

2014 05 00 -- Chensheng Lu -- Amateurish Attempt To Perform Bee Research
By Lunatic Of Harvard Medical School -- Randy Oliver

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Beekeeping Through the Eyes of a Biologist

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News and blogs page

The New "Harvard Study" on neonics, May 2014

Dr. Lu of Harvard Medical School, who has no background with honey bees, attempted to run an experiment in 2012 ([The 2012 Harvard Study](#)) that would "prove" that the seed treatment of corn put so much imidacloprid into high fructose corn syrup that the feeding of such was the cause of CCD. Although both the notion and the way in which the "study" was run were preposterous, and were dismissed by all serious bee researchers, it nevertheless got a lot of press.

Thoroughly chastised by the bee research community for his amateurish attempt to perform bee research, Dr. Lu recently released yet another [study](#), again in a journal practicing questionable peer review.

Update: May 16, 2014

My criticisms of Dr. Lu's studies have raised a great deal of interest. I'd like to explain my position. As a beekeeper who makes his living from having healthy colonies of bees, I am acutely interested in the causes of colony morbidity and mortality. Without a doubt, pesticides can cause colony morbidity or mortality, which I've covered in my Sick Bees series of articles (e.g., [The Slaughter of the Innocents](#)). The neonicotinoid class of insecticides are no exception, and I've detailed problems associated with them in [The Neonicotinoids—Trying to Make Sense of the Science](#). But I've also done on-the-ground reality checking on the effects of neonics upon those bees and beekeepers at Ground Zero of neonicotinoid use in [The Extinction of the Honey Bee](#). Although I initially suspected that

neonicotinoids may have been a likely cause of Colony Collapse, my extensive research does not support that hypothesis.

I've also run (or participated in) a number of studies on the actual causes of colony collapse, and have published a widely-accepted model of its progression ([A Model of Colony Collapse](#)). Any of several factors may be involved in colony collapse, including pesticides. In short, sudden colony depopulation is typically due to the troika of varroa, viruses, and nosema, exacerbated by poor nutrition, beekeeper-applied miticides, and chilling—which may push colonies past the tip point. Exposure to agricultural pesticides can certainly be involved, but other than in the case of the planting dust from corn seeding, there is scant evidence that the neonicotinoids at field-realistic exposures are a consistent contributor; there is abundant evidence to the contrary.

Although I receive abundant positive feedback and support from the beekeeping community, there are those who excoriate me for telling the truth. It irks me, that instead of discussing facts and research, they stoop to trying to discredit me as being beholden to the pesticide industry or some other bullshit (go ahead, ask any pesticide company which writer they are most afraid of crossing).

Perhaps one should instead ask why a Harvard medical researcher with no background in entomology or beekeeping is attempting studies with honey bees. A recent post to Bee-L offers a suggestion:

The word around here is that Lu really doesn't care about bees at all. They report that he's attempting to use the bee results to prove that neonics are harmful to humans. I was in one of those yards last summer inspecting some other hives (there was a significant AFB problem in some other hives). I [was] surprised that these bees did not get infected since neonics are reported to suppress the immune system of bees.

I truly appreciate Dr. Lu and all other researchers who are looking out for negative impacts of pesticides on either human health, or that of the environment. I'm a long time organic gardener myself, and use only "natural" mite treatments in my own commercial operation. I find myself in the curious and unlikely place of appearing to defend the neonics. In actuality, I am defending only the truth and good scientific inquiry.

As a lifelong environmentalist, I'm distraught that so much environmental activism is misdirected these days to trivial issues. We have serious problems to address—the burgeoning human population, the destruction of natural habitat (and the associated extinction of species), unsustainable

farming practices, the overfishing and pollution of the oceans, and skyrocketing CO2 levels. The focus on the neonics distracts us from more important considerations. Honey bees are *not* going extinct by any means. Varroa and loss of forage are our main problems. OK, now that I've got that straight, let's get back to the "The Harvard Study on CCD Redux."

Let me be clear that I commend Dr. Lu and his collaborators for stepping up their game—this time they at least took the time to monitor varroa and to treat against nosema.

But it's still hard to imagine that anyone actually reviewed this paper. For example, their total description of the alcohol wash was "The Varroa mite counts were assessed twice using the common alcohol wash method." Only later do we learn that they washed only 150 bees per sample (instead of the "standard" 300), with no explanation of from where the bees were collected in the hive (from a brood frame?). Nor did they specify the sugar concentration of the syrup solutions. And the number of colonies tested was far too few from which to draw statistical conclusions (plus the error bars were not given in the usual manner as SEMs). Such omissions are normally caught by at least one reviewer.

