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Midwest Beekeeper

The Indiana Beekeeping School

Colony Collapse Disorder

Bee die-off in Penn. 'worse than we thought'

*During late 2006, an alarming number of honey bee colonies began to die across the country. Subsequent investigations suggest these outbreaks of unexplained colony collapse were experienced by beekeepers for at least the last two years. Reports of similar die offs are documented in beekeeping literature, with outbreaks possibly occurring as long ago as 1896. The current phenomenon, without a recognizable underlying cause, has been tentatively termed **Colony Collapse Disorder (CCD)**, and threatens the pollination industry and production of commercial honey.*

PITTSBURGH PA – For months, a devastating honeybee die-off has frustrated beekeepers, threatened growers and stumped bee specialists.

Now, the affliction that has wiped out three-quarters of some Pennsylvania beekeepers' colonies has an official name – Colony Collapse Disorder.

Still, researchers say, they are only slightly closer to understanding what is causing the large-scale deaths of bees noticed here in October and since identified in 11* other states.

Colony Collapse Disorder most immediately threatens pollination of California's \$1.5 billion almond crop, which typically starts in February.

In a few months, though, it could impact Pennsylvania's \$45 million apple industry, the country's fourth largest, along with crops such as strawberries, cucumbers, pumpkins and cranberries. Without bees, some fruits and vegetables simply will not grow.

"It sounds like it's more widespread than we thought. It's a very serious situation," said Troy Fore, executive director of the American Beekeeping Federation in Jessup, Ga., the industry's trade organization. "Some of the numbers are just horrifying."

There is no substitute or simulated version of pollination, said Tom Rinderer, a researcher at the U.S. Department of Agriculture's breeding and genetics lab in Baton Rouge, La.

"Almonds are completely dependent on honeybees; apples and blueberries less so," Rinderer said. "There is no substitute, and wild bees can be unreliable."

The problem has been identified in states as scattered as Georgia, Oklahoma, Wisconsin and California, Fore said.

Talk of the die-off dominated the federation's annual

meeting in Austin, Texas, in January and will be the subject of a special meeting of researchers and government regulators and scientists in Stuart, Fla. Fore said.

Researchers are trying to find a common thread running through the abrupt loss of so many bee colonies in so many places.

"We called it Colony Collapse Disorder because calling it a disease may be misleading until we know the cause," said Dennis van Engelsdorp, a bee specialist with the state Department of Agriculture. "We are pretty sure, but not certain, that it is a contagious disease."

Van Engelsdorp spent last week taking samples in Florida. Superbowl weekend, he travels to California, site of the single largest honeybee pollination in the nation in any given year – the almond crop.

"It does look like there is a pathogen involved, but we have not been able to identify it," said van Engelsdorp, a member of a group of government and university specialists who are trying to find the cause.

This winter, Dave Hackenberg of Lewisburg, Union County, and one of the state's biggest beekeepers, lost about 70% of his beehives.

"It's worse than we ever thought it would be," Hackenberg said from Dade City, Fla., where he takes his bees each winter for orange crop pollination.

Many beekeepers are discovering dead colonies once they arrive in Florida and California, the two largest winter destinations for beekeepers, Hackenberg said.

The situation could worsen as the weather warms, said Maryann Frazier, an agriculture researcher at Penn State University in State College.

"Beekeepers in cold climates do not look at their colonies in the winter," she said. "Many are likely to be surprised when they look in the spring."

More than \$15 billion worth of U.S. agricultural products each year rely on honeybee pollination.

The effect on the honey market is less pronounced. More than half the honey sold in the United States is imported, especially from Argentina and China.

"Honey is a commodity, and there's a world price for it, just like oil," Fore said.

Rick Wills

Pittsburgh Tribune-Review

**According to CBS News on February 13, the problem has now been reported in 22 states including Michigan. No reports yet from Indiana or Illinois.*

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Dieoff alarms beekeepers, crop growers & researchers

UNIVERSITY PARK PA – An alarming die-off of honey bees has beekeepers fighting for commercial survival and crop growers wondering whether bees will be available to pollinate their crops this spring and summer.

