder (CCD).

My son David R. and I operate Hackenberg Apiaries with about 3,000 colonies based in Lewisburg, Pennsylvania and Dade City, Florida for crop pollination and production of honey. We use our 3,000 bee colonies to do approximately 9,000 pollination sets each year in Florida, Pennsylvania, New York and Maine to pollinate citrus, melons, cantaloupes, squash, apples, cherries, blueberries, pumpkins and cucumbers.

In my 45 years of beekeeping I have seen all kinds of problems in honeybee colonies (diseases, two mites, small hive beetles, wax moth, numerous viruses, pesticide kills, etc.), but this new mystery we call CCD is a disaster.

The letter that follows I sent in mid March to my growers that use our bees for pollination to try to explain the honeybee collapse (CCD). As I state in this letter I am not a scientist but this is the way as I see it in my years of experience as a beekeeper. I have had a lot of inside of the beehive experience in my 45 years of beekeeping.

I would ask that you read my grower letter and the attachments and include it as part of today's testimony to this committee.

The beekeeping industry needs a lot of new research to solve this mystery. We need your help to make this happen. A lot of beekeepers including our own operation are in serious financial trouble with these honeybee losses. The tremendous cost of restocking these honeybee colonies to be able to provide pollination services this year along with the loss of income of loss pollination and no honey crop have put beekeepers into a troublesome financial situation. Any financial help would be much appreciated.

I wish to thank you for taking time to hear the plight of the US Bee Industry in this new mystery (CCD).

If you have any questions feel free to contact me.

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March 14, 2007

Dear Grower,

I have been receiving calls because of the stories in the media about what is now being called "Colony Collapse Disorder". I will try to explain as well as I can what is going on in the Bee Industry.

First it seems that ever since we discovered Varroa mites in this country in 1987 there has been one crisis after another for our industry. I am sure many of you are to the point where you do not want to hear any more about these troubles that our bee industry seems to be mired in. Well I can tell you that it has not been pleasant being on the inside of each one of these almost continued crises. I wish I could take a few years off from the problems and honestly tell everyone "life is good" in the bee business but that is not the case.

Colony collapse Disorder (CCD) may be one of the most serious problems the bee industry ever faced. I have many beekeeping friends who have lost 50 to 95% of their hives since November. I have had reports of disaster in California where over one million hives are now pollinating the almonds. Beehives that were full of what appeared to be healthy bees in early January are now empty boxes with a few sick and dying bees left in them. A Texas beekeeper with 10,000 hive outfit that has less then 1,000 hives left. A package bee and a queen bee producer in Georgia that supplies beekeepers in the north in the spring with replacements cancelled all his orders this past Monday. There is speculation that maybe 150,000 or more hives may have already died nation wide, but this is only a guess since numbers are impossible to estimate while hives are still collapsing.

Unfortunately I was the first to discover CCD in one of my locations just south of Tampa, Florida in November 2006. In October I brought several loads of bees to Florida from Pennsylvania and New York and they appeared to be strong healthy hives when I unloaded them but by mid November several of my larger yards had less then 10% of the hives still alive. I contacted people at Penn State and the Pennsylvania Department of Agriculture and USDA. They requested that I bring those hives that were still living but appeared to be collapsing as well as dead bee hives to analyze in their labs. The initial findings were very puzzling. Dead bees showed signs of fungus, amoebas, and undigested pollen in their mid-gut (this can be viewed on website MAAREC.org, look up CCD). There was no record in bee research literature on this kind of pathogen levels that were present in these bees. At the same time this was happening in Florida, reports from several other states were beginning to come in at larger than normal beehive losses. By mid January at the American Beekeeping Federation convention in Austin, Texas a large number of dead (disappearing) hives were reported in 22 states. Two weeks ago researchers from all over the country met in Stuart, Florida to discuss CCD. I and 10 other beekeepers from across the US were there.

This has been a very difficult problem to figure out what is happening to the bees????? At first many of us thought we were seeing something related to varroa mite or maybe a new virus spread by mites. But the symptoms of CCD were very different from any mite damage we have seen in the past. There are four particular things about CCD that were perplexing but some what consistent across the country. First, some people referred to this as "disappearing disease" because the bees literally disappeared. The second symptom is that bees left behind frames of brood (young baby bees) and boxes filled with honey that no other bees came in and robbed out as normally happens. The third symptom was that the small hive beetle and wax moth would not move into the hive for at least 3 weeks as if something toxic was in the hive. One problem that beekeepers experienced early is that it is a common practice to place dead bee hive boxes on top of a live hive nearby to fill them with bees again. When you place a dead CCD hive on top of a live hive nearby you kill the hive below. This makes us think that there must be something toxic in the hive from CCD. But when aired out for several weeks the toxicity levels seem to go away. The last symptom is that the dead bees always seem to have a fungus found in the bee's mid-gut and sometimes through their entire body.

So the big question (problem) is what is killing the bees???? According to one spokes person from the CCD working group of researchers, extension people, university officials and industry leaders, preliminary work has identified several likely factors that could be causing or contributing to CCD. Among them are mites associated diseases and viruses, some unknown pathogenic disease and pesticide contamination or poisoning. I have been in CCD group discussions from the beginning. I have had detailed talks with affected beekeepers, researchers, bee inspectors, growers, farmers, seed company representatives and anybody that might be able to contribute any useful information. The picture that has emerged so far has many people in this industry extremely concerned.

Environmental contaminants are a research priority. Neonicotinoids are a relatively new class of pesticides that are being wildly used and we know that they can be toxic to bees and for these reasons it makes sense that they are one of the group of pesticides being looked at.

Even though the problem is wide spread across the USA not all beekeepers have been affected <u>yet.</u> That is a key piece of information in solving the puzzle.

Beekeepers that have been most affected so far have been close to corn, cotton, soybeans, canola, sunflowers, apples, vine crops and pumpkins. So what is it about these crops that are killing the bees?? In the last three years what changed about the growing practices that would have this affect. Initially beekeepers discounted the possibility of pesticide damage because there is no sign of dead or dying bees when bees are working around these plants. Also in the past it was accepted that soybeans and cotton were good crops to produce honey and corn was an excellent source of pollen when in tassel and pollinating apples, vine crops and pumpkins other than causing stress and queen loss from moving bees so many times was acceptable. Bees were not dying in the summer while these crops are blooming but rather several months later in the late fall and early

winter. During the fall and winter of 2004 and 2005 there were similar die-offs in mid-western states. This year the die-off has spread more across the country and there are much larger losses.

In conversation with farmers, growers and seed and spray company representatives we have learned that there has been a big change in pesticides used to treat these crops.

We are simple beekeepers not entomologists, chemists or biologists, but we are now taking a crash course in insect and pesticide interactions. Before November I knew very little about neonicotinoids. In the past three months I have come to know more than I want to know about this newer type of pesticide. From what I have learned so far, I am convinced that neonicotinoids may play a role in CCD and exposure to these materials is something that is under our control.

From research on the internet I have learned that neonicotinoids are systemic insecticides used to control sucking insects on plants, everything from corn, tree crops, most vegetables, cranberries, blueberries, strawberries, cotton, canola, ornamentals, forestry and turf.

I think that the reason neonicotinoids may be so damaging to honeybees is that they are found in fairly low "sublethal" levels in the pollen and nectar of the plants. The field bees often do not die when working on plants treated with these products. Instead they may bring the pollen and nectar back to the hive and store it in their comb to use later. It is usually several months later when natural sources of pollen and nectar slow down in the field that the bees would use this store of pollen and nectar to raise brood that the symptoms appear. The young bees raised on this food may exhibit memory loss and impaired immune response. What may finally kill the hive are two things: first, the loss of most of their adult bees because when "sick" bees leave the hive to collect food they do not return (disappearing disease) and second, the remaining young bees in the hive may have such a weakened immune system that normal pathogens found in the hive such as fungus easily overwhelm them. The result is a dead hive loaded with pathogens in the dead and dying brood left behind. Of course, these symptoms appear several months after exposure to neonicotinoids and up until recently the cause of effect appeared unrelated.

Much sampling and testing is being done on dead and dying bee hives in different parts of the country.

Even though I have lost over 2,000 of 2,950 hives of bees here in Florida in October, I feel fortunate when I talk to beekeepers across the country that has had 80-95% losses. We have been busy since November feeding and working with bees to build these hives into large hives to make new hives of bees as well as we have brought bees in from Australia to restock about 400 hives at a great cost.

I am very concerned in the coming season about minimizing my beehive exposure to whatever is killing the bees. I am hopeful that there are things that we can do to help keep our bees as healthy as possible.

Even though we may "think" we know something about what is killing the bees. There is very little that will be done by regulatory agencies in short term to help us. We need the cooperation of our pollination customers for this. That is something individual growers can help with. I have already got word from my largest customer, Jasper Wyman and Sons Blueberry Co. that they will not use these products on blueberries and I wish to thank them for taking the lead. I am asking you as a grower to take a look at what you have used last year and what you might be using this year. If at all possible, please try to use something beside these products. I have attached a list of neonicotinoids products and their brand name.

If you as a grower feel you must use these products, please speak to me before honeybees are placed in your crops. We as beekeepers must do everything we can to minimize our exposure.

We also need help from growers to speak up about the importants of honeybees for the pollination of your crops to your elected officials in Washington, D.C. The bee industry leaders have been working very hard to get more money for bee research in the country. The new "Farm Bill" is currently being developed in congressional committees. We are trying to get increased funding for USDA and University Bee Labs around the country. There are so many factors contributing to honeybee health and disease that we know very little about. We need to accelerate the learning curve dramatically to figure out how to keep the bees alive. Political support from growers will be crucial to fund some of this research so we can hopefully have a good supply of healthy bees for your pollination needs.

I am sorry this is so lengthy but I feel it is important for you to know this information.

We will have honeybees available for you for the 2007 pollination season. Prices will be somewhat higher because of these new problems. You may contact me or I will contact you before the pollination season about your pollination needs.

