



John Elias Baldacci  
GOVERNOR

STATE OF MAINE  
DEPARTMENT OF AGRICULTURE, FOOD & RURAL RESOURCES  
BOARD OF PESTICIDES CONTROL  
28 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0028

SETH H. BRADSTREET III  
COMMISSIONER

HENRY JENNINGS  
DIRECTOR

## PRESS RELEASE

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For Immediate Release  
Date: August 31, 2007

Contact: Paul Schlein, 207-287-7533  
paul.b.schlein@maine.gov

### STATE OFFERS FREE DISPOSAL OF BANNED, UNUSABLE PESTICIDES IN OCTOBER

AUGUSTA—Hundreds of Maine citizens live unaware of a quiet crisis lurking in or near their homes. In barns, basements, sheds, or garages throughout the state reside tons of banned and unusable pesticides: old chemicals with infamous names like DDT, lead arsenate, 2,4,5-T, and chlordane.

Often, new owners of older homes or farms discover they have inherited hazardous waste. When they do, citizens face a dilemma: hire an expensive hazardous waste disposal service or dump the chemicals illegally, inviting harm to the environment and public health.

Fortunately, there's a third option that's both legal and responsible. Even better, it's free, simply by contacting the Maine Board of Pesticides Control (BPC). During the first week of October 2007, the state regulatory agency will dispose of banned pesticides or pesticides that have become caked, frozen, or otherwise rendered unusable. And, again, there is no cost to homeowners.

"We urge people holding these chemicals to contact us immediately to register," says Paul Schlein, BPC Public Information Officer. "There will be four sites throughout the state where folks will be able to bring their obsolete pesticides."

The collected chemicals go to out-of-state disposal facilities licensed by the US EPA where they are incinerated or reprocessed.

"While offering free obsolete pesticide disposal is expensive for us," notes Schlein, "it's a bargain, compared to the cost of cleaning up contaminated soil or water. However, it's worth noting that future funding is not guaranteed, so be sure to take advantage of this year's collection while you can."

To register, find out collection dates and locations, and learn important information about the temporary storage and transportation of obsolete pesticides, go to the BPC Web site at [www.thinkfirstspraylast.org](http://www.thinkfirstspraylast.org). Or, call the BPC at 287-2731.

###

*The Maine Board of Pesticides Control (BPC) is the lead state agency for pesticide regulation. It is an administrative unit of the Maine Department of Agriculture, Food and Rural Resources with policy decisions made by a seven-member, public board. The BPC is creator of "YardScaping," a statewide program that recognizes the connection between backyards and watersheds, and calls for Maine citizens to make lawn care choices that don't compromise the environment or the beauty of their lawn.*

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## Larger Colony Densities of Corn Leaf Aphids Reported on Some Bt Corn Hybrids

By: Mike Gray, University of Illinois at Urbana-Champaign

9/10/2007 --

An interesting journal article was recently published that serves to remind us that unintended consequences can result from our pest management decisions. By conducting a carefully controlled laboratory investigation, European scientists were able to make the following observations:

"Here we show a remarkable positive effect of *Bt* maize on the performance of the corn leaf aphid *Rhopalosiphum maidis*, which in turn enhanced the performance of parasitic wasps that feed on aphid honeydew. Within five out of six pairs that were evaluated, transgenic maize lines were significantly more susceptible to aphids than their near-isogenic equivalents, with the remaining pair being equally susceptible. The aphids feed on the phloem sieve element content and analyses of this sap in selected maize lines revealed marginally, but significantly higher amino acid levels in *Bt* maize, which might partially explain the observed increased aphid performance. Larger colony densities of aphids on *Bt* plants resulted in an increased production of honeydew that can be used as food by beneficial insects."

The plants used in this experiment were grown in a climate chamber at 27C with 60% relative humidity. The six *Bt* hybrids and their corresponding near-isogenic lines were the following Bt11 (N4640Bt/N4640), MON 810 (MEB 307Bt/Monumental, TXP138/EXP138, Novartis/Nobilis), and Event 176 (Valmont/Prelude, Navaris/Antaris).