Researchers are scrambling to find answers to what's causing an affliction recently named Colony Collapse Disorder, which has decimated commercial beekeeping operations in Pennsylvania and across the country.

"During the last three months of 2006, we began to receive reports from commercial beekeepers of an alarming number of honey bee colonies dying in the eastern United States," says

Maryann Frazier (pictured), apiculture extension associate in Penn State's College of Agricultural Sciences. "Since the



beginning of the year, beekeepers from all over the country have been reporting unprecedented losses.

"This has become a highly significant yet poorly understood problem that threatens the pollination industry and the production of commercial honey in the United States," she says. "Because the number of managed honey bee colonies is less than half of what it was 25 years ago, states such as Pennsylvania can ill afford these heavy losses."

A working group of university faculty researchers, state regulatory officials, cooperative extension educators and industry representatives is working to identify the cause or causes of Colony Collapse Disorder and to develop management strategies and recommendations for beekeepers. Participating organizations include Penn State, the U.S.

Department of Agriculture, the agriculture departments in Pennsylvania and Florida, and Bee Alert Technology Inc., a technology transfer company affiliated with the University of Montana.

"Preliminary work has identified several likely factors that could be causing or contributing to CCD," says Dennis vanEngelsdorp, acting state apiarist with the Pennsylvania Department of Agriculture. "Among them are mites and associated diseases, some unknown pathogenic disease and pesticide contamination or poisoning."

Initial studies of dying colonies revealed a large number of disease organisms present, with no one disease being identified as the culprit, vanEngelsdorp explains. Ongoing case studies and surveys of beekeepers experiencing CCD have found a few common management factors, but no common environmental agents or chemicals have been identified.

The beekeeping industry has been quick to respond to the crisis. The National Honey Board has pledged \$13,000 of emergency funding to the CCD working group. Other organizations, such as the Florida State Beekeepers Association, are working with their membership to commit additional funds.

This latest loss of colonies could seriously affect the production of several important crops that rely on pollination services provided by commercial beekeepers.

"For instance, the Pennsylvania's \$45 million apple crop – the fourth largest in the country – is completely dependent on insects for pollination, and 90 percent of that pollination comes from honey bees," Frazier says. "So the value of honey bee pollination to apples is about \$40 million."

In total, honey bee pollination contributes about \$55 million to the value of crops in the state. Besides apples, crops that depend at least in part on honey bee pollination include peaches, soybeans, pears, pumpkins, cucumbers, cherries, raspberries, blackberries and strawberries.

Frazier says to cope with a potential shortage of pollination services, growers should plan well ahead. "If growers have an existing contract or relationship with a beekeeper, they should contact that beekeeper as soon as possible to ascertain if the colonies they are counting on will be available," she advises. "If growers do not have an existing arrangement with a beekeeper but are counting on the availability of honey bees in spring, they should not delay but make contact with a beekeeper and arrange for pollination services now."

"However, beekeepers overwintering in the north many not know the status of their colonies until they are able to make early spring inspections," she adds. "This should occur in late February or early March but is dependent on weather conditions. Regardless, there is little doubt that honey bees are going to be in short supply this spring and possibly into the summer."

Pennsylvania State University



Photo: Zachary Huang www.beeography.com

CBS runs national story on CCD On February 13

It was the first nationally broadcast report on the problem. Had this been a decade ago, before Internet usage was widespread, this probably would have been the first we heard of it.

But thanks to the Internet, and the ability it offers to scan for news stories from just about anywhere, plus the many forums and blogs on beekeeping, we had an early warning. Unfortunately, until we get some details correctly determined by the scientists, most of what's being suggested is just guess work.

Bees disappearing from the hive could be absconding, or they could just be exiting at a distance far enough away from the hive and dropping dead. And one would presume that absconding bees have a reason to leave.