As always, any comments, questions or suggestions you have about any of the information I have presented would be more than welcome. Feel free to call me at 813-713-1239 or 352-583-2796. After April 20th call 813-713-1239 or 570-568-2337 or e-mail at buffybee@sunlink.net.

Thanks.

David Hackenberg
HACKENBERG APIARIES
1466 Crossroads Dr.
Lewisburg, PA 178237

What do Growers need to do?

- Know the pesticides you are using and their toxicity to bees (do not depend on outside sources)
- READ the LABEL AND FOLLOW THE LABEL DIRECTIONS
- Never use neonicotinoid pesticides on blooming crops
- Blooming time varies depending on varieties: bees pollinating one variety may be at risk while another is being treated
- Protect water sources from contamination by pesticides

What is the status of neonicotinoid insecticide registrations and what are the hazard issues these insecticides present to bees?

Neonicotinoids

Chemical	Brand Names	1st Registered (mo./yr.)	Current Uses
imidacloprid	Confidor, Merit, Admire, Legend, Provado, Encore, Gaucho, Premise	3/1994	blueberries, citrus, cranberries, strawberries, pecans, stone fruits, cotton, corn, melons, vegetables, forestry, ornamentals, turf, and others
thiamoxetham	Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship	12/2000	apple, pecan, stone fruits, melons, peppers, cotton, corn, and others
acetamiprid	Pristine, Tristar, Assail, Intruder, Adjust	3/2002	grapes, citrus, canola (seed treatment) citrus, pone fruits, leafy vegetables, ornamentals, and others
clothianidin	Poncho, Titan, Clutch, Belay, Arena	6/2003	corn (seed treatment) and canola (seed treatment) with others pending
thiacloprid	Calypso	9/2003	apples, pears, cotton, and others
dinotefuran	Dinotefuran	not applicable	none - some pending

Neonicotinoids' Toxicity to Honeybees

Chemical	Brand Names	Acute Contact LD_{50} (µg ai/bee) Tech	Acute Oral LD_{50} (µg ai/bee) Tech	RT_{25} (hours) at Rate of Application (lb ai/A) TEP
thiamethoxam	Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship	0.024 highly toxic	0.005 highly toxic	conditional registration study pending
clothianidin	Poncho, Titan, Clutch, Belay, Arena	0.0439 highly toxic	0.0037 highly toxic	117 hrs. at 0.07 lb ai/A 180 hrs. at 0.13 lb ai/A 512 hrs. at 0.2 lb ai/A
imidacloprid	Confidor, Merit, Admire, Legend, Provado, Encore, Gaucho, Premise	0.078 highly toxic	0.0039 highly toxic	8 hrs.at 0.5 lb ai/A
acetamiprid	Pristine, Tristar, Assail, Intruder, Adjust	8.1 moderately toxic	15.1 slightly toxic	study submitted was invalid new study pending
thiacloprid	Calypso	17.32 practically nontoxic	17.32 slightly toxic	<2 hrs. at 0.18 lb ai/A

Honeybee Acute Contact Toxicity Categories:[1]

[1]Atkins, E.L. et al. *Reducing Pesticide Hazards to Honey Bees*. (1981). Univ. of California. Division of Agricultural Science . Leaflet 2883.

- If the LD_{50} is less than 2 μg a.i./bee, then the test substance is highly toxic.
- If the LD_{50} is 2 to less than 11 μg a.i./bee, then the test substance is moderately toxic.
- If the LD_{50} is 11 μg a.i./bee or greater, then the test substance is practically nontoxic

RT_{25}

RT_{25} is the residual time required to reduce the activity of the test material and bring bee mortality down to 25% in cage test exposures to field-weathered spray deposits (Mayer and Johansen, 1990).

The time period determined by this toxicity value is the time EPA expects the test material will remain toxic to bees in the field.

The toxicity time results from the residual exposure of the test material on vegetation at an expressed rate of application (lb ai/A).

THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION
4828 Southeast Hawthorne Boulevard Portland, Oregon 97215, USA
Telephone 503-232-6639 Fax 503-233-6794 www.xerces.org

Dedicated to protecting the diversity of life through the conservation of invertebrates - the little things that run the world

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Xerces Society for Invertebrate Conservation
Written Comments to the Subcommittee on
Horticulture and Organic Agriculture

regarding

The Oversight Hearing on Colony Collapse Disorder
Thursday, March 29th, 2007
1302 Longworth House Office Building

April 4, 2007

These comments are regarding the testimony given before the Subcommittee on Horticulture and Organic Agriculture on March 29, 2007. In light of widespread declines in honey bee colonies resulting from Colony Collapse Disorder (CCD), our comments specifically relate to wild and managed native pollinators as an insurance policy for when honey bees are scarce.

Native Pollinators as an Important Insurance Policy
Although honey bees are certainly the most important single crop pollinator in the United States, recent research from across the country demonstrates that a wide range of native bees help with crop pollination -- in some cases providing all of the pollination required. With the decline in the number of managed honey bee colonies resulting from CCD, diseases, parasitic mites, and Africanized bees, it may no longer be a safe assumption that honey bees will always be able to provide the pollination services farmers need. Given the demise of many managed honey bee colonies, it is important to diversify the pollinators upon which many growers rely, and thus increase our agricultural security.

Hundreds of species of native bees are available for crop pollination. These unmanaged bees provide a free and valuable service. In fact, pollination by native bees was recently estimated at 3 billion dollars annually in the U.S. Some native bee species, like mason and bumble bees, are active when conditions are too cold and wet for honey bees. In addition, native bees collectively are more versatile than honey bees. For example, some native species are able to buzz-pollinate flowers, which honey bees cannot do; this vibration releases pollen from deep inside the anthers of certain flowers. Plants, such as tomatoes, cranberries, and blueberries, produce larger and more abundant fruit when buzz-pollinated. Finally, in some situations, like hybrid seed production, native bees may improve the efficiency of foraging honey bees by causing honey bees to move between rows of cultivars.

Recommendations
To improve the long-term sustainability of crop pollination, we recommend implementation of discovery surveys supported by the USDA Agriculture Research Service (ARS), U.S. Geological Survey, and other agencies responsible for crop pollination research or natural resource protection, to identify potential new crop pollinators.

Because of the importance of pollination as an ecosystem service in both agricultural and natural ecosystems, we further recommend that federal funding agencies, such as the National Science Foundation, and federal research agencies, such as the USDA ARS, should recognize pollination as a cross-cutting theme in their programs and work to integrate research that includes the taxonomy and ecology of crop-pollinating wild native bees. The USDA ARS should be provided with increased funding so as to be able to expand their research programs into native bee taxonomy and ecology.

Conserving America's pollinators will require economic incentives for private landowners. Upcoming discussions of the Farm Bill provide an opportunity to address this need. Through the Farm Bill, the federal government has an opportunity to encourage state-level Natural Resources Conservation Service (NRCS) offices to promote scientifically tested and approved pollinator-friendly practices for farmers participating in Farm Bill conservation programs. USDA cost-sharing, land retirement, and production stewardship programs should be available to producers of all commodities that depend on pollinators.

The Xerces Society For Invertebrate Conservation has been working with the NRCS to incorporate native pollinators into Farm Bill programs at both the national and state level and offers our time and expertise to congressional staffers to develop language for the Farm Bill and its programs to accomplish this goal.

Summary
The National Academy of Sciences recently released a report on the *Status of Pollinators in North America*. These scientists found many pollinators were declining across the United States, and that farmers have the potential to play an important role in pollinator conservation. At the same time, these growers will reap the benefits of increased crop pollination.

We encourage the Congress to pass a Farm Bill in 2007 that includes pollinators (particularly native bees) as a priority for restoration and funding.

Thank you very much for the opportunity to present these comments. Please feel free to contact me at sblack@xerces.org, 503-449-3792 or at the address above if you have any questions. More information on agricultural pollinators and their conservation can be found at www.xerces.org.

Sincerely,

Scott Hoffman Black,
Executive Director, Ecologist/Entomologist

THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION
4828 Southeast Hawthorne Boulevard Portland, Oregon 97215, USA
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The Value of Pollinators for Agriculture

Pollinators are essential to our environment. The ecological service they provide is necessary for the reproduction of nearly 70 percent of the world's flowering plants. This includes more than two-thirds of the world's crop species, whose fruits and seeds together provide over 30 percent of the foods and beverages that we consume. The United States alone grows more than one hundred crops that either need or benefit from pollinators. The economic value of insect-pollinated crops in the United States was estimated to be $20 billion in 2000. Native insects are responsible for pollinating $3 billion in crops.

The work of pollinators has value beyond the clearly economic. Pollinators are keystone species in most terrestrial ecosystems. The services they provide ensure that plant communities reproduce and maintain genetic diversity. These plant communities then provide food and shelter for many other animals. Fruits and seeds derived from insect pollination are a major part of the diet of approximately 25 percent of birds, and of mammals ranging from red-backed voles to grizzly bears. In some areas, these pollinator-supported plant communities prevent erosion by binding the soil—thereby conserving an important resource and keeping creeks clean for aquatic life.

In many places, however, the essential service of pollination is at risk. Habitat loss, alteration, and fragmentation, as well as pesticide use, all contribute to pollinator declines.

- Insects, primarily bees, were responsible for roughly $20 billion in agricultural production in 2000. Approximately $3 billion of this was attributed to native bees.
- Animal pollinators ensure or increase production of up to 35% of the volume crops grown in the world.
- The National Academy of Sciences' recent report, the *Status of Pollinators in North America*, highlights decline of pollinators across North America: honey bees and wild native bees.
- Wild native bees can provide significant crop pollination when their habitat is available close to a farm.
- Agricultural landscapes that need pollinators most are also places where habitat clearing has significantly reduced pollinator habitat.
- Pollinators provide a reason for growers to engage in conservation activities, particularly implementing habitat projects, such as hedgerows, windbreaks, and riparian buffer plantings that support clean water, clean air, and wildlife babitat.

-- References are available upon request --

Cover Stories:

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Cooperative State Research, Education, and Extension Service

2007 No. 6

Honey Bee Genome Sequencing Consortium. 2006. Insights into Social Insects from the Genome of the Honeybee, *Apis mellifera*. *Nature* 443: 931-949.