Aphids were placed on plants using clip cages to estimate colony performance. Corn leaf aphids (50 adults and 50 nymphs) were contained in clip cages on the sixth leaf of plants. After three days had elapsed, the clip cages were taken off and the plants were totally enclosed in tight mesh cages. Five weeks later, the number of aphids per plant was estimated.

For additional details concerning this research, funded by the Swiss National Science Foundation, please read the following paper: C.A. Faria, F.L. Wäckers, J. Pritchard, D.A. Barrett, and T.C. Turlings. 2007. High susceptibility of *Bt* maize to aphids enhances performance of parasitoids of lepidopteran pests. *PLoS ONE* 2(7): e600.doi:10.1371/journal.pone.0000600.

This summer there were numerous reports concerning large densities of corn leaf aphids in some fields. Considerable speculation ensued regarding potential explanations. We've reported previously that the approximately 40% of corn acres in Illinois planted to "stacked" *Bt* hybrids this season had doubled as compared with 2006 (19%). Is there a connection between increased *Bt* usage and large corn leaf aphid densities in 2007? Providing a direct answer to this question and many others will likely remain elusive under large-scale commercial conditions. The publication of this paper reminds us how much we have yet to learn about the potential ecological consequences of these powerful transgenic pest management tools.--Mike Gray

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Release No. 0257.07

Contact:  
Andrea McNally (202) 690-4178  
Angela Harless (202) 720-4623

## **CONNER ANNOUNCES PLAN TO IMPROVE QUALITY COMPLIANCE OF GENETICALLY ENGINEERED PRODUCTS**

WASHINGTON, Sept. 20, 2007 - Acting Agriculture Secretary Chuck Conner today announced a new program to help universities, small businesses and large companies develop sound management practices to enhance compliance with regulatory requirements for field trials and movements of genetically engineered (GE) organisms. The new Biotechnology Quality Management System, a voluntary compliance assistance program, is scheduled for initial implementation in spring 2008.

"Biotechnology is a key component of our growing agricultural economy," said Conner. "USDA's program will help the biotechnology sector become better stewards by focusing on the implementation of best management practices so that problems can be prevented."

USDA's biotechnology initiative complements a program called, "Excellence Through Stewardship," which is already underway in the biotechnology industry. While industry's program is focused on quality management to ensure product integrity of biotech-derived plant products throughout the product life cycle, USDA will emphasize the quality of the process for safely introducing these GE organisms in compliance with federal regulations.

The Biotechnology Quality Management System was developed to be as inclusive as possible so that a broad array of participants could participate. It will consist of two program levels, based on domestically and internationally recognized quality management systems. Specifically,

- 1) Level-A program: This program will be designed for participants that do not have formal quality management systems in place. It will help them develop good management procedures and will be geared toward small businesses and universities.
- 2) Level-B program: Companies and researchers that have formal management systems in place may choose to participate in the Level-B program. This program is intended for those participants that grow GE plants at multiple sites, often through the use of cooperators, and will include training guidelines and documentation procedures to ensure accountability at all levels by all involved parties.

USDA's Animal and Plant Health Inspections Service (APHIS) intends to oversee the Biotechnology Quality Management System program in partnership with USDA's Agricultural Marketing Service (AMS), which will manage the audit component of the program and accredit third party auditors. Audits will verify that participants have procedures in place, and that they are performed correctly to meet the regulatory requirements for any given GE field trial or movement. As part of the program's emphasis on preventive measures, participants will be encouraged to correct deficiencies discovered in an audit before compliance problems develop.

The Biotechnology Quality Management System and its associated audits will complement, not replace, APHIS' current regulatory compliance and inspection process by focusing on planning and good management practices that can improve a participant's ability to meet regulatory requirements. The current inspection program will continue to cover specific permits and notifications to ensure compliance with regulations.

APHIS, in partnership with AMS, will implement the voluntary system through an agency notice and participation in the program will not be a regulatory requirement. APHIS also will work proactively to provide outreach and guidance to those companies and researchers that choose to participate and develop these quality management programs.