If their disappearance was just a bizarre behavior, it would still need to be determined if it was programmed into their genetics, or the result of environmental factors.

Could it be the result of our abnormally mild early winter or other weather issues. While I haven't seen it yet, I'm waiting for someone to suggest it's related to global warming.

One column in a national bee magazine suggested it could be an intestinal problem, perhaps a new form of Nosema. If this were true, we might have expected some of the fecal stains that are so common to Nosema infections.

Other things being checked on are pathogens. We know it can't be the DWV virus vectored by varroa mites because that virus renders the bees unable to fly and we'd see the bodies outside the hive entrances. It is perhaps an entirely new pathogen, and yet it probably isn't entirely new at all, but one that was helped along by the right

environmental or weather conditions.

We know that beekeepers have had losses of 50% or more over the winters in the past decade, although recent winters were seeing higher survival rates we know that every winter is unique and it's certainly possible to have a reoccurrence of the serious dieouts of the late 90s.

If you don't remember those dieouts, let's just say that

a lot of beekeepers got out of the business as a result of those years.

We have the benefits of the past couple of decades. It would be unwise for us to expect to be exempt from this problem because it hasn't happened to me... yet.

And, we have scientists and at least some funding in place quickly. Last month's almond pollination in California provides a living laboratory where colonies can be observed in spring weather.

And with any luck we'll have our problem identified soon, and then the hunt can begin for a solution.

One of our graduates posted a message saying don't be in denial but don't jump to conclusions either. He even suggested praying about this might not be a bad idea.

Remember, we're not waiting for the sake of waiting. We're waiting to learn the facts.

Finally, I want to comment on the CBS News story. My first reaction to the story – before it aired – was that

this was a ratings period, and objectivity might be missing.

CBS did a fine job pointing out the importance of the honeybee and keeping the story on the facts. I was wrong in my assumptions and they deserve full credit.

Rob Green

The Case Of The Vanishing Bees

OAKDALE CA – In spite of all the advances in agriculture, honeybees remain indispensable. By moving pollen from flower to flower, bees are the only efficient way for many crops to pollinate, CBS News correspondent John Blackstone reports.

As growing season begins in California's Central Valley, there is nothing quite as busy as a beekeeper. Farmers pay them to put their hives in their fields and orchards.

"It means the difference between profit and loss for them," says beekeeper Lance Sundberg.

But beekeepers like Sundberg have a mystery in their hives this year. Bees are disappearing at an alarming rate.

"Colonies are going down. The bees aren't dead in the box or aren't out front," says Jerry Bromenshenk, a bee researcher at the University of Montana. "They've just disappeared. Just vanished."

Bromenshenk is leading a team of bee researchers looking for a cause. He's even listening to hives for signs of distress. Beekeepers in 22 states have reported bees dying in huge numbers.

Jeff Pettis of the U.S. Department of Agriculture says parasites and disease have killed bees in the past, but never anything like this.

"We went through multiple hives and we couldn't find anything that I would even call a beehive, so it was depressing," Pettis says.

Part of the mystery is that colonies can go from active and healthy to dead and gone within days. For beekeepers, that's a loss that stings.

They "just disappeared," says beekeeper Louise Rossberg. "There's nothing there. There's no bees on the ground anywhere. There's just a completely empty hive."

In just a few weeks, Rossberg has seen hundreds of her hives go empty. "I don't know what to do," she says. "And I'm not alone."

For now, plenty of beekeepers are stacking up silent and empty hives. But scientists are working hard to find the cause and a cure for what's ailing the bees. After all bees do for us, it's the least we can do for them.