Cover reprinted with permission by Nature Publishing Group

The newly sequenced genome for honey bee, *Apis mellifera*, remains incomplete and may contain some errors. One way to verify the accuracy of the sequence is by testing how many of the 'predicted genes' are actually active, or transcribed. In this project, the researchers created a genome-wide map, obtained by a custom designed microarray, to assist in validating the sequence. This map confirmed a surprising observation. Unlike the human genome that contains large 'gene deserts' rich in nucleotides Adenine and Thymine, the honey bee genome is rich in the nucleotides Guanine and Cytosine. Results using the new microarray express a 67 percent confidence that the predicted genes were valid. Thus, these genes will be used for the "official gene set" for annotation and analysis by the Honey Bee Genome Sequencing Consortium. This work demonstrates an efficient approach for rapidly developing an unbiased empirical annotation of a new genome. This process substantially reduced the time-lag between sequencing and annotation. As a result, researchers can quickly identify the genes that are relevant to key traits that may lead to improved honey bee pollination of the world's crops.

This research was supported by the National Research Initiative's Functional Genomics of Arthropods and Nematodes Program of the USDA Cooperative State Research, Education, and Extension Service. This research was conducted at the Department of Entomology, University of Illinois at Urbana-Champaign.

NRI Research Highlights
National Research Initiative Competitive Grants Program

2007 No. 5

Large-Scale DNA Analysis of Bumble Bees: Worldwide Phylogeny Points to Commonality in the Decline of North American Species

Sydney Cameron, University of Illinois, Urbana-Champaign

A new phylogeny study sheds light on the relationship between different species of bumble bees throughout the world. This information helps narrow the search for which bumble bee species, important to agricultural crop pollination, are on the decline in the United States.

a)
b)
c)

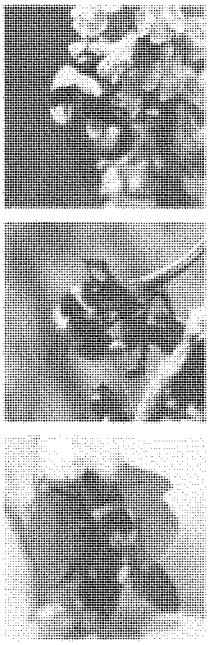


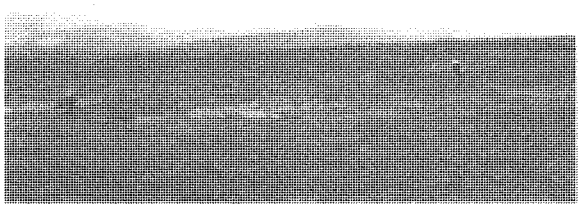
Figure. 1. Images of bumble bees from the long-tongued species a) *B.(Megabombus) supremus*; b) *B. (Diversobombus) trifasciatus*, and the short-tongued species c) *B. (Melanobombus) keriensis*.

Photograph Credit - Paul Williams, Natural History Museum, London.

Bumble bees are among the most important wild bees in the United States. These insects are increasingly used in the managed pollination of greenhouse crops, such as tomatoes and peppers. Despite their elevated importance to agriculture, bumble bee populations are on the decline in Western Europe and North America. Five bumble bee species in the United States are currently on the Xerces Society Red List of threatened insects. The timely work of entomology professor Sydney Cameron and her colleagues at the University of Illinois and the Natural History Museum in London contributes important insight into this critical agricultural problem.

BUMBLE BEE PHYLOGENY

Until recently, the relationship between bumble bee species remained unclear. Most prior bumble bee studies focused on morphological traits, which provided too few characters to resolve species relationships. In this study, the researchers conducted a phylogenetic analysis of nearly 90 percent of the world's 250 described bumble bee species based on DNA sequences from five genes, comprising approximately 4,000 base pairs. Independent Bayesian and parsimony analyses of each gene across 220 bumble bee species tested the reliability of the relationships estimated from the data. The researchers found strong evidence that the majority



Photograph Credit - James Whitfield, University of Illinois, Urbana-Champaign.

Figure 2. Bumble bee field work on the Tibetan Plateau in the Sichuan basin of southwestern China.

of bumble bee species fall into two distinct groups, the longer-tongued species in one group and their shorter-tongued sisters in the other. The complete bumble bee phylogeny is available as a PDF*. Using the robust bumble bee phylogeny, Cameron's team inferred that bumble bees originated approximately 35 million years ago in central Asia and dispersed into the New World primarily between 15 and 10 million years ago.

Most bumble bees in the United States belong to the shorter-tongued group. From the phylogeny study, the researchers determined that out of the 47 bumble bee species in the United States, five of the declining species belong to the subgenus *Bombus sensu stricto*. The reasons for the decline remain unclear and may vary regionally. Species in this subgenus include the most important pollinators for managed agriculture, specifically *B. occidentalis* in the United States and *B. terrestris* in Europe. *Bombus occidentalis* and another species *B. franklini* have all but disappeared in the United States. In addition, the range of their close relatives has been radically reduced compared to a decade ago. The bumble bee phylogenetic tree also reveals that two species, *B. impatiens* and *B. vosnesenskii*, within another subgenus, *Pyrobombus*, are undergoing range expansion in the United States. These species are distantly related to the species from the subgenus *Bombus s.s.*, currently in decline.

IMPACT

The information gained from this novel and comprehensive phylogenetic tree may allow scientists to resolve the causes leading to the decline of subgenus *Bombus s.s*, and the increased range expansion in different bumble bees groups. Ultimately, the knowledge gained from understanding bumble bee relationships may assist scientists in working with other bumble bee groups to aid future agricultural applications.

*Bumble bee phylogeny available at http://www.life.uiuc.edu/scameron/news/USDAchronogram_maptree.pdf

The research reported on this fact sheet was sponsored by the Entomology and Nematology Program of the National Research Initiative Competitive Grants Program. To be placed on the mailing list for this publication or to receive additional information, please contact the NRI (202-401-5022 or NRICGP@csrees.usda.gov). The fact sheet also is accessible via the NRI section of the Cooperative State Research, Education, and Extension Service Web site (http://www.csrees.usda.gov/nri).

Any findings, conclusions, or opinions expressed by individuals in this research report are those of the authors and do not necessarily represent the policies of the U.S. Department of Agriculture. Publication of this fact sheet does not imply recommendation or endorsement by USDA over other research reports not mentioned.

March 2007

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Newsroom

NEWS RELEASE

New Research Tool Enhances Honeybee Genomics Research

Contact:
Jennifer Martin, (202) 720-8188

WASHINGTON, Nov. 20 2006 – With funding from the USDA's Cooperative State Research, Education and Extension Service, researchers at the University of Illinois (UI) developed and distributed a microarray of the honeybee genome, which will enhance and accelerate research on the honeybee genome.

"Honeybees are valued at $20 billion annually for the role they play in pollinating plants, making a significant contribution to agriculture productivity," said Gale Buchanan, USDA under secretary for Research, Education and Economics. "This research will help protect the health of this vitally important species."

The microarray, a device that can measure thousands of genes simultaneously, allows scientists to study honeybee genes and apply the information to a broad range of research interests for bees and other organisms. For example, American Foul Brood (AFB), a disease caused by bacteria, attacks bee larvae. Large infestations of AFB can lead to the death of entire honey bee colonies. The microarray lets researchers look at how AFB is affecting the bee, what genes are involved in the process, and, more importantly, scientists can determine an appropriate immune response to provide further protection for honey bee health.

UI researcher Gene Robinson and colleagues released the honeybee microarray for public distribution through the UI W.M. Keck Center for Comparative and Functional Genomics. This resource provides entomologists and biologists all over the world access to the microarray for genomic studies on insects and comparative research with several other organisms.

CSREES funded this research project through the National Research Initiative (NRI) Functional Genomics of Agriculturally Important Organisms program. The NRI is the largest peer reviewed, competitive grants program in CSREES. It supports research, education, and extension grants that address key problems of national, regional, and multi-state importance in sustaining all components of agriculture.

CSREES advances knowledge for agriculture, the

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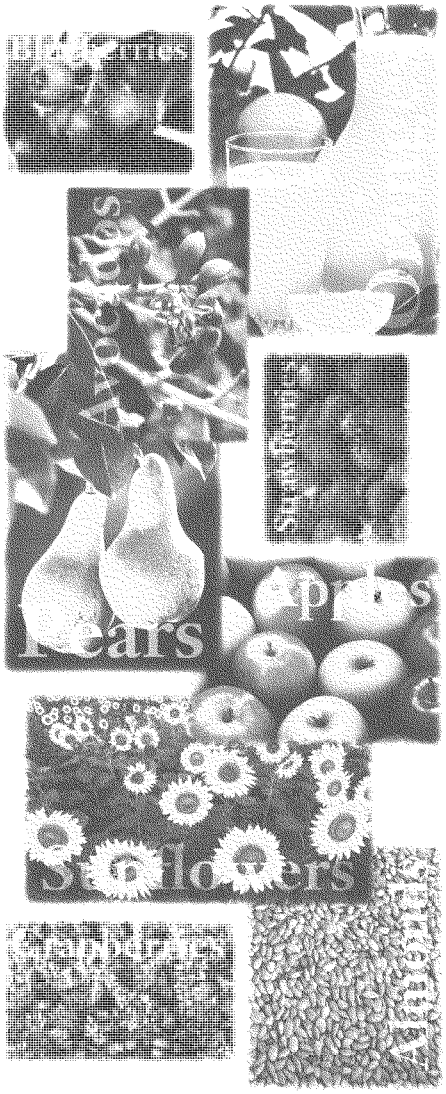
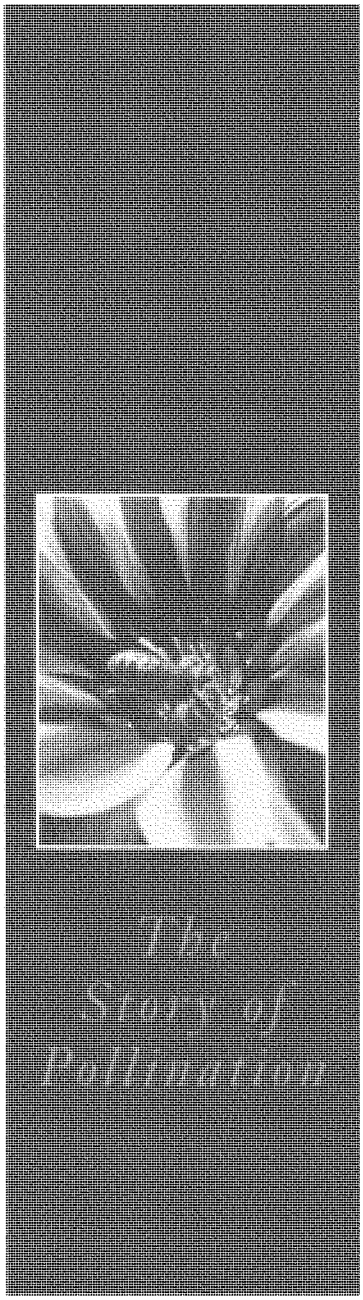