Currently there are several audit-based, quality verification systems in operation throughout USDA's marketing and regulatory programs mission area, such as AMS' Process Verified Programs. APHIS regulates the confined field release, interstate movement and importation of GE organisms. APHIS currently ensures compliance with regulations through inspections conducted at critical stages, consistent and appropriate enforcement actions and comprehensive record keeping and reporting requirements. Quality management systems are intended to improve regulatory compliance by fostering a company's commitment to sound controls, quality management practices and effective compliance with federal regulatory requirements.

Additional information about the Biotechnology Quality Management System is available at [www.aphis.usda.gov](http://www.aphis.usda.gov).

Fact Sheet: [Biotechnology Quality Management System](#)

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## Statewide

# ***Board receives Bt corn proposal***

By Sharon Kiley Mack

Saturday, September 08, 2007 - Bangor Daily News

FAIRFIELD, Maine - Members of the Board of Pesticides Control spent much of Friday struggling with creating regulations to follow up their decision in July to allow Maine farmers to grow certain varieties of Bt corn, a genetically modified corn used to feed cows.

Maine previously was the only state in the country that did not allow Bt corn, which is considered by the board, but not the federal government, to be a pesticide.

Bt, or *Bacillus thuringiensis*, corn is genetically engineered to produce pesticidal proteins from the naturally occurring soil-borne Bt bacteria that kill certain insects.

The board grappled Friday with definitions and requirements for training and registration, an exercise that has become more urgent with the recent application to the BPC by Syngenta Crop Protection Corp. to sell Bt corn seed to be grown in Maine for human consumption.

"Bt sweet corn is being used in other states and already consumed in this state," board member Thomas Qualey said.

"It would be incredibly naive of us to believe that when we go to Hannaford or Shaw's and buy sweet corn from November to June that it is not this product," agronomist Lauchlin Titus commented from the audience. He also noted that Bt sweet corn grown throughout the Midwest is used in creating corn syrup, which is widely found in products ranging from sugar to salad dressings to processed lunch meat.

This new application by Syngenta, however, is the first to seek permission to grow such corn in Maine for humans.

BPC Chairman Carol Eckert, M.D., said that the issue of approving the sale or growth of genetically modified corn for human consumption is different from the feed corn approval.

"People grow corn in their backyards," she said. "The numbers are so much larger that need protection."

Farmers, particularly those conforming to organic standards, are concerned about pollen drift from genetically engineered crops affecting their own crops.

Maine dairy farmers sought to remove the ban on Bt corn so they could better compete with farmers across the country who can grow the modified feed corn for their cows less expensively. The Maine farmers said they could save money and the environment by eliminating pesticide spraying and growing bigger, disease-free crops.

After corn is genetically engineered to produce the pesticidal proteins, in essence, the plant growing from the seed becomes a pesticide factory. As such, the state Board of Pesticides Control determined that since the DNA of the corn cannot be separated from the seed, the corn seed would be considered a pesticide.

Some in attendance Friday, including Russ Libby and C.R. Lawn of the Maine Organic Farmers and Gardeners Association and Logan Perkins of Protect Maine Farmers, watched the proceedings closely.

In a break in discussions, Libby said the Legislature already has allowed more genetically engineered crops to enter Maine's food stream by failing to approve a labeling law. Such a law would require product labels to indicate when any food sold for human consumption has been genetically modified.

"This all goes back to the failure of the Maine Legislature to ask people what is in their food," he said. "They had the opportunity five times and refused to act each time. People are eating GE-altered sweet corn right now and have no idea."

Much of the BPC's discussion Friday centered on education and training for Bt farmers and dealers.

One of the board members also pointed out that though the board voted at its July meeting to allow farmers to grow Bt feed corn in 2007, the approval came too late for its use in the current planting season.

"Should we be dissatisfied with our ability to regulate farmer training, we could conceivably refuse to permit [Bt] in 2008," board member Daniel Simonds noted.

After several hours of conversation, the BPC also agreed to have toxicologist LaBelle Hicks conduct research on the Bt sweet corn and bring recommendations back to the next board meeting.