CBS Evening News

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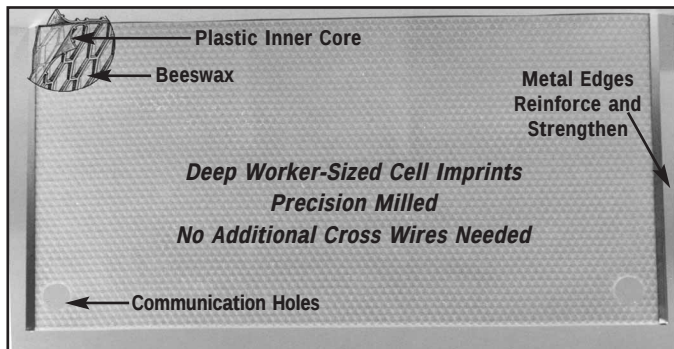
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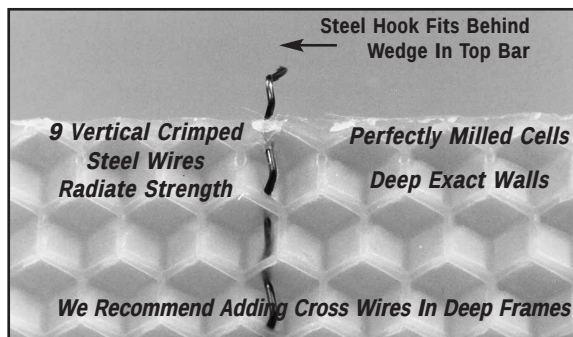
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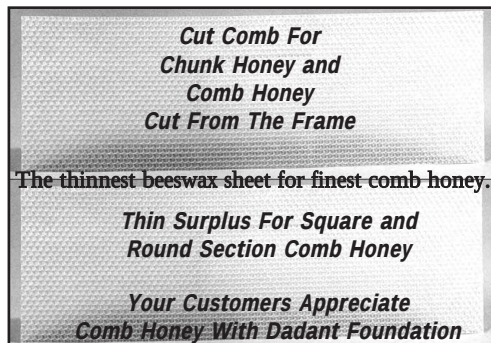
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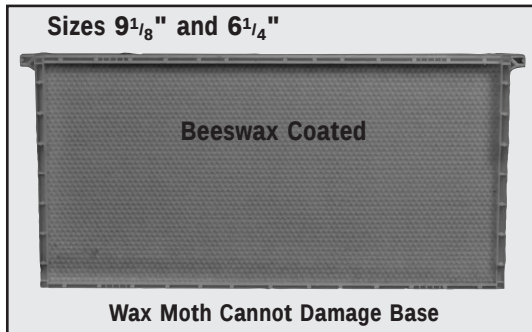
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It's a National Problem

The map (right) was current as of Friday, February 16, when it was revised.

New York state was added, and Indiana was moved back to non-reported status. Earlier in the month, Indiana had been mistakenly flagged as an affected state. It's good to be accurate, but it's not a victory by any means.

A quick look at the map shows the problem is occurring in most every region of the country, in all climatic zones. It's a coarse method of highlighting the problem, and it doesn't tell us very much except that no one and no region should feel smug or complacent.

Jerry Bromenshenk (pictured) writes the following:

The maps of CCD are based on the beekeeper survey posted on **www.beesurvey.com**. All state reports must be confirmed by follow-up interviews, inspections. The maps are based on a 12 month period – not all states are experiencing the CCD at this time. For a state to be added to the list, we look for evidence of collapse in the state itself, as well as any collapse in states like California or Florida.

Most recently, CCD has been playing out in CA, OR, OK, and TX, as well as some continued failure in SE states.

Several beekeepers have indicated that we should go back 2-3 years.

As per honest responses – we've made a concerted effort to protect beekeeper confidentiality (read the intro to the survey). In fact, after the latest map was posted, some state inspectors called or e-mailed us, wanting to know WHO the reporting beekeeper(s) were.

We told them that we can only share that information IF the beekeeper has checked the box on the form allowing us to do so. Not surprisingly, state regulatory officials are the one group that several beekeepers do not want to receive specific information.