Blueberries
Avocados
Pears
Strawberries
Apples
Sunflowers
Grapefruits
Watermelon


The
Seasons of
Pollination

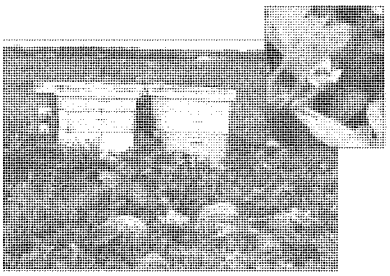
Honey bee hives are moved to orchards such as this cherry orchard by truck. The hives are then unloaded to the exact location specified by the grower.

Unlike people in other countries of the world, consumers in the United States enjoy delicious, nutritious and affordable agricultural products year-round. America's farmers feed more and more people each year while using less land to do so.

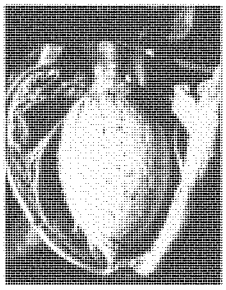
Honey bees are a critical component of this agricultural picture. As honey bees visit blossoms to gather the nectar and pollen necessary for their survival, they help agricultural crops, home gardens and wildlife habitats flourish.

Pollination is the transfer of pollen from the anthers of one flower to the stigma of that or another flower. Simply put, pollination is the first indispensable step in a process that results in the production of fruits, vegetables, nuts and seeds.

Without the honey bees' pollination work, the quantity and quality of many crops would be reduced and some would not yield at all. According to a 2000 Cornell University study, the increased yield and quality of agricultural crops as a result of honey bee pollination is valued at more than $14.6 billion per year. In fact, approximately one-third of the total human diet is derived directly or indirectly from insect-pollinated plants (fruits, legumes and vegetables).



Watermelon blossoms must be cross-pollinated to produce fruit.
(Photo - National Watermelon Board)



California produces more than half of the world's almonds. Without honey bee pollination, the almond crop would be extremely limited.
(Photo of orchard and almond - Almond Board of California)

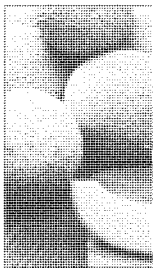
The USDA has estimated that 80 percent of insect crop pollination is accomplished by honey bees. While other insects can pollinate plants, honey bees are premier pollinators because they are available throughout the growing season, they pollinate a wide range of crops and they can be concentrated whenever and wherever they are needed.

Much honey bee pollination occurs naturally. A hobbyist beekeeper's honey bees, for example, will pollinate a neighbor's squash blossoms, herbs or fruit trees during the summer. Likewise, honey bees will pollinate the non-cultivated fruits, nuts and seeds that animals depend on for food in the wild.

To meet the demands of agriculture, however, special efforts are required. About one-half of the full-time beekeepers in the United States move their colonies from state to state and

Crunchy almonds.

field to field during the year to provide pollination services to farmers as well as to reach abundant sources of nectar for honey production.

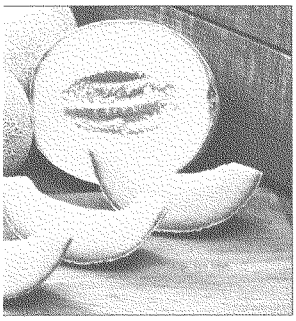


Thus, approximately 2 million colonies of bees are "on the road" each year to pollinate crops. Many of these bees are moved to California, where an estimated 1,000,000 colonies of honey bees are needed just to pollinate the almond crop. And, the demand for these tiny, efficient workers and their keepers continues to grow.

A healthy beekeeping industry is vitally important to a healthy agricultural economy, to wildlife habitat, to a healthy environment — and to the plants in your own backyard!

The quality and quantity of apples increase with pollination.
(Photo - ARS/USDA)

Crisp apples. Colorful melons.



An estimated 300,000 colonies of honey bees are rented each year to pollinate melons.
(Photo - ARS/USDA)

"A healthy beekeeping industry is critical to both agriculture and the environment — without honey bees, our food supply would be significantly reduced."

— Gene Brandi, *beekeeper*

A honey bee visits a peach blossom. Pollination must occur for the blossom to produce a healthy fruit.
(Photo - California Tree Fruit Agreement)

As the worker bee visits the avocado blossom, the pollen clings to her hairy body and is thereby transfered from blossom to blossom.
(Photo - Mary Lu Arpaia, University of California)

The Workers

Pollination depends on the work of honey bees and the migratory beekeepers who manage them.

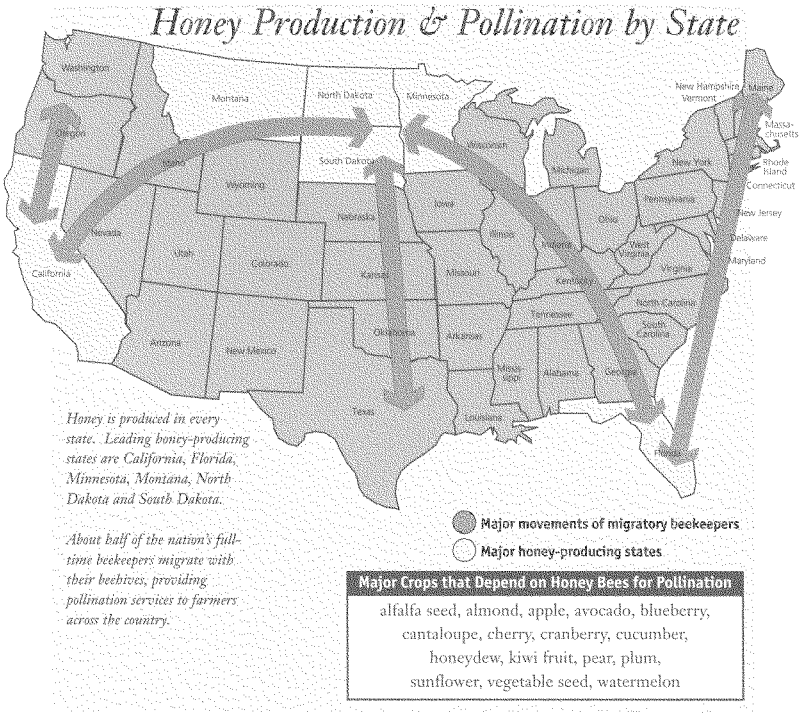
Many factors influence the success of a migratory beekeeper. Fuel, labor and equipment are required to manage and transport bees from location to location — often great distances apart. Migratory beekeepers may spend months away from their families and homes as they move their bees.

Beekeepers maintan the health of their colonies by ensuring that they have access to adequate supples of pollen, nectar and water. As agricultural land, wildlife and natural areas are reduced, so is the foraging area for bees.

As they move their bees, beekeepers must closely monitor pesticide and herbicide treatments used on nearby crops — treatments that may harm or kill beneficial insects, including bees.

In recent years, beekeepers have also had to battle mites — small parasites that attack bees. Left unchecked and untreated, mites can rapidly kill a colony. Because mites have killed most wild bee colonies, dependence on managed honey bees for pollination of crops and wildlife habitat has grown.

Honey Production & Pollination by State



Honey is produced in every state. Leading honey-producing states are California, Florida, Minnesota, Montana, North Dakota and South Dakota.

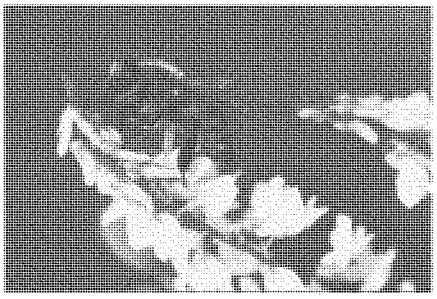
About half of the nation's full-time beekeepers migrate with their beehives, providing pollination services to farmers across the country.

Major Crops that Depend on Honey Bees for Pollination

alfalfa seed, almond, apple, avocado, blueberry, cantaloupe, cherry, cranberry, cucumber, honeydew, kiwi fruit, pear, plum, sunflower, vegetable seed, watermelon

"The value of honey bees can not be measured by their ability to produce honey alone — rather, it must include the work bees do for agricultural crops, home gardens and wildlife habitat."

— Nicholas Calderone, Ph.D.
Cornell University



Clover is the most common floral source of honey produced in the United States.

National Honey Board / 390 Lashley Street / Longmont, CO 80501-6045
www.honey.com / www.nhb.org / www.honeylocator.com
(303) 776-2337

Cover Photos: ARS/USDA; Almond Board of California; Mary Lu Arpaia, University of California

Bayer CropScience

April 5, 2007

Honorable Dennis Cardoza, Chairman
Subcommittee on Horticulture and Organic Agriculture
Committee on Agriculture
U.S. House of Representatives
Washington, DC 20515-6001

Dear Mr. Chairman:

Bayer CropScience LP, would like to respond to several inaccuracies contained in the March 29, 2007 testimony of Mr. James E. Doan at the Subcommittee on Horticulture and Organic Agriculture's hearing to "Review Colony Collapse Disorder in Honey Bee Colonies Across the United States".