Board members felt it was critical to get some use regulations in place before the 2008 planting season. Since farmers generally purchase their seed late in the year, that puts a deadline just a few months away.

Ned Porter, deputy commissioner of agriculture, questioned how much overlap was going on between the board and a task force appointed by the state's Committee on Agriculture, Conservation and Forestry to develop seed regulations. The task force was created after the committee's decision to carry over a bill that would have dealt with the integrity of seed crops.

Porter said that bill must be handled by the committee by Dec. 10 and the task force will begin meeting next week.

Members of the BPC felt the two groups could work parallel in creating regulations — with the BPC focusing on Bt seed and the task force dealing with all seed — and asked that Porter keep them updated about the task force's recommendations.

## **Pesticides can 'double' the risk of asthma**

By DAVID DERBYSHIRE

Exposure to pesticidal chemical sprays doubles the risk of developing asthma, researchers have found.

In the first study of its kind, scientists discovered adults who come into contact with pesticides are at a higher risk of developing respiratory problems.

The findings will further heighten concerns about the impact of chemical sprays on food and the proximity of schools and homes to farms where they are used.

Last week, an official report showed 2 per cent of food sold in Britain contains illegal levels of chemical pesticides. Traces were also found in a third of fruit, vegetables, milk and meat.

Five million Britons suffer from asthma and the number is growing. The condition afflicts nearly a million children, around one in ten.

Past studies have linked asthma to second-hand tobacco smoke, poor diet and obesity. Traffic fumes and smoke have also been shown to worsen symptoms.

The study of 20,000 American farmers was presented yesterday at the European Respiratory Society's annual congress in Stockholm.

It found farmers who used the most pesticides were at the highest risk, even after their age, weight and smoking history were taken into account.

During the study, 452 farmers aged 30 and over developed asthma. Farmers in Iowa and North Carolina, who used around 16 chemical sprays, were found to be most at risk.

Although some of the sprays being used at the time have been withdrawn on U.S. and British farms, others - including the fungicide captan and the insecticide lindane - are still sprayed on crops.

Exposure to the pesticide coumaphos doubled the risk of a farmer suffering from asthma, the study added.

A spokesman for the researchers said: "The possible scope of the link between pesticides and adult-onset asthma raises a problem of broader interest, given the considerable quantities of pesticides used in the domestic and urban environments.

"Their impact on a population which, while less exposed, has a greater risk of allergies and a higher prevalence of asthma, remains to be determined."

Dr Noemi Eiser, of the British Lung Foundation, said: "Understanding what triggers someone's asthma attack can be immensely helpful when it comes to managing the condition.

"But it also emphasises how important it is for farmers to get themselves checked out and, if they have asthma, to always carry any necessary medication with them."

Lord Melchett, of the Soil Association, said: "There is something very rotten with the state of pesticide safety regulation.

"The Royal Commission on Environmental Pollution recently criticised the regulators for overstating the certainty of safety and ignoring the wide variety of scientific views."



September 26, 2007

Global Health

## WHO Backs Use of DDT Against Malaria

by Joanne Silberner



Olivier Martel/Corbis

Villagers wait for care at an antimalaria health center in the Bao Thang district of Vietnam. © 2006

[In a 1963 broadcast, biologist Rachel Carson talks about the dangers of DDT.](#)

*All Things Considered*, September 15, 2006 · The World Health Organization today announced a major policy change. It's actively backing the controversial pesticide DDT as a way to control malaria. Malaria kills about 1 million people a year, mainly children, and mainly in Africa, despite a decades-long effort to eradicate it.

The WHO previously approved DDT for dealing with malaria, but didn't actively support it. While DDT repels or kills mosquitoes that carry the malaria parasite, it doesn't get much good press. In 1962, environmentalist Rachel Carson wrote a book, *Silent Spring*, about how it persists in the environment and affects not just insects but the whole food chain.

As activist Malvina Reynolds once sang, "It kills the bugs in the apple tree, I eat the pie and it's killing me. DDT on my brain, on my brain."