Although the researchers ran a better trial this time, they still fed the test colonies levels of neonics far above any normally found in the "real world" (i.e., not field relevant). The dosage that they used in the fed syrup, 135 ppb (w:v, or slightly less on a w:w basis), is far above the levels found in any crop plant nectar, which typically run in the range of 1-3 ppb (perhaps up to 20 ppb in extreme cases). Levels of over a hundred ppb are typically only reached in the case of overapplication by drenching ornamental plants or by tree injection. In a recent study by Bayer themselves, and reported by Bayer ecotoxicologist Dr. Dave Fischer at a recent national bee conference, the Bayer researchers observed adverse effects on colonies from imidacloprid fed in syrup at 50 ppb, and freely admit this, since that level is never observed when the treatments are properly applied.

So why Dr. Lu would feed syrup spiked with neonics at 100 times the normal concentration found in corn pollen or soy or canola nectar is beyond me! As one beekeeper in a discussion group pointed out, Lu's "findings" did little more than support the fact that feeding bees highly toxic levels of insecticides may eventually kill them. No surprise there!

Of interest though, is that although Lu fed colonies a half gallon of clearly toxic syrup every week for 13 straight weeks during the summer, he noticed no difference between the treated and the control groups from the beginning

of July (when they started poisoning the hives) through the end of December. Why they didn't notice the colony morbidity observed by Bayer researchers is surprising.

What is more interesting is the apparent delayed effect of the neonics (if there actually was one—there were too few colonies in the trial to actually say so with certainty). Why did the treated colonies not die until after January 1st? One thing that comes to mind are the viruses and nosema that tend to spike at that time of year (although Lu did apply an antibiotic against nosema, he did not confirm actual nosema levels).

This raises the question as to whether that extreme exposure to neonics reduced the bees' immune suppression of viruses, as recently reported in a well-performed study by [Di Prisco](#). Since the most problematic viruses to bees are those vectored by the varroa mite, the mite levels in Lu's study are of interest.

Lu's mite counts in mid August, were 7-8 per 100 bees, a level at which viruses start to go epidemic. Note that this varroa infestation rate was about twice the national average for hives in August ([USDA](#)). So Lu's colonies would likely have been fighting virus epidemics when he finally treated for mites. The question then is whether the exposure to neonics had anything to do with the colonies' getting the viruses under control once varroa were reduced.

Perhaps the most serious shortcoming of this paper is Lu's claim again that he observed symptoms of CCD. CCD is defined as the sudden disappearance of adult bees from queenright colonies with brood, with no dead bees present. To the contrary, Lu shows a photo of dead bees on the bottom board, and describes the surviving treated colonies thusly:

The honey bee clusters in the six surviving neonicotinoid treated colonies were very small, and were either without queen bees, or had no brood.

So I have no idea how he feels that he can claim that he created the symptoms of CCD. It appears instead that treatment with sky-high levels of neonics may have led to queen failure during the ensuing winter.

What would have been of interest is if the researchers had measured the residue levels in the honey of the overwintering colonies. Lu gives us no verification that the winter bees were even exposed to neonics (residues would have needed to have been in the stored honey). If Lu had sent some winter honey samples in for analysis, we might have learned the mechanism

by which summer exposure to high concentrations of neonicotinoids might affect the early spring buildup of colonies.

In any case, this “study” is more a distraction by someone trying to save face, rather than being a meaningful contribution to bee science.

Update May 15, 2014

I've now been contacted by a number of reporters, one of whom told me that Dr. Lu is personally trying to discredit me by saying that I'm funded by pesticide companies. Such desperate personal attack using disinformation is appalling—if his work can't stand on its own legs, it makes no difference who is critically reviewing it.

Allow me to reprint a comment on Lu's recent paper by a prominent university entomology professor:

Although there are a lot of good studies on pesticide effects and bees, this is not among them.

There has been a lot of discussion about this paper in recent days and I have rarely seen any published study so thoroughly reamed by other scientists than this study (as was a previous one by Dr. Lu.)

Anything of this nature that has to be published in the Bulletin of Insectology – an extremely obscure Italian journal – should raise flags. It is strongly suggestive that the author was unable to find a more legitimate outlet to accept this research. A critical review of his methods and assumptions indicates that this paper contributes nothing new or useful to this complex subject.