Bayer CropScience
1275 Pennsylvania Avenue NW #80
Washington, DC 20004
Phone: 202 737-8900
Fax: 202 628-6622

While the insecticide, imidacloprid, belongs to a relatively new class of chemistry, it has been used extensively for well over 10 years and is therefore extremely unlikely to be linked to the relatively recent phenomenon known as Colony Collapse Disorder.

On page 4 of his testimony, Mr. Doan mentions our seed treatment product GAUCHO® as having been removed from France because of concerns regarding the health of bees. While the use of GAUCHO was suspended by French authorities (under pressure from bee keepers), there has been no evidence that this product was ever responsible for honey bee mortality as previously described. In fact, a recent publication in the national newspaper "le Figaro" reports that studies carried out by AFSSA (the French Food Safety Agency) do not support the French bee keepers opinions (see attached).

Mr. Doan states that "They [the French] have not reported any significant losses since" GAUCHO was suspended. This claim is countered by a number of studies and recent press reports indicating that the problem of bee decline continues in France, several years after the suspension of GAUCHO.

Because of these reports, an increasing number of French officials are revisiting the previous decision and are asking for a fact-finding committee to look into the real reasons for honey bee declines and to

disclose the decision-making process with the Ministry of Agriculture, with respect to the suspension of GAUCHO.

Bayer CropScience is committed to sustainable development in order to meet the global challenges of tomorrow. Our products are the result of years of testing to ensure they meet strict human and environmental standards required by our government and stakeholders. We have an inherent interest in helping to promote a robust agricultural system in U.S. agriculture. We understand the importance of thoroughly researching the causes of bee health and support efforts in finding remedies.

Thank you for allowing us to share our views with the committee.

Margaret Cherny

Margaret A. Cherny
Vice President, Regulatory Affairs
Bayer CropScience

Cc: Honorable Randy Neugebauer

Les abeilles ne meurent pas toutes de la même façon

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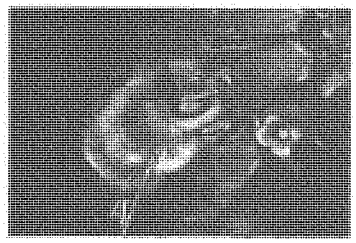
Publié le 25 janvier 2007
Actualisé le 25 janvier 2007 : 19h42



ZOOM
Les jachères fleuries pourraient permettre d'apporter un complément alimentaire aux abeilles, de plus en plus privées de fleurs sauvages.
M.Mary.

Une enquête multifactorielle de l'Afssa réalisée de 2002 à 2005 dans cinq départements recense les nombreux problèmes rencontrés par les insectes.

LES RÉSULTATS de l'enquête multifactorielle de l'Afssa (Agence française de sécurité sanitaire des aliments) sur les troubles des abeilles constatés en France au milieu des années 1990 ne sont toujours pas sortis. Ils ne devraient pas être visibles avant longtemps. Le laboratoire de Sophia-Antipolis attend, en effet, la venue d'un statisticien pour traiter le monceau de données accumulées entre 2002 et 2005. Le retard est dû à des problèmes budgétaires.

Jean-Paul Faucon, chef de l'unité pathologie de l'abeille de l'Afssa, estime toutefois que ces données statistiques ne modifieront pas les conclusions de l'enquête multifactorielle. Ces dernières ont donc été rassemblées dans un document de 20 pages qui circule depuis quelque temps dans les milieux apicoles. *Le Figaro* a réussi à se procurer ce texte.

Les conclusions de l'enquête ne manqueront pas de provoquer des remous car elles ne recouvrent pas le diagnostic des apiculteurs. Ces derniers affirmaient - on était alors au milieu des années 1990 - que les mortalités des colonies d'abeilles et la baisse de production de miel étaient dues à deux insecticides : l'Imidaclopride et le Fipronil. Mélangées à l'enrobage des semences de tournesol et de maïs, ces deux molécules, aujourd'hui interdites par le ministère de l'Agriculture, étaient commercialisées respectivement sous le nom de Gaucho et de Régent TS. Ces derniers constituent ce qu'on appelle des insecticides systémiques (c'est la plante entière qui exprime la substance toxique).

Acarien parasite

L'enquête de l'Afssa a été menée dans cinq départements (Eure, Gard, Gers, Indre et Yonne). Elle a porté sur cinq colonies choisies au hasard dans cinq ruchers. Les colonies ont été visitées quatre fois dans l'année. La Coordination apicole avait refusé de participer à cette enquête. Elle estimait en effet que, pour elle, la seule chose à faire était d'interdire ces deux

produits. C'est donc dans un contexte très conflictuel que s'est déroulé ce travail. Jean-Paul Faucon s'est fait entarter par des apiculteurs, l'accusant de complicité avec les industriels (Bayer et BASF).

L'enquête de l'Afssa révèle notamment que dans les cinq départements, les différentes « matrices » (miel, cire, pollen) sont contaminées à faible dose par les produits phytosanitaires agricoles (imidaclopride, fipronil, endosulfan, deltaméthrine, parathion-méthyl et d'autres). Elles sont contaminées aussi par des résidus de substances (coumaphos et fluvalinate) utilisées par les apiculteurs pour lutter contre les maladies causées par le varroa, un acarien parasite qui a envahi les ruches du monde entier à partir des années 1990. Un seul cas de mortalité due à une toxicité aiguë a été constaté, les analyses ayant révélé après coup la présence d'endosuflan et de fluvalinate dans les abeilles mortes.

« Nous avons constaté plusieurs pratiques apicoles inadaptées. Parmi celles-ci, l'utilisation de produits non homologués pour le traitement de la varroase », note l'équipe de l'Afssa. Celle-ci a d'ailleurs noté au cours des trois ans qu'a duré l'enquête une amélioration du suivi sanitaire des abeilles. Une observation à mettre en parallèle avec le manque de formation de certains apiculteurs, régulièrement dénoncé par le SPMF (Syndicat des producteurs de miel français).

Le dernier volet de l'enquête concerne le fait que, en raison de l'uniformisation des paysages agricoles, certaines colonies manquent de nourriture (de nectar mais surtout du pollen qui apporte les protéines nécessaires au développement des jeunes larves). *« Les anomalies concernant l'alimentation des abeilles, qui ont été suspectées en raison de la situation de certains ruchers, ont pu avoir des conséquences sur la santé des colonies »*, avancent les chercheurs de l'Afssa. Dans ce contexte de disette de fleurs sauvages, certains apiculteurs explorent d'ailleurs la possibilité de nourrir les abeilles grâce à des jachères fleuries. Une initiative qui en dit long sur les changements apportés par l'agriculture intensive.

Le Figaro

There is no one single factor causing bee mortality

A multifactorial study carried out by Afssa from 2002 to 2005 in five regions of France documents numerous problems facing these insects.

The results of the multifactorial study carried out by Afssa (the French Food Safety Agency) into the problems affecting bees in France in the mid-1990s have still not been published. They will probably not be available for a long time to come. The laboratory in Sophia-Antipolis is waiting for a statistician to process the reams of data gathered between 2002 and 2005. The delay is due to budget constraints.

Jean-Paul Faucon, head of the Bee Pathology Unit at Afssa, feels that these statistics will not alter the conclusions reached by the multifactorial study. The conclusions have been summarized in a 20-page document which has been doing the rounds in bee-keeping circles for some time. Le Figaro has succeeded in obtaining a copy.

The conclusions reached by Afssa are bound to cause a stir because they do not agree with the bee-keepers' opinions. The bee-keepers claimed – in the mid-1990s – that the death of bee colonies and the drop in honey production were due to two insecticides: imidacloprid and fipronil. These two active ingredients, sold under the brand names Gaucho and Régent TS respectively and currently banned by the Ministry of Agriculture, were mixed into seed dressings used for sunflower and maize seeds. They are both systemic insecticides, i.e. the whole plant is exposed to the toxic substance.

A parasitic mite

The Afssa study was carried out in five regions (Eure, Gard, Gers, Indre and Yonne). It focused on five colonies chosen at random from five apiaries. The colonies were visited four times per year. Coordination apicole (the bee-keepers' coordination office) refused to take part in the study. It felt that the only possible response was to ban the two products. The study was thus carried out against a background of serious conflict. Jean-Paul Faucon became the target of bee-keepers' antipathy, and was accused of complicity with the manufacturers (Bayer and BASF).

The Afssa study shows that, in the five regions, various "matrices" (honey, wax, pollen) contain a low level of contamination with crop protection products (imidacloprid, fipronil, endosulfan, deltamethrin, methyl parathion and others). They are also contaminated with residues of substances (coumaphos and fluvalinate) used by bee-keepers to control diseases caused by Varroa, a parasitic mite which invaded apiaries throughout the world from the 1990s. The study found a single instance in which bee mortality was due to acute poisoning; subsequent analysis showed the presence of endosulfan and fluvalinate in the dead bees.

"We found several inappropriate bee-keeping practices, including the use of products not approved for treating Varroa infection," the Afssa team observed. During the three years of the study, the team also observed an improvement in the way the bees' health was managed. At the same time, the team noted that some bee-keepers were poorly trained, something that is criticized regularly by SPMF (the organization of French honey-producers).

The final part of the study focuses on the fact that some bee colonies have been deprived of food (nectar and, more particularly, pollen, which provides the proteins needed for the young larvae to develop) by the elimination of biodiversity in agricultural regions. "Problems with the bees' food

supply, which were suspected because of the situation found in some apiaries, have affected the health of colonies," the Afssa scientists suggest. Faced with a lack of wild flowers, some bee-keepers are exploring the possibility of feeding their bees on flowering fallow land. This initiative speaks volumes about the changes wrought by intensive agriculture.