Once again, the only way we can get correct data is if you, the beekeepers, provide it. We need to know where and when the CCD has been seen, actual locations of affected yards – to see if it spreads to nearby yards, and management information that may help us understand what beekeepers without the CCD are doing differently, if anything, from those with the disorder.

As such, not only do we need to hear from beekeepers who have experienced the CCD, but we need to also need to have beekeepers who have managed a reasonably large number of bees for several years without seeing the CCD. (A beekeeper with 1-2 years experience and 1-2 hives is

too small to tell much – may have just been lucky).

So, rather than argue the correctness of the survey, please participate. These surveys depend on adequate input.

We need your assistance. Our maps are based on the best available information, and that information mainly comes from beekeepers. Where possible, we try to get independent confirmation, but we have to trust the beekeeper in the same way that the beekeeper has to trust that we will protect the confidentiality of the information.

Finally, the map on CBS February 13 is already out-of-date. You can all add Washington and New York to the list of affected states.

Again, the location of the survey is www.beesurvey.com. Once again, here's Jerry Bromenshenk with more comments about the survey, the map, and search for answers...

If a bright side exists, it's that CCD is helping our beekeeping industry by making us take a long look at the way we keep, medicate and feed our bees! And, I'd add, the industry (and researchers) need to stop making excuses for bee losses. Bee losses are telling you something. I'm from a cattle industry (beef and dairy) background. If we had routinely lost 20% or more of our cows, we'd have been considered very poor cattle men, and probably would not have remained in business.

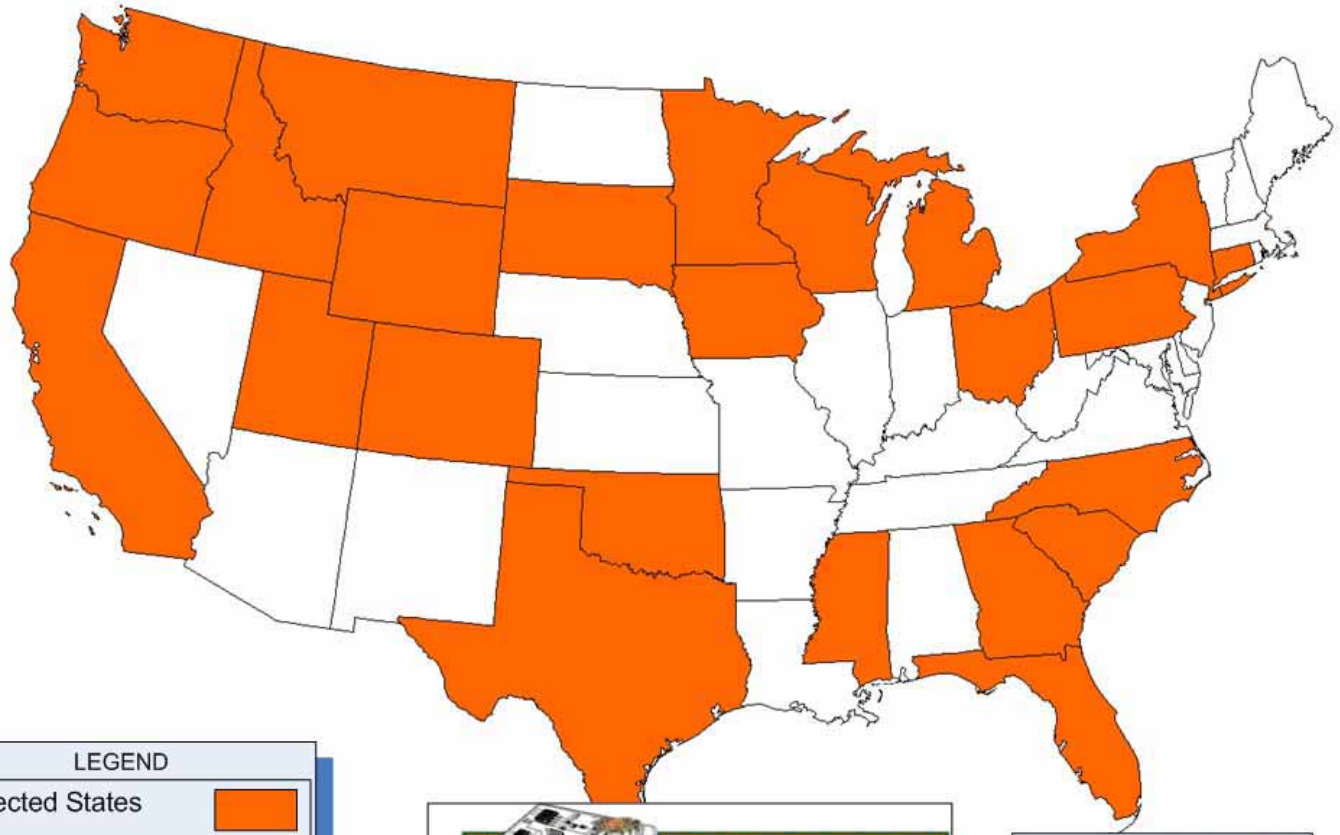
By excuses, I mean taking the easy way out – picking your favorite culprit of the day. In the 60s, early 70s, pesticides killed the majority of bees. In the 90s, mites killed bees, or mites and viruses. In recent years, it's new pesticides, and because of some bad batches of HMF in California earlier this year, it's now HMF. If not, the new noseema. And, when none of these fits, the driver left the truck in the sun or its toxic honeydew.