In the early 1960s, several developing countries had nearly wiped out malaria. After they stopped using DDT, malaria came raging back and other control methods have had only modest success.

Which is why Arata Kochi, head of the WHO's antimalaria campaign, has made the move to bring back DDT. His major effort at a news conference Friday in Washington, D.C., was not so much to announce the change, but to deflect potential opposition from environmental groups.

"We are asking these environmental groups to join the fight to save the lives of babies in Africa," Kochi said. "This is our call to them."

A number of major environmental groups support the limited use of DDT, such as spraying only inside of houses and huts once or twice a year. That type of use is supported by the Sierra Club and Environmental Defense, which was originally founded by scientists concerned about DDT. The limited application is also part of President Bush's new malaria initiative.

But some environmental groups say spraying DDT will be harmful. Jay Feldman, executive director of a group called Beyond Pesticides, says using it is a war plan without an exit strategy.

"WHO holds a lot of clout in the world health community and the fact that they're now changing policy and advocating use of DDT will have dramatic impact," Feldman says. "They announced today that they expect 85 percent receptivity, that is knocking on people's doors and convincing them -- that's their language -- to use DDT."

Looking at the medical literature, he predicts harmful effects.

"This is a chemical that has been studied and evaluated," Feldman says, "and over the years has been found to cause cancer, endocrine disruption, adversely affect the immune system and is very problematic from the standpoint that it is persistent." DDT collects "in fatty tissue and in the environment," he adds, and can also be passed on in breast milk.

But supporters of the new policy discount those studies and point to others showing it's safe. Richard Tren, member of a group called Africa Fighting Malaria, says that while there may be lab studies showing DDT could potentially cause cancer, no large studies show an actual increase in cancer in people.

Some opponents say DDT will be diverted to more direct and more harmful agricultural use. Tren has watched indoor-spraying campaigns in Zambia.

"You're not seeing leakage into the environment," Tren says. "You're not seeing leakage into agriculture. What you are seeing are sharp dramatic reductions in malaria deaths and disease."

The field of malaria control has historically been dogged by problems with resistance. Each time scientists find a way to fight the parasite, the parasite finds a way to fight back. It has become resistant to most treatments, for example. And some mosquitoes have already adapted to tolerate DDT. The WHO's Kochi says resistance can be limited if DDT is used carefully, and only where it's likely to be effective.

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from the September 13, 2007 edition - <http://www.csmonitor.com/2007/0913/p14s01-sten.html>

## Bring back DDT? Think again.

**We know it kills birds, fish, and frogs; new research shows it can stunt food crops as well.**

**By Robert C. Cowen | Columnist**

Public-health specialists are debating whether or not to bring back DDT to help control mosquitoes. DDT advocates should think again. The environmental damage this pesticide can cause goes beyond the decimation of hawks, eagles, fish, and frogs documented during its previous use. (It was introduced early in World War II; a federal law banned its use in 1972.) Recent research shows that the class of pesticides to which DDT belongs stunts the growth of legumes such as alfalfa and soybeans, limiting their ability to fix nitrogen and so provide their own fertilizer and improve the soil. Also, a comprehensive survey has found that residues of discontinued pesticides such as DDT continue to contaminate streams, lakes, and groundwater throughout the continental United States.

Plants need nitrogen to grow. They can't take it directly out of the air. It has to be combined with hydrogen to form ammonia – a process called nitrogen fixation. Plants ingest the ammonia and recover the nitrogen they need. Nitrogen can be fixed in chemical factories and spread on farm land. Legumes can do the trick naturally. They send out chemical "signals" that recruit nitrogen-fixing soil bacteria. These bacteria form nodules on legume roots and fertilize the soil. Hence the age-old practice of maintaining soil fertility by rotating crops to include plantings of legumes.

For the past several years, Jennifer E. Fox at the University of Oregon in Eugene has used test tube experiments to study the subtle way pesticides impede this nitrogen-fixing process. Last June she joined several colleagues to report research with real plants. Their paper, published in the Proceedings of the National Academy of Sciences, shows that the pesticides block the bacteria recruitment "signal" that legumes emit. "In essence," Dr. Fox says, "the agrichemicals are cutting the lines of communication between the host plants and symbiotic bacteria."