Another well-respected bee researcher wrote me that:

Once again [Lu] is proving that insecticides kill bees.

It is too bad when someone does not know about bees stick his nose in bee research.

I had gone fairly easy on my review of Lu's recent paper. One reporter asked me why I've put so much effort into reviewing Lu's papers. I have nothing against Dr. Lu or his research. In fact, prior to the publication of his previous paper I had offered to withhold any criticism if he were to withdraw it from publication.

The problem lies in that Lu's research isn't about trying to learn something about CCD; rather, it is to support a preconceived agenda—that a certain insecticide is the cause of CCD (despite the fact that no other researcher on Earth, no matter how hard they've tried, have ever been able to make such a connection).

Lu's sophistry offends my Boy Scout upbringing. Scientific studies should be performed honestly and without bias or agenda. And they should be based upon validated assumptions, not made up numbers, sloppy technique, poor data collection, etc.—all problems in this study.

Perhaps the most egregious claim of Lu's studies is that he despite the fact that in neither of his studies did the field signs match the published criteria for Colony Collapse Disorder (he himself states that *"Although this observation is not quite reminiscent of the reported CCD symptoms"*), he continues to issue [press releases](#) that he has found the cause of "CCD."

And then some of his methods and discussion are simply ridiculous; examples to wit:

1. His "grading" of the strength of colonies consisted of *"Notes were taken on the size of the clusters observed by counting the numbers of frames containing honey bees from the top of the hive in which it generally took no more than 10 seconds."* As an almond pollinator and researcher, I've graded thousands of colonies for strength. Lu's method of grading does not even begin to constitute any sort of meaningful data—it takes careful inspection from the top and bottom of each box, and very close observation to estimate the strength of a cluster of bees.
2. His treatment for nosema apparently consisted of an unapproved "drench," with no mention of the amount or how it was applied, and no verification whatsoever that it had any effect upon nosema.
3. He states that *"only 1 of the 6 control colonies was lost exhibiting Nosema ceranae like symptoms, although we did not perform any test to confirm Nosema infection in this control hive."* Well, in the first place, there are no field signs for *Nosema ceranae*, and for all he knows, all the colonies that dwindled were infected by nosema, since he did not test.
4. In his press release, he claims that *"We demonstrated again in this study that neonicotinoids are highly likely to be responsible for triggering CCD in honey bee hives that were healthy prior to the arrival of winter."* How in the world can he claim that the colonies

were “healthy”? He only tested for varroa levels, not for any of the common pathogens that take down colonies during the winter (DWV, IAPV, ABPV, KBV, LSV, or nosema).

5. Lu continues to pull numbers out of his, er, behind, e.g., *“Assuming each colony consisted of 50,000 bees at any given day in spring and summer.”* He ran the study in double-deep Langstroth hives containing 20 frames, but *“The dosing regime was initiated after each of the 20 hives consisted of at least 15 frames of bees.”* It takes about 2000 bees to completely cover a frame, so 15 frames of bees would only be 30,000 bees. Even if every single frame was completely covered with bees (which would likely have led to swarming), such a hive contains fewer than 40,000 bees at the peak of the season.
6. And then he uses his made-up figure to calculate the average exposure of each bee to the insecticides in order to be able to claim that they were given a sublethal dose. How the hell does he know which bees actually consumed the spiked syrup and whether they even consumed it or stored it as honey? **He performed no testing of either bees or honey to validate exposure, or to be able to make the statement that they were given a sublethal dose.**
7. He makes a big point of saying that the bees were fed a sublethal dose. So let’s look at his calculations. He fed each colony 1.9L of syrup each week, but did not check back to see how quickly the syrup was consumed. He rather assumed that the syrup uptake could be divided equally by 7 days. But any beekeeper knows that a strong colony will easily slurp up a half gallon of light syrup in a few hours. So if we divide the 258,000ng dose by a realistic 30,000 bees, we get 8.6ng of insecticide per bee—twice the daily LD50 for clothianidin that he cites in the paper! **That means that for at least one of the test insecticides, they were fed at least twice the lethal dose for every bee in the hive once a week for 13 consecutive weeks!** It’s truly a wonder that the colonies didn’t dwindle sooner (unless his poor method of “grading” by only looking at the top bars of the upper box for a few seconds simply missed the fact that the colonies were actually dwindling during summer (extremely likely). And even the above figure assumes that the dose was equally distributed to every bee in the hive—again a ridiculous assumption, since only a portion of the bees actually work the feeder.