All of these can and sometimes are causes of bee losses. But, common sense says pesticide usage hasn't diminished, and some beekeepers in specific regions of the U.S. have been very vocal about this – yet most beekeepers that I know have assumed for the last couple decades that they somehow WERE routinely not exposed to the same chemicals – until the CCD. Why are pesticide kills occasional nowadays, with more and I'd contend, riskier chemicals being used in recent years? Because its mites that kill bees, as everybody knows – or thought they knew.

The CCD has brought some regional favorites – causal agents – to light. Toxic honeydew – or just poor nutrition from honeydew – seems to be real in some areas at some times – but where's the proof? So far, it's always been – my dad told me, another beekeeper told me.



Honey bee Colony Collapse Disorder
Map of Affected States February, 2007



LEGEND

Affected States



Non-reported States



Bee Alert Technology, Inc.

Analysis & Map Support
by Lupine Logic Inc.
(2/16/2007)



In some cases, honeydew was blamed for the CCD when that region produced no honeydew (at least not that any plant industry or other beekeepers know about). I'm sure that there are regions with toxic plants – but just because bees fail in a region doesn't prove it's from a toxic plant source.

Maybe someone ought to sample, find out once and for all – is it real, or is it a myth? Is something else in the area causing the problem? For example, MT beekeepers are concerned about death camas – and I'd say its a fair question. But the patch of death camas next to my 60 colony research yard never gets any visits. Our beekeepers want to prove me wrong, and I hope they do – but my bees are at no risk from this plant.

At this point Jerry encourages all

of us, to review the report published this far on CCD. You can find it at www.ento.psu.edu It's being revised over and over again, so you'll find the latest version on that website.

Jerry spoke to the idea of whether use of High Fructose Corn Sweetener (HFCS) was a cause.

We've been asked if beekeepers that fed only sucrose (sugar water) and not HFCS and yet, still experienced the CCD? The answer we've been getting is "Yes."

That said, we at Bee Alert/UM are sampling for HMF residues, just in case – but I no longer think this is the main issue – maybe it is in a few cases.

I don't know that anyone will argue that HFCS is the best food for

bees – but it may be better than starvation – maybe not.

Our surveys, and remember, we've been in a lot of states and have received input from a lot of beekeepers indicate that HFCS is NOT, in many cases, a factor. It may contribute (as another stressor), but we've got beekeepers who have never fed HFCS with the CCD problem. We have bees that had great stores of honey and natural pollen, STRONG bee populations, and the bees crashed with CCD. And feeding with sucrose does not necessarily protect the bees from CCD.