Download **Le rapport confidentiel de l'Afssa** (pdf) [Afsaa's confidential report]:
http://www.lefigaro.fr/medias/pdf/RapportConfidentielAFSSA.pdf

WRITTEN TESTIMONY SUBMITTED BY
JAY VROOM, PRESIDENT AND CEO, CROPLIFE AMERICA
BEFORE THE HOUSE AGRICULTURE SUBCOMMITTEE
ON HORTICULTURE AND ORGANIC AGRICULTURE
MARCH 29, 2007

Mr. Chairman and Members of the Subcommittee:

CropLife America is the national trade association representing the developers, manufacturers, formulators and distributors of virtually all crop protection chemicals used by American farmers for agriculture and pest management. Our industry's products help provide Americans and the world with abundant and affordable food and fiber, while also protecting people, animals and our homes and businesses from disease-carrying and destructive pests. I appreciate the opportunity to submit this testimony to you today.

I commend Chairman Cardoza and the entire Subcommittee for holding this important hearing on the bee decline problem. I represent CropLife America and our member companies who support the need for additional research to better understand the nature of Colony Collapse Disorder (CCD), and then develop solutions. The sudden disappearance of worker honey bees from a colony with an apparently healthy queen and brood left behind is indeed a profoundly troubling situation. As an indicator of our industry's awareness of this problem and our commitment to being a part of the solution, I have been a member of the Pollinator Protection Initiative Steering Committee since last year.

As you are aware, bees are critical for a healthy and productive agricultural system. The nation's farmers depend on bees to pollinate a significant number of crops. In fact, more than 90 crops – including almond, alfalfa, sunflower seed, apple, cherry, melons and berries – require pollination support from bees. According to the USDA, honey bees pollinate crops valued at more than $14 billion annually. Because only a few species of bees can be used for commercial pollination, their health is crucial to agricultural production.

The specialty non-agricultural pesticide industry is also keenly aware of the importance of flowering plants to sustaining native bee populations, particularly for crop pollination. Specialty pesticides are those used in non-agricultural applications to ensure the health and vitality of blooming plants, including trees, bushes and flowers, and for disease vector control. Carefully managed growth and care of such plants in fencerows or hedgerows, in riparian buffers, drainage ditches, rights-of-way and other naturalized areas near crops provide pollen and

nectar forage for bees across multiple seasons. Specialty pesticides are an important part of an Integrated Pest Management approach to ensure the health of bee forage plants, along with effective control of insect predators that can harm native bees, and control of noxious weeds and non-native invasive plant species that can harm bee forage areas.

The concern with declining bee populations is not new. Before Colony Collapse Disorder, the beekeeping industry experienced heavy losses of colonies from conditions called autumn collapse, May disease, spring dwindle, disappearing disease and fall dwindle disease.

In its report released last fall titled "Status of Pollinators in North America," the National Academy of Sciences stated:

- "Populations of the honey bee, *Apis mellifera*, North America's most important managed pollinator, are in decline.
- Introduced parasites, in particular *Varroa destructor* (the varroa mite), have had a significant negative impact on honey bees in the U.S.
- Importation of foreign bees into the U.S. ... carries the risk of pest and parasite introduction
- Other factors affecting bee populations include antibiotic-resistant pathogens, pesticide-resistant mites, and the encroachment of Africanized honey bees..."

Pesticides Protect Bees against Mites

Although pesticides have been mentioned as one of many possible factors for the decline in bees, without protection by miticides, a significant percentage of bees in the U.S. would fall victim to varroa mites and tracheal mites, which began affecting bees in the late 1980s. Before using miticides in beehives, the only way to stop the spread of the mites was to destroy infested beehives.

Pesticides are Heavily Regulated

The pesticide industry, because of the nature of its products, is heavily regulated and remains committed to environmental responsibility and the safe use of its products. Every pesticide product sold or distributed in the U.S. must be granted a registration by the U.S. Environmental Protection Agency (EPA), with labeling and use requirements regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The regulations and policies that implement FIFRA are revised and updated as necessary to address new needs and the latest science and technologies.

Nearly 900 scientists and program officials in EPA's Office of Pesticide Programs make sure that products are properly registered and comply with federal law. These experts are responsible for ensuring that pesticides cause no unreasonable adverse effects on the environment and human health. EPA's approval and re-registration processes include the evaluation of potential environmental effects on wildlife – birds, amphibians, mammals and beneficial insects, which include bees.

The commitment of our industry to bring a pesticide product from "lab to label" requires dozens of separate studies – all subject to Good Laboratory Practices. The development process for a new pesticide can cost in the range of $160-$200 million with a normal timeline of eight to 10 years.

Bee Toxicity Tests Required
EPA requires bee toxicity studies in the data package necessary to register a pesticide. The honey bee acute contact toxicity test (OPPTS Guideline 850.3020) is routinely conducted for all pesticides (not just insecticides) that would be sprayed when the crop is in bloom and attracting honey bees. Testing the toxicity of residues on foliage (OPPTS Guideline 850.3030) is required for the same pesticide uses if toxicity is indicated from the acute contact test. Field testing for pollinators (OPPTS Guideline 850.3040) is required when data from other studies indicate adverse effects on bee colonies, extended residual toxicity to bees, or reproductive or chronic effects occurring in other species. Based on the results of these studies, the agency specifies label language to ensure that the pesticide can be used without adverse effects on bees. The application of pesticides that are highly toxic to bees is restricted or prohibited when bees are actively visiting the application area.

Neonicotinoids
Neonicotinoids are a class of insecticides that affect the nervous system of insects in a similar way to nicotine, a naturally-occurring insecticide. Like most insecticides, these compounds are active against many insect pests, and some are also active on pollinators, including bees. Industry and independent scientists have worked diligently to ensure that these efficient and highly beneficial insecticides can be used without causing adverse effects on bees. For example, foliar sprays are generally not applied on bee-attractive crops when bees are foraging. Neonicotinoids are frequently applied to seed or soil, and when applied in this way, the amount of chemical reaching the "bee-attractive" parts of the crop (nectar and pollen) is well below the level that could harm bees. Actual testing in field situations has confirmed this. Neonicotinoids are rapidly broken down and do not bioaccumulate; therefore chronic exposure does not result in a significantly greater risk than acute exposure.

In 2004, the use of two insecticides (including one neonicotinoid) was suspended on certain crops in France due to allegations of harmful effects on honey bee colonies. However, a comprehensive study carried out by the French Agency for Food Safety from 2002 to 2005 in five regions of France documents numerous potential causes of the bee decline including diseases, the use of products not approved for treating Varroa mite infection and poor nutrition. Although a low level of some crop protection products were sometimes found in honey, wax and pollen, the study found only a single instance in which bee mortality was due to acute poisoning; subsequent analysis showed that a neonicotinoid was not responsible.

Despite the suspension of these compounds in 2004, France continues to suffer from significant declines in its honey bee population.

Stewardship and Safe Use

The pesticide industry is committed to stewardship of its products. Our industry sponsors extensive outreach and education programs to help educate farmers and commercial applicators on proper application techniques and on following the label instructions. In addition, we are active in container recycling efforts and wildlife preservation. For economic reasons as well as environmental stewardship, farmers do not use more pesticides than necessary, as doing so would increase their cost per acre for the same yield. As part of Integrated Pest Management practices, farmers combine pesticide use with other agronomic practices, such as crop rotation and use of beneficial insects, to control pests and increase yields at a lower cost than can be achieved using any one method exclusively.

Bees are vitally important to agriculture, to our industry, and to the future of our nation's crops. The crop protection industry supports vigorous efforts to determine the cause of the decline in honey bee populations.

Mr. Chairman, thank you again for the opportunity to share our views with the Subcommittee.

The American Beekeeping Federation, Inc.

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STATEMENT OF
THE AMERICAN BEEKEEPING FEDERATION, INC.
JESUP, GEORGIA

FOR THE COMMITTEE ON AGRICULTURE
SUBCOMMITTEE ON
HORTRICULTURE AND ORGANIC AGRICULTURE
Hearing on Colony Collapse Disorder in Honey Bee Colonies

U.S. HOUSE OF REPRESENTATIVES

MARCH 29, 2007

Chairman Cardoza and Members of the Subcommittee:

Thank you for allowing our organization to present a statement for the record of the Hearing on Colony Collapse Disorder in Honey Bee Colonies.

The American Beekeeping Federation, established in 1943, is a nationwide trade association composed of beekeepers, honey processors, bee supply manufacturers and

dealers, and other interested parties. We have about 1,000 members spread across the country. Our beekeeper members range from hobbyists with one or two colonies to multi-state commercial beekeepers operating tens of thousands of colonies; they are involved in honey production, pollination, bee breeding, and all other aspects of beekeeping.

Many of our beekeepers have reported extraordinary losses of honey bee colonies over this fall and winter. While some losses are expected every winter, these losses far exceed the percentage of colonies the beekeepers would expect to lose. Many of the dead colonies have been determined to exhibit the symptoms of the syndrome that is being called Colony Collapse Disorder (CCD).

As our organization began to look into the reports we were receiving and to attempt to help our members deal with the situation, we came to recognize that the beekeeping industry was lacking a number of pieces of information that we felt would have aided our efforts.

The missing bits of information include:

HONEY BEE RESEARCH

The federal government has conducting honey bee research for over 100 years and now has four research locations. Beekeeping research is being conducted at a dozen universities. Even so, when we faced this new problem, one that defied the usual solutions, we began to realize how much we do not know about honey bees and their interaction with the varied aspects of their environment.

We need to enhance our research on parasites, pathogens, toxins and other environmental factors affecting bees and pollination of cultivated and wild plants. Do we really know that GMO crops – their pollen and their nectar – have no effect on bees? We certainly do not understand the sub-lethal effects of insecticides, herbicides and fungicides on honey bees. There are knowledge gaps in bee physiology, insect pathology, insect chemical ecology, honey bee toxicology, bee immunology, bee biology and ecology, pollination biology, bee genomics, and bee bioinformatics.