This has serious implications for farmers. Heavy use of commercial nitrogen fertilizers is showing diminishing returns in terms of crop yields, while fertilizer runoff contaminates streams, lakes, and even coastal ocean areas. If legumes can't do their natural fertilizing job, even more artificial fertilizer will be required.

Some of the pesticides hang around for a long time. The US Geological Survey has made a comprehensive study of pesticide residues in surface and ground water across the continental United States. It used data collected nationwide between 1992 and 2001. A summary of that study, published in Environmental Science & Technology last May, states that the "assessment shows widespread occurrence of pesticides, with concentrations in many streams at levels that may have effects on aquatic life and fish-eating wildlife." Ground water is less contaminated. Nevertheless, one or more pesticides showed up in 33 percent of wells that tap major aquifers used for water supply.

The report notes that most of the DDT class of pesticides that were phased out decades ago "continue to persist in the environment." It adds, "The frequent occurrence of pesticide mixtures, particularly in streams, implies that the combined toxicity of pesticides in aquatic ecosystems may often be greater than that of any single pesticide that is present."

Research like that of Fox and the USGS raises a significant warning: We don't know the full extent of DDT's harmful influence in our environment. We do know that, once it gets into our environment, it stays there. We need to find better ways to control mosquitoes.

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## The NATION'S HEALTH

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### Online only: Antibacterial soaps show no health benefits over plain soaps

Antibacterial soaps show no health benefits over plain soaps and in fact may render some common antibiotics less effective, according to a new University of Michigan study.

Allison Aiello of the University of Michigan School of Public Health and her team found that washing hands with an antibacterial soap was no more effective in preventing infectious illness than plain soap. Moreover, antibacterial soaps at formulations sold to the public do not remove any more bacteria from the hands during washing than plain soaps, according to the study, which appeared in the August edition of *Clinical Infectious Diseases*.

Because of the way the main active ingredient — triclosan — in many antibacterial soaps reacts in the cells, it may cause some bacteria to become resistant to commonly used drugs such as amoxicillin, the researchers say. These changes have not been detected at the population level, but *E. coli* bacteria bugs adapted in lab experiments showed resistance when exposed to as much as 0.1 percent wt/vol triclosan soap.

"What we are saying is that these *E. coli* could survive in the concentrations that we use in our (consumer formulated) antibacterial soaps," Aiello said. "What it means for consumers is that we need to be aware of what's in the products. The soaps containing triclosan used in the community setting are no more effective than plain soap at preventing infectious illness symptoms, as well as reducing bacteria on the hands."

The team looked at 27 studies conducted between 1980–2006, and found that soaps containing triclosan within the range of concentrations commonly used in the community setting — 0.1 to 0.45 percent wt/vol — were no more effective than plain soaps. Triclosan is used in higher concentrations in hospitals and other clinical settings, and may be more effective at reducing illness and bacteria.

Triclosan works by targeting a biochemical pathway in the bacteria that allows the bacteria to keep its cell wall intact. Because of the way triclosan kills the bacteria, mutations can happen at the targeted site. Aiello said a mutation could mean that the triclosan can no longer get to the target site to kill the bacteria because the bacteria and the pathway have changed form.

The analysis concludes that government regulators should evaluate antibacterial product claims and advertising, and further studies are encouraged. The U.S. Food and Drug Administration does not formally regulate the levels of triclosan used in consumer products.

Other antiseptic products on the market contain different active ingredients, such as the alcohol in hand sanitizers or the bleach in some antibacterial household cleaners. Aiello's team did not study those products and those ingredients are not at issue.

Story courtesy University of Michigan, Aug. 14, 2007. This story does not contain original reporting by The Nation's Health staff.

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## Virus becomes new suspect in bee die-off

Genetic tests find link between colony collapse and little-known virus

By Alan Boyle

Science editor

Updated: 10:47 p.m. ET Sept 6, 2007

Scientists have found a new prime suspect in the deaths of about a quarter of America's honeybees, a mystery that could take a multibillion-dollar toll on the nation's agricultural industry.