Note, no one wants a simple fix more than I do, but it just isn't happening.

We appreciate Jerry's time helping us at Midwest Beekeeper.

Rob Green

As a beekeeper, you should know about CCD

You have heard the PMS and *the PMS*, with the second one relating to bees, the Parasitic Mite Syndrome. Another new acronym was made quite recently, again a synonym with a well-known one. For most digital photographers, CCD stands for “charge coupled device,” which Nikon cameras use to replace the film.



Unfortunately the new CCD has nothing to do with digital photography (which I happen to love, right next to my love of bees). The second CCD stands for *Colony Collapse Disorder* and has been literally the talk of the nation for the past few weeks. It is large in scale (22 states are affected), comes in quickly (colonies that were fine in August/September had collapsed by October/November), and hit people hard (many beekeepers, the majority of them migratory beekeepers, with hundreds to thousands of colonies are losing 50-90% of their bees). The worst of all of this? We do not yet know what causes it!

The symptom seems to be that bees simply disappear, that is why initially people called it the disappearing disease. A colony with 40,000 bees in the fall, apparently healthy with lots of honey and pollen, suddenly has nothing or a handful

of bees with a queen left. Very few dead bees are found inside the hive or near the entrance. What could be causing this? A few things come to mind. When tracheal mites (*Acarapis woodi*) first showed up in North American (circa 1983), we had bees disappearing also. The disappearing mostly happened during the over-wintering process – colony with small clusters or no bees in the spring because bees with their trachea plugged with mites could not make back to the colony after defecation flights or they simply fly out to die late fall.

A new species of nosema (*Nosema ceranae*, so named because it was discovered first in the Asian honey bees, *Apis cerana*) also showed up in the European bees (*Apis mellifera*, the only species we have in North America and Europe) in Europe during summer of 2006 and killed up to 60% of bees in some apiaries. Recently it is confirmed to be present also here in our bees in US. It could be also related to all the chemicals we have been throwing into bee colonies, which conceivably can weaken the immune system of honey bees and/or affect their learning and orientation.

A few years ago, French beekeepers suspected that their “Mad Bee Disease,” where bees got confused and could not return home successfully, was related to the use of an insecticide called Gaucho. These are just some of the possible causes that came to my humble mind and they may or

may not be the real cause of CCD. Scientists from the University of Montana, Penn State University, Bee Alert Technology, Inc. and USDA Beltsville Bee Lab have been collecting and analyzing a large number of bee samples. Funding help has come from the National Honey Board and U.S. Army’s Center for Environmental Health Research. We will have answers soon.

Midwest beekeepers will be impacted by this new disorder in several ways. First, MI, OH, PA, NY and WI are on the map as officially having CCD, while IL, IN, KY and WV remain as unreported, which can either mean the disease is not present (highly in doubt), or simply nobody reported the occurrence (either did not know CCD was killing their colonies or did not bother to report).

A more widespread impact would be for beekeepers who do not experience this disorder but lose colonies anyway due to severe winter conditions. It is already common for beekeepers to lose 50-70% of their colonies during the wintering process because a combination of stresses: varroa mite, tracheal mite, nosema disease, and residual pesticides inside colonies. Prior to the arrival of both mites, the normal winter loss is about 10-20% in the Midwest, this number has increased considerably the last few years. These beekeepers rely on buying package bees to replenish their lost colonies. There will be a significant increase of package bee price simply because of the bee shortage caused by the large CCD related die-offs.

In 2006 the average price of 3 lb packages was already \$65, compared to \$45 five years ago. This price might yet increase again. A third way of impacting the Midwest (or other States) would be higher pollination fees for fruit and vegetable growers. In the past few years, apple, cherry and blueberry growers have been paying \$40-50 a colony to pollinate their crops in the Midwest, because pollination is the critical step to insure a good crop for these fruits. Again due to bee shortages, the fee per colony will be increased. In California some almond growers are paying as high as \$200 a colony for this year’s pollination job, compared to \$125-160 per colony spring of 2006.