TECHNOLOGY TRANSFER

Once the researchers find knowledge that can be used, the technology must be transferred to the industry to be useful. Beekeepers would be well-served to have a central point, or person, who monitors the beekeeping research being conducted, not only in the United State, but also around the world, and disseminate this information to the beekeepers – a national beekeeping extension program.

BETTER STATISTICAL INFORMATION

How many beekeepers are there? How many colonies are used to pollinate crops? What revenue do beekeepers receive from pollination services? USDA-NASS has been collecting information about honey production for many decades. The annual NASS honey report is vital; it is all we have. However, over the years pollination activities have become increasing more important to beekeepers. It has been suggested that the pollinating the California almond crops brings the industry as much revenue as does the annual honey crop – nationwide – during a typical year. We need more information about the business side of pollination activities.

MORE INFORMATION ON PESTS AND DISEASES

The beekeeping industry, for some time, has been asking USDA-APHIS for more information on the prevalence of honey bee pests and diseases. Many states have reduced or eliminated their local beekeeping specialists, leaving huge gaps in the official knowledge of the pests and diseases that may be affecting honey bees around the country.

To be forewarned is to be forearmed. We need to know what we will have to deal with so we can prepare our defenses.

We need a national honey bee pests and diseases survey, not only for our own protection, but also to be able to certify our honey bee exports to other countries.

RISK MANAGEMENT AND CROP INSURANCE

In 2002, Congress authorized a crop insurance program for beekeepers. Since then, the industry has been looking forward to the development of a crop insurance program for beekeepers. We hope that USDA's Risk Management Agency will give this issue a higher priority than in the past.

HONEY BEES' NON-PAID POLLINATION BENEFITS

A Cornell University study, in 2000, estimated the added value of honey bee pollination to major U.S. crops at $14.7 billion per year, but beekeepers are not paid for all their bees' pollination services. Many smaller acreages and crops that marginally benefit are pollinated without payment to the beekeepers. Ornamental plantings and environmental plants also benefit from honey bee pollination.

To have bee colonies ready to pollinate a crop such as California almonds or New York apples – during a pollination period lasting just a few weeks – a beekeeper has to

maintain the colonies year-round. The beekeeper may be able to rent out the colonies to some other crops at considerably lower fees, and he will probably be able to produce some honey off those colonies, but his major emphasis must be toward being ready for pollination. As a result, he will provide his colonies additional winter feed and colony stimulation treatments to ensure they are ready to pollinate in the late winter and early spring.

We hope the Subcommittee will consider some sort of direct payment for beekeepers to enable them to maintain the active, strong colonies necessary for pollination.

OTHER ISSUES

While not directly CCD issues, there are two additional issues that do impact beekeepers' financial health and, therefore, their general ability to cope with CCD.

• Standard of Identity for Honey – The industry has petitioned the Food and Drug Administration to promulgate a standard, a legal definition of honey. Using an international standard, the industry has done most of the work for FDA. We need them to give this standard a higher priority. We feel this standard will help us combat what we are calling "honey pretenders" – products that are not pure honey, but are being sold as pure honey. These products cheat consumers and undermine our honey markets.

• Honey Chemistry Research – In the past, USDA-ARS conducted cutting-edge research on honey chemistry. Then, the primary researcher retired, and the resources were directed elsewhere. There is a need to have this research updated, using new analytical techniques. In addition to providing the industry with new tools for honey processing and marketing, this work would tie-in directly with the Standard of Identity, providing the technical tools for enforcing such a standard.

We appreciate the interest the Subcommittee is showing in our beekeepers' predicament. We stand ready to assist the Subcommittee staff in working to solve these issues.

Thank you,

THE AMERICAN BEEKEEPING FEDERATION, INC.

By: Troy H. Fore, Jr.
Executive Director

THE NATIONAL ACADEMIES

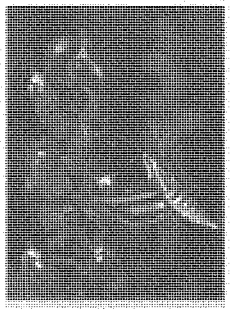
October 2006

REPORT IN BRIEF

Status of Pollinators in North America

About three-quarters of the world's flowering plant species rely on pollinators—insects, birds, bats, and other animals—to carry pollen from the male to the female parts of flowers for reproduction. There is direct evidence for decline of some pollinator species in North America. For many species, there has not been enough monitoring over time to determine whether or not there has been a population decline.

Pollinators are vital to agriculture. Most fruit, vegetable, and seed crops and some crops that provide fiber, drugs and fuel are pollinated by animals. Bee-pollinated forage and hay crops, such as alfalfa and clover, also are used to feed the animals that supply meat and dairy products. Pollination by animals also is essential for maintaining the structure and function of a wide range of natural communities in North America. In view of that economic and ecological importance, this report assesses the status of pollinators in North America, identifies species for which there is evidence of decline, and analyzes the putative causes and potential consequences of those declines.



Status of Managed Pollinators: Bees

Populations of the honey bee, *Apis mellifera*, North America's most important managed pollinator, are in decline in the United States. Many farmers depend on honey bees, which they lease for specific seasons to pollinate crops. Managed pollinator decline can adversely affect the availability, price, and quality of the many fruits, vegetables, and other products that depend on animal pollination.

Long-term honey bee population data have been gathered by U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) since 1947. However, the assessment of populations in North America has been complicated by NASS's historic focus on honey production rather than on the number of colonies, its exclusion of hobbyist beekeepers in its survey, the movement of colonies around the country, and inconsistent data collection methods among the United States, Canada, and Mexico. Population data are not available for other managed pollinators, such as alfalfa leafcutting bees and bumble bees.

Recommendation: Improved information gathering for the beekeeping industry is critical, and the National Agricultural Statistics Service (NASS) should modify its data collection methodologies. NASS should refine its assessment of honey bee abundance, collect commercial honey bee pollination data, and coordinate and reconcile data collection on honey bee colonies throughout North America.

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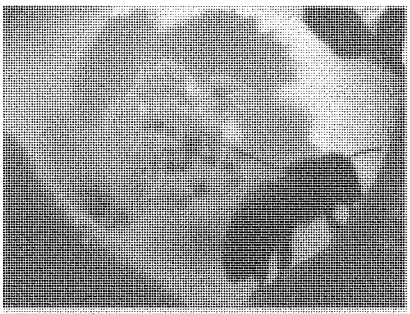


The honey bee, *Apis mellifera*, is North America's most important managed pollinator. Photo by S. Buchmann, University of Arizona, Tucson.

Introduced parasites, in particular Varroa destructor (the varroa mite), have had a significant negative impact on honey bees in the United States. Importation of foreign bees into the United States, which was conducted in 2005 for the first time since 1922, carry the risk of pest and parasite introduction. Other factors affecting bee populations include antibiotic-resistant pathogens; pesticide-resistant mites; and the encroachment of Africanized honey bees, particularly in the southeastern United States.
Recommendation: The Animal and Plant Health Inspection Service (APHIS) should ensure that its regulations prohibit introduction of new pests and parasites along with imported bees, and Congress should expand the Honeybee Act of 1922 to include culturing of bumble bees and the fostering and breeding of other imported pollinator species.

Research in genetics and genomics has facilitated the development and maintenance of mite- and pathogen-resistant stocks of honey bees. However, these technologies have not been widely adopted, and there is a pressing need for translational research to develop commercially viable practices from the results of basic research.
Recommendation: Through research at the Agricultural Research Service (ARS) and competitive grant programs, USDA should expand its efforts to encourage innovative approaches to protecting honey bee health and improve genetic stocks of honey bees.

Despite the evidence of their efficacy as crop pollinators, wild species are not being effectively utilized in agriculture. The development of management protocols for wild species and the management of agricultural landscapes to better sustain wild pollinator populations can create alternatives to supplement honey bees as pollinator demands rise and shortages become likely.
Recommendation: USDA should establish discovery surveys for crop pollinators throughout the range of crops in North America to identify the contributions of wild species to agricultural pollination.

Status of Wild Pollinators

Long-term population trends for several wild bee species (notably bumble bees), and some butterflies, bats and hummingbirds are demonstrably downward. For most pollinator species, however, the paucity of long-term population data and the incomplete knowledge of even basic taxonomy and ecology make definitive assessment of status exceedingly difficult.

Improving Population Assessments

Most insect pollinators in natural and agricultural systems are not well characterized, taxonomically or ecologically, in part because of the lack of monitoring programs and in part because of a shortage of taxonomic resources. Although suggestive evidence of decline, extirpation, or extinction exists for some species, documentation of population changes is available for very few.
Recommendation: To address the taxonomic impediment to assessing pollinator status, the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS) should expand basic research on the systematics of pollinators and on the development of rapid identification tools.

Determining the Causes of Population Declines

The causes of decline among wild pollinators vary by species and are generally difficult to assign; definitive causes of decline could be assigned in only a few cases.

One possible cause of decline in native bumble bees appears to be introduced parasites carried by bumble bees imported from Europe for greenhouse pollination. These bees frequently harbor disease organisms and their escape from greenhouses can lead to pathogen spillover into native species. Disease, notably chalkbrood (caused by the fungal pathogen, *Ascosphaera aggregata*), also has harmed populations of the alfalfa leafcutting bee, *Megachile rotundata*, in the United States.

Recommendation: To prevent pathogen spillover to wild populations, APHIS should require that any commercially produced bumble bee colony shipped within the United States be certified as disease-free.

For some wild species, competition with exotic pollinators (including the honey bee, *A. mellifera*, which is not native to North America) has led to population declines.

Declines in many pollinator groups are associated with habitat loss, fragmentation, and deterioration, although data are often inadequate to demonstrate causation unambiguously.

Changes in the temporal patterns and spatial relationships of pollinators and plants (as their ranges and distributions change) that result from global climate change can lead to a decline in interactions between flowers and pollinators. Disruption of migratory routes is evident in hummingbirds, nectar-feeding bats, and some butterflies.