Months of genetic testing have fingered a virus that was first reported in Israel just three years ago and may have passed through Australia on its way to the United States. The correlation between Israeli Acute Paralysis Virus and the mysterious bee disease — known as Colony Collapse Disorder, or CCD — was reported Thursday on the journal Science's Web site.

Although the scientists behind the research cautioned that they haven't yet cracked the case, their study provides enough curious coincidences to keep even the fictional detective (and beekeeper) Sherlock Holmes buzzing.

The economic effect of the bee disappearances goes far beyond the lost honey: In fact, the bee industry's primary impact is felt through the crops that the insects pollinate — products that are valued at \$14 billion to \$20 billion annually. Since Colony Collapse Disorder first came to light last year, the malady has affected an estimated 23 percent of the nation's beekeeping operations, with losses of up to 90 percent. Other countries are reporting mysterious bee losses as well.

The disorder is characterized by the rapid disappearance of a colony's bees, even if there are adequate stores of food in the hive. The bees just seem to fly off into oblivion — hinting that the malady somehow affects the insects' navigational sense or learning ability.

For months, researchers have been struggling to figure out the causes of CCD. Some even proposed that [cell-phone radiation](#) was disrupting bee colonies. Penn State entomologist Diana Cox-Foster, the lead author of the Science report, said the cell-phone theory was on the bottom of the list of suspects. But she said it's likely that several factors are contributing to the bee disappearances — including environmental stresses, pesticides, viruses and parasitic Varroa mites, which all weaken the bees' immune systems.

The latest research moves Israeli Acute Paralysis Virus to the top of the list as a "significant marker" for Colony Collapse Disorder, the researchers reported. And they said the technique they used could be applied to other disease outbreaks as well, even those that afflict humans.

### The genetic game's afoot

The scientific sleuths began their investigation early this year by sampling bees from four colonies that suffered a collapse, and two healthy colonies. They also took samples from apparently healthy bees imported from Australia and royal jelly from China. Royal jelly is a special food secreted by bees that is also used in cosmetics.

Those samples were run through gene-sequencing machines and meticulously analyzed. The researchers subtracted out the honeybee genome itself, then identified the genetic markers of bacteria, fungi and viruses that were left over. A similar technique was recently used to identify [182 species of bacteria](#) living on human skin.

Penn State's Edward Holmes concentrated on an in-depth analysis of viruses found in the bee samples. "This is breaking new ground in trying to look at how viruses work in this class of animals," he told reporters Wednesday during a pre-publication teleconference.

"We found a remarkably high viral burden in bee populations. ... We characterize in this paper seven different viruses that circulate in bee populations. Only one of them was consistently associated with CCD and royal jelly," he said.

That was Israeli Acute Paralysis Virus, or IAPV — a little-known bug that sets bees' wings shivering and eventually causes paralysis. IAPV-afflicted bees are typically found dead outside their hives. IAPV was also detected in the Australian bees as well as two of the four Chinese royal jelly samples.

These initial clues led the researchers to look for IAPV and other suspected pathogens in more bee samples. They

checked the genetic sequences for bees collected over the past three years from 30 colonies that suffered a collapse and 21 healthy colonies. The presence of IAPV was found to be the best indicator for Colony Collapse Disorder, with a 96.1 percent correlation.

### **Not so elementary**

"I hope no one goes away with the idea that we've actually solved the problem," Jeff Pettis of the U.S. Department of Agriculture's Agricultural Research Service told reporters. "We still have a great deal of research to do to resolve why bees are dying in the U.S. and elsewhere."

Among the questions yet to be answered:

- Is IAPV really a cause, or will it turn out that vulnerability to the virus is merely a consequence of the disease?
- How and when did IAPV get into the United States?
- Why did the Australian bees (and even a few American bees) seem healthy even though they were carriers of the virus?
- What roles are played by other bugs that were found in the bee samples, such as the Kashmir bee virus and Nosema fungi?
- If the cause or causes can be definitively identified, what can be done to stop the collapse?