In the meantime, use this chance to educate your neighbors and the politicians about the importance of bees to our agriculture. Hopefully we will know the real cause of, and some ways to combat, another new and dreadful problem to beekeeping, the CCD.

Zachary Huang

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Seven Questions for Indiana's Chief Inspector

Colony Collapse Disorder (CCD) seems to be affecting beekeepers in a significant number of states. Severe losses have been recorded already in Pennsylvania. Do we have any indication of the problem for Indiana?

Not that I know of.



Finding the pathogen, if any, seems to be the particular problem. As this all came along about the time that hoosiers were putting their bees down for the winter, what do you expect we'll find in the spring?

This article talks about fall die out not winter die out. Winter die out will depend on how well the bees went into the winter. That they had enough food. That mite population was low enough, and disease-free.

If we have winter die out it will be hard to tell what killed them. If they were too weak due to this new disease or was it something else. We may be able to tell if it is starvation or the bees getting wet by where the cluster was and what shape they were in.

Is there an indicator from other states that this affects pollinators more than beekeepers who simply keep their

bees in their own yards all year?

No news from other states yet. Other states may be still checking. As to pollinators vs. hobby beekeepers, no news yet.

Is there an indicator that the problem may have been spread by packages or nucs from southern states?

Do not know. Cannot say that either.

How well equipped is Indiana, and the DNR, to respond to this problem, should it develop into a major catastrophe for beekeepers? Is there any chance that the state will increase their commitment to the apiary inspection program?

I alone will be the apiary inspection program. There is no money in the budget for seasonal inspectors. I will keep in touch with USDA. Hopefully they will be able to find and ID what is killing off these hives. Once we know what is causing it then we can do something about. If we do not know what is causing it we cannot treat for it.

Indiana beekeepers will have to keep their hives strong. If they purchase queens, packaged bees, or nucs from someone they should do their homework. Ask the person or company if they have any problem with this fall die off. What they use for mite control. Ask any other question they may have.

Given the sudden arrival of this problem to beekeepers across the U.S., do you recommend an early spring inspection for beekeepers?

This new "disease" will not make a difference in if we should inspect hives in spring. You should be checking your bees in early spring anyway to make sure they have enough honey to make it till a good flow. Weather will be always and issue on how we can inspect hives. If it is cold out, below 50, you will not be able to do a complete inspection. When it gets above 55°, you can get in the hive for a time. I would not do a complete inspection until the "average" day time highs are around 65°.

What recommendations do you have for midwest Beekeepers?

Keep up good beekeeping practices. Make sure the bees have enough honey. That the bees stay dry. Keep checking hives through the active season making sure you have a strong queen leading to a strong hive.



Photo: Zachary Huang www.beeography.com



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Afterword

This was a very difficult issue to put together. Almost everything in these pages is related to Colony Collapse disorder, and we're well aware that putting things into a published volume means it's going to become dated, and obsolete very quickly.

Even worse, this story has been taken up by the national express and everybody's asking "What is it?"

The fact is, we still don't know. But I'm confident in the people who are doing the research that it won't be

long. Then we'll know.

And it really doesn't change things for our graduates. For the past five years our students have left the classes knowing that beekeeping is an uphill battle. We have good years and then we have occasional very, very bad news.

But we're all committed to doing our best to help the honeybees, and to keep them safe. After all they do for us, it's the least we can do. So, we'll press on.

If you like the photographs in this

issue, they're all for sale. Zachary Huang, who writes regularly for us, is a photo buff and these are all his pictures. I had the privilege to being side by side with him, our cameras in hand, taking photos of these wonderful insects

View his portfolio and consider buying some at www.beetography.com.

Midwest Beekeeper