I am no supporter of insecticides, and am acutely aware of their negative effects upon colonies (I suffered bee kills from pesticides this spring). But I am a strong supporter of good science. It disturbs me greatly when trash like Lu’s papers become the darlings of advocacy groups to support their

misguided agendas to ban a particular pesticide outright, rather than to find the actual causes of colony losses, and to push for specific regulations that would ensure more pollinator-friendly use of pesticides in general (like not spraying on flowering crops during daylight hours).

There is so much really good research being done by dedicated bee scientists (who actually know what they are doing). They are helping us to understand which pesticides (including beekeeper-applied miticides) are actually contributing to colony morbidity and mortality. I have no idea as to why a study like Lu's gets so much more attention.

Update May 16, 2014: I'm getting emails from bee researchers and beekeepers from all over, thanking me for publishing scientific critiques of Lu's studies. The scientists (many with lifetimes of work on honey bee health) are all dismayed that Lu's "study" is getting any attention from the press. One wrote:

"His work is clearly biased, sensational, and, through sins of omission (in full statistical transparency and ignoring or not reporting contrary evidence), provides the signature of "advocacy science," where the objective is not to shed light on a subject, but to tweak experiments until they fit preconceived bias.

There are good reasons why Dr. Lu has had to publish his data in Bulletin of Insectology, and not elsewhere. Even greenhorn reviewers should have caught the large number of problems with his 2012 and 2014 papers. Bulletin of Insectology appears to welcome anti-neonicotinoid papers, even when they are poorly conducted and written.

I would suggest that every opportunity be used to explain to the public that Dr. Lu's experiments represent extreme dosing of honey bees, and that Dr. Lu's own data demonstrate that at field-relevant dosages, neonicotinoids do not appear to harm bees.

Only properly conducted and adequately replicated experiments exposing honey bees to a series of dosages of neonicotinoids that they could encounter and store in the hives will fully resolve the question of whether honey bees will abandon the hive during the winter, as was demonstrated in his 2014 paper that used extreme dosages. His work represents a fringe element that ignores wide geographical patterns and much more plausible explanations for Colony Collapse Disorder.

A good blog on GMO's—another hot topic.

<http://appliedmythology.blogspot.com/2013/10/the-people-side-of-gmo-crops-part-i.html>

October 8, 2013

“As with any new technology, the development and commercialization of biotech crops is a story about people. Its a story about people with ideas and vision; people who did hard and creative work; people who took career or business risks, and people who integrated this new technology into the complex business of farming...

Many narratives about “GMOs” leave out the people side, presenting it instead as some faceless, monolithic phenomenon devoid of human inspiration, intention and influence. That’s not how it happened. Other narratives about “GMOs” demonize those who made biotech crops a reality. Such portrayals are neither fair or accurate. The real stories of these people matter, because trust in a technology is greatly influenced by what people believe about those behind it.

800-lb Gorillas and Biotechnology

May 25, 2013

Plant scientist Steve Savage has been blogging to tell it like it really is with regard to pesticide and biotech issues. I highly recommend his posts for good, factual information.

OK, the public has been exposed to a pretty one-sided media demonization of GMOs. For some more rational and informative information, I’ve compiled some alternative recent writings at [GMO Updates](#).

What Happened to the Bees this Spring?

April 18, 2013

The news is rife with the shortage of bees for almond pollination this spring. Were the neonicotinoid insecticides to blame?

Key words: colony collapse, almond, pollination, pollinators, CCD, neonicotinoid, pesticides

The Birds and the Bees

April 3, 2013

Are the neonicotinoid insecticides the cause of bird decline? (I wrote this blog as a response to an email from a good friend who is a leader of the organic farming movement, and thus the discussion of the Big Picture of agricultural practices.)

The 2012 Harvard Study on Imidacloprid and CCD

Researchers at the Harvard Medical School attempted to “prove” that unsubstantiated insecticide residues were the cause of Colony Collapse Disorder. I review the study, and ask the authors to explain their study as would a referee in a standard peer review.

“Zombie Bees”

A parasitic fly was recently discovered to be infesting honey bees– the press wildly extrapolated it into being the cause of CCD. I’ve kept in touch with the researchers in San Francisco, and with beekeepers in the affected areas. The study is ongoing.