The first task ahead is to confirm the linkage with the virus and figure out the actual mechanism behind Colony Collapse Disorder. Not everyone is convinced IAPV will turn out to be the culprit. Researchers from the U.S. Army and Montana-based Bee Alert Technology have turned up IAPV and other viruses in sick and healthy bees — but have not found any pattern of correlation.

"For the good of the industry, we wish they had a smoking gun and a quick answer, but we're not convinced they're there," Bee Alert's Jerry Bromenshenk told msnbc.com. He said he and his colleagues have turned up more than a dozen suspect viruses, including "a bunch we're still scratching our heads over."

Scientists suspect that some sort of organism will turn out to be the leading cause of the bee collapse, whether it's IAPV, a different virus or a combination of bugs. That's because irradiating beehives appears to make them safe for recolonization, Pettis said.

The Australian connection is another line of investigation: The United States allowed the import of packaged Australian bees in 2004, and reports of bee disappearances began soon afterward, Pettis noted. That may be how IAPV came into the country, though Pettis said it's also possible the virus was here before that time.

Colin Henderson, one of Bromenshenk's colleagues at Bee Alert, said it was still premature to assume that the virus was passed from Australia to America. Pettis said tests of bee samples that were taken in the United States and frozen before 2004 could shed light on whether there's a connection or not.

If Australian bees are carrying the virus, why aren't bee colonies collapsing Down Under? Pettis noted that the Australian bees aren't afflicted by Varroa mites, which have decimated America's wild bee population in recent years. As a result, the Australians may have weathered the stress of IAPV better than their American cousins. "That alone could account for the differences between the two countries," he said.

In the weeks ahead, the researchers behind the Science study will try combining IAPV with other stress factors to see if they can experimentally create the conditions that tip a healthy bee colony into a collapse.

### **Is there a 100 percent solution?**

Pettis said it's still too early to propose putting new restrictions on bee imports. "We're looking at the science behind it and what we feel needs to be done, but no decisions have been made at this time," he said.

Just to be safe, beekeepers should refrain from using imported royal jelly in their hives, he said.

Pettis said Colony Collapse Disorder was almost certainly the result of a "combination of things," and he didn't expect a magic antiviral bullet to appear anytime soon. "We're really right now going to have to rely on beekeepers to continue just to manage nutrition, parasitic mites, Nosema, things like that — and try to keep bees as healthy as possible," Pettis told msnbc.com.

There's more hope on the horizon: Recent research in Israel indicates that some bees have become resistant to IAPV

by incorporating the virus' genetic code into their own genes. Creating virus-resistant strains of bees, either through genetic modification or old-fashioned breeding, "is a very intriguing idea," Pettis said.

At the same time, the strategy used to track down the genetic correlation between Colony Collapse Disorder and the suspect virus provides a "road map for rigorously and efficiently addressing outbreaks of infectious disease," said W. Ian Lipkin, a molecular biologist at Columbia University's Mailman School of Public Health who was the corresponding author for the Science study.

"I really do think that these new technologies will revolutionize our approach to epidemiology and the characterizing of outbreaks of infectious disease," he said.

If the strategy were available in 2003, public-health experts might have been able to track down the roots of severe acute respiratory syndrome, or SARS, in much less time than the months that were required back then, Lipkin said.

"We would be able to get similar sorts of answers in as short as a week," he said.

*In addition to Cox-Foster, Lipkin, Holmes and Pettis, the researchers behind the Science study included Sean Conlan, Gustavo Palacios, Phenix-Lan Quan, Thomas Briese, Mady Hornig, Andrew Drysdale, Jeffrey Hui and Junhui Zhai of Columbia University; Jay Evans of the USDA-ARS Bee Research Laboratory; Nancy Moran and Vince Martinson of the University of Arizona; David Geiser, Dennis vanEngelsdorp, Abby Kalkstein and Liwang Cui of Penn State; and Stephen Hutchison, Jan Fredrik Simons and Michael Egholm of 454 Life Sciences.*

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