Identifying the Consequences of Pollinator Population Declines

One consequence of pollinator decline may be an increased vulnerability of some plant species to extinction, although consequences are difficult to define in nonagricultural systems. In the event of declining pollinator populations, some plant populations that are dependent on affected pollinators for reproduction could become more vulnerable to an extinction vortex—the interacting factors that serve to progressively reduce small populations—because of the demographic and genetic consequences of small population size. The effects of pollinator decline on rare plant species or on those with small populations should be given special attention.
Recommendation: The U.S. Geological Survey, the Fish and Wildlife Service, and other agencies responsible for natural resource protection should establish discovery surveys for pollinators of rare, threatened, and endangered plant species.

Long-term, systematic monitoring is necessary for unambiguous documentation of trends in species abundance and richness. Such monitoring allows detection of relationships between changes in pollinator communities and the putative causes of change. Those relationships must be understood to assist development of plans to mitigate harm or to manage species sustainably. Pollinator-monitoring programs in Europe (for example, the Survey of Wild Bees in Belgium and France and the European Union's project, Assessing Large-Scale Risks for Biodiversity with Tested Methods, ALARM) have effectively documented declines in pollinator abundance, but there is no comparable U.S. program. The lack of historical baselines with which contemporary survey data can be compared makes it difficult to assess pollinator status or to determine the causes of documented declines. However, the ALARM project showed that such baselines could be established by mining museum specimens for historical data.
Recommendation: The federal government should establish a network of long-term pollinator-monitoring projects that use standardized protocols and joint data-gathering interpretation in collaboration with Canada and Mexico. A rapid, one-time assessment of the current status of wild pollinators in North America to establish a baseline for long-term monitoring is a laudable initial goal.

Steps Toward Conservation of Pollinator Species

Effective conservation or restoration of pollinator populations requires comprehensive knowledge of their biology. Current knowledge is insufficient to inform conservation and management programs.
Recommendation: The National Science Foundation and USDA should recognize pollination as a cross-cutting theme in their competitive grant programs and work together to integrate research that ranges from the genomics of honey bees and the systematics and ecology of wild pollinators to the effects of global climate change on pollinator-plant interactions.

Hummingbird, a wild avian pollinator.
Photo by W. Mau.

Many simple and relatively low-cost practices that would promote pollinator conservation are known and available. Land managers and landowners, including farmers and homeowners, should be encouraged to adopt "pollinator-friendly" practices, many of

which incur little expense. Farmers and ranchers can be offered economic incentives to adopt such practices. Landowners such as homeowners and businesses could contribute to the conservation of pollinators by planting wildflowers to provide floral resources for resident and migratory adult pollinators and by providing nesting sites for females. Public outreach is key to pollinator protection, conservation, and restoration.

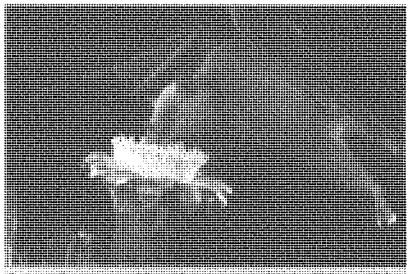
Recommendation: Economic incentives should be expanded for pollinator conservation.

Recommendation: As part of their outreach, federal granting agencies should make an effort to enhance pollinator awareness in the broader community through citizen-scientist monitoring programs, teacher education, and K-12 and general public education efforts that center on pollination.

Recommendation: Professional societies (Ecological Society of America, Entomological Society of America, American Association of Professional Apiculturists, Botanical Society of America) and nongovernmental organizations (North American Pollinator Protection Campaign, Xerces Society for the Preservation of Endangered Invertebrates) should collaborate with landowners and the public to increase awareness of the importance of pollinators and to publicize simple activities the public can use to promote and sustain pollinator abundance and diversity.

Although the object of the Endangered Species Act of 1973 (ESA) is to protect endangered species and their habitats, many endangered pollinators are not recognized as candidate species for two reasons. First, Congress directed that listing of species required a scientific determination of its continued existence as threatened or endangered, but data on many pollinators are inadequate for such a determination. Second, a 1981 congressional revision of the ESA specifically exempts any "species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man." Some caterpillars and carpenter bees, for example, can cause or have the potential to cause damage. This means that some pollinating species are not likely to receive protection.

Recommendation: Congress should not consider any Endangered Species Act amendment that would create additional barriers to listing pollinator species as endangered.



Lesser long-nosed bat (*Leptonycteris curasoae*), a vital nocturnal pollinator. Photo © Merlin D. Tuttle, Bat Conservation International, reprinted with permission.

COMMITTEE ON STATUS OF POLLINATORS IN NORTH AMERICA

May R. Berenbaum - (Chair), University of Illinois at Urbana-Champaign; **Peter Bernhardt,** Saint Louis University; **Stephen Buchmann,** University of Arizona, Tucson; **Nicholas W. Calderone,** Cornell University; **Paul Goldstein,** Florida Museum of Natural History; **David W. Inouye,** University of Maryland, College Park; **Peter Kevan,** University of Guelph; **Claire Kremen,** University of California, Berkeley; **Rodrigo Medellin,** National Autonomous University of Mexico; **Taylor H. Ricketts,** World Wildlife Fund; **Gene E. Robinson,** University of Illinois at Urbana-Champaign; **Allison A. Snow,** The Ohio State University; **Scott Swinton,** Michigan State University; **Leonard B. Thien,** Tulane University; **F. Christian Thompson,** U.S. Department of Agriculture. **National Research Council Staff: Evonne P. Y. Tang**, Study Director, Board on Life Sciences.

This report brief was prepared by the National Research Council based on the committee's report. For more information, contact the Board on Life Sciences at bls@nas.edu or visit http://nationalacademies.org/bls. *Status of Pollinators in North America* is available from the National Academies Press, 500 Fifth Street, NW, Washington, D.C. 20001; (800) 624-6242; www.nap.edu.

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U.S. House Agriculture Subcommittee
on Horticulture and Organic Agriculture
April 9th 2007

Mr. Chairman and Honorable Representatives of the Committee,

My name is Larry Starrh, I am a third generation farmer engaged in farming with my family. My father, brother and brother in-law farm together as Starrh and Starrh Farms. We farm in Kern County west of Bakersfield, Ca. and our primary crops are almonds, alfalfa hay, cotton, pistachios and oats. Currently we have 4064 acres of almonds and approximately 2400 acres are in full production.

I would like to thank Chairman Cardoza and this committee for the opportunity to provide input on the issue of bees and their impact. Bees are a very integral part of almond production. In fact without bees to pollinate our trees production levels would drop below tolerable levels and in certain cases where growers tried bloom time without bees there was no production at all. It is critical as a grower to have a stable reliable source of honey bees.

My understanding of bees (other than knowing they are important to us) is limited, however, in talking to the bee keepers that I know and work with there is a definite need for help. Help in two areas:

1. Research
2. Additional management tools i.e., insecticides and such.

My friends in the bee industry say that there is no definitive understanding of why the bee population crashed this last year. The keeper that provides bees for our ranch said he personally had a 30% loss in hives through the year. He said he doesn't know what happened and that the USDA was searching for answers. Hopefully they will be able to determine what caused the event that occurred this year and subsequently find out how to prevent it from occurring again. It is important that research dollars reach this relatively small industry's most important needs. A side note to the impact of the bee crash is this; Our bee keeper wanted to increase his hives this last year to meet our needs for the future. We agreed to finance this event, because we were able to guarantee a per hive price of $100.00 dollars per hive and hopefully a supply of bees (We use 2.5 to 3 hives per acre). He needed financing because by increasing his hives quickly rather than over time he would make less money on honey and on other crops that he would have pollinated, so funding him made sense for both of us. As it turned out the loss of 30% of his hives created a deficit for our bee needs and he had to go out and find other bees to provide us at a cost of $135.00 to $140.00 per hive. The dollar cost to us was substantial but the cost to him was huge not just in dollars but assets.

The issue of management tools comes up in every conversation I have with our bee keeper. His constant comment is, that due to the small size of the bee industry, getting new products released to help them combat predator mites and other enemies are non-existent. If there were any way to help encourage development and promotion of new products the battle against enemy insects might have more hope and we might increase the health of the bee industry.

Thank you for your attention and time that you have committed to this important issue
Sincerely,
Larry Starrh

ADDITIONAL TESTIMONY OF GENE BRANDI OF THE CALIFORNIA STATE BEEKEEPERS ASSOCIATION

I appreciate this opportunity to submit additional testimony on colony collapse disorder to the Subcommittee on Horticulture and Organic Agriculture.

Certain pesticides have adversely affected bee health throughout the United States for many years. Additional scientific knowledge about the acute, residual, and sub lethal adverse affects of particular pesticides to honey bees is critical to understanding whether or not these compounds are responsible for any degree of colony collapse disorder.

Beginning in 1996, as Chairman of the American Beekeeping Federation's Research and Technical Committee, I served as a member of the EPA State Labeling Issues Panel. The panel consisted primarily of EPA and state pesticide regulators, and was assembled in an effort to improve the bee hazard warning on pesticide labels. It became apparent to me early in these discussions that there was a severe lack of appreciation by EPA with regard to the severity of pesticide problems encountered by honey bees and other pollinators in the United States. After several years and many attempts, in my opinion the bee hazard warnings on pesticide labels were not improved.

Pesticide toxicity to honey bees from spray, dust, and certain bait formulations has been apparent for years, but there is also concern that systemic pesticides may be adversely affecting honey bees as well. Independent research by a honey bee toxicologist can determine the effects of topically applied and systemic pesticides to honey bees on various crops.

My experience leads me to believe that the effects of pesticides on honey bees are not a high priority with the U.S. Environmental Protection Agency. Given that approximately $15 billion of the U.S. farm economy would not exist without the pollination work of honey bees, and it is clear that the nation's honey bees are at risk from colony collapse disorder, it is vital that EPA increase its "level of concern" with regard to pesticides that adversely impact honey bees.

I very much appreciate the concern of the House Subcommittee on Horticulture and Organic Agriculture and its attempt to help the bee industry and the scientific community find solutions to the colony collapse disorder problem.

Thank you for the opportunity to testify at the hearing and for allowing this additional testimony to be added to the record as well.

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