

Rethinking the pesticides–neonicotinoids–bee health crisis narrative: Why the media get it wrong

Jon Entine | Genetic Literacy Project | January 9, 2018



A

re bees endangered because of the use of insecticides, and in particular the class of chemicals known as neonicotinoids, which are used on many crops?

It's a debate that's played out in research laboratories and in the media over the past decade since the phenomenon known as Colony Collapse Disorder roiled the bee industry in California and elsewhere in North American and Europe beginning in 2006-7.

entomologists, farmers and beekeepers, are genuinely struggling to understand the complex factors behind why bees face a host of problems, from attacks from the killer [Varroa destructor](#) mite to the overuse of insecticides to kill them and the pervasive use of agricultural pesticides. But in the media and in cyberspace, hyperbole and ideology have come to eclipse rational discussion and the sometimes plodding pace of science. The highly-charged debate now pits activists, including some advocacy-minded scientists, against the agro-chemical industry and many scientists who view neonics as a relatively minor driving force in the health issues confronting honeybees and bumble bees.

One resource that has often been looked upon by the media as an objective source is the [Bee Informed Partnership](#) (BIP)—a US Department of Agriculture project developed in cooperation with University of Maryland entomologist [Dennis vanEngelsdorp](#). Each year in the spring it releases an annual U.S. ‘[bee hive loss estimate](#)’. Each year, it seems, the report frames the debate over whether the ‘bee crisis’ is accelerating or abating.

Media v Science?

The popular narrative among journalists and on the Internet in recent years has been that honey bees and wild bees face impending doom—it’s been dubbed a beepocalypse or beemageddon, with most of the ire focused on a class of pesticides, applied mostly as a seed coating, known as [neonicotinoids](#). The insecticide was introduced in the 1990s in large part to replace chemicals that were demonstrably hurting bees and posed human health dangers as well.

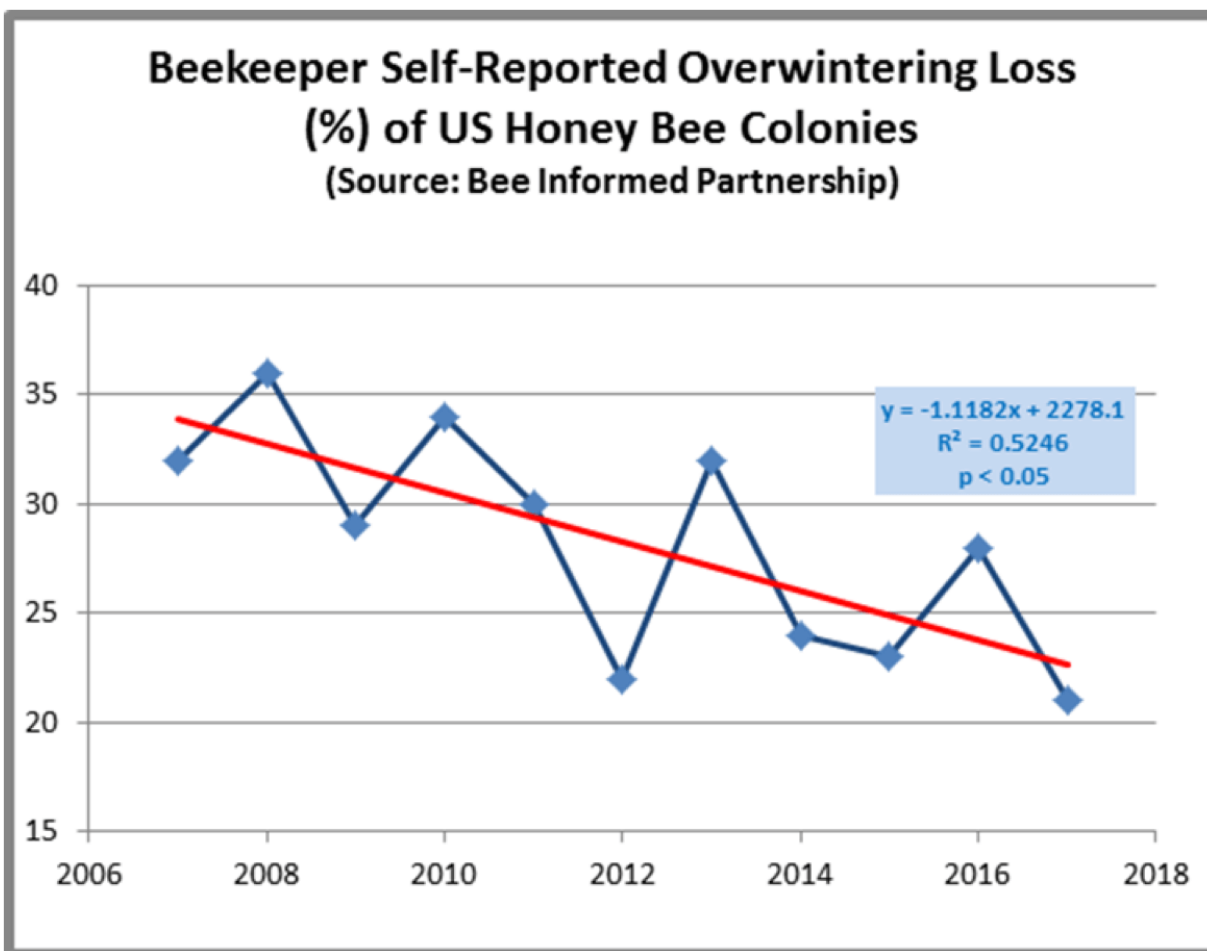
Bee health is a genuine concern. After all they are trucked around from farm to farm as insect livestock. And entomologists and the USDA say that *Varroa destructor* mites have been infesting bee hives at an accelerating rate over the past few decades, and present a serious and on-going threat. Pesticides rank low as a likely cause of bee health problems, [contend most entomologists](#), but that’s not the way the issue has played out in the media and online.

Anti-pesticide campaigners have long rejected the conclusions of government agencies and scientists, deciding that bee health issues could not be driven by something as prosaic as a well-known parasite, and have focused instead on neonics.

The question of the relative role of neonics in bee health is fascinating because of the [split](#) in the science—some lab studies point to potential serious problems linked to one or more of the neonics but [field research](#), [meta-studies](#) and the hard numbers worldwide—bee hives are at record numbers globally—tell a much different story.

high, the media has generally taken them as confirmation that the disaster has finally arrived. Activists fill the social media echo chamber with scare blogs, which they often use as an anchor issue for [fund raising](#) or [campaigns](#)

But the most recent [year's survey results](#) didn't exactly support that narrative. Over-winter losses, which is when bees face severe threats from cold weather, were 21.1%, the lowest in the 10 years the survey has been in existence. Taken together with previous years' findings, the 2016-17 number continues a downward trend of over-winter losses that, on the current path, will reach the 15% goal set in the 2015 [National Pollinator Strategy](#) by 2024.



Seven years ago, however, BIP began collecting survey responses on in-season (summertime) honeybee losses as well. However, combining in-season and over-winter losses can result in an alarming and spectacularly misleading loss number. For example, in 2016, [it was 44%](#), making it appear that nearly half of all US honeybees had died, which is exactly how most of the media reported it.

In the latest reporting year, 2016-17, the combined result was lower: 33.2%. This was the second lowest in the seven years of reporting combined statistics, but it was still an occasion for apocalyptic headlines: "A third of the nation's honeybee colonies died last year," [headlined USA Today](#), which ran a scare cover story years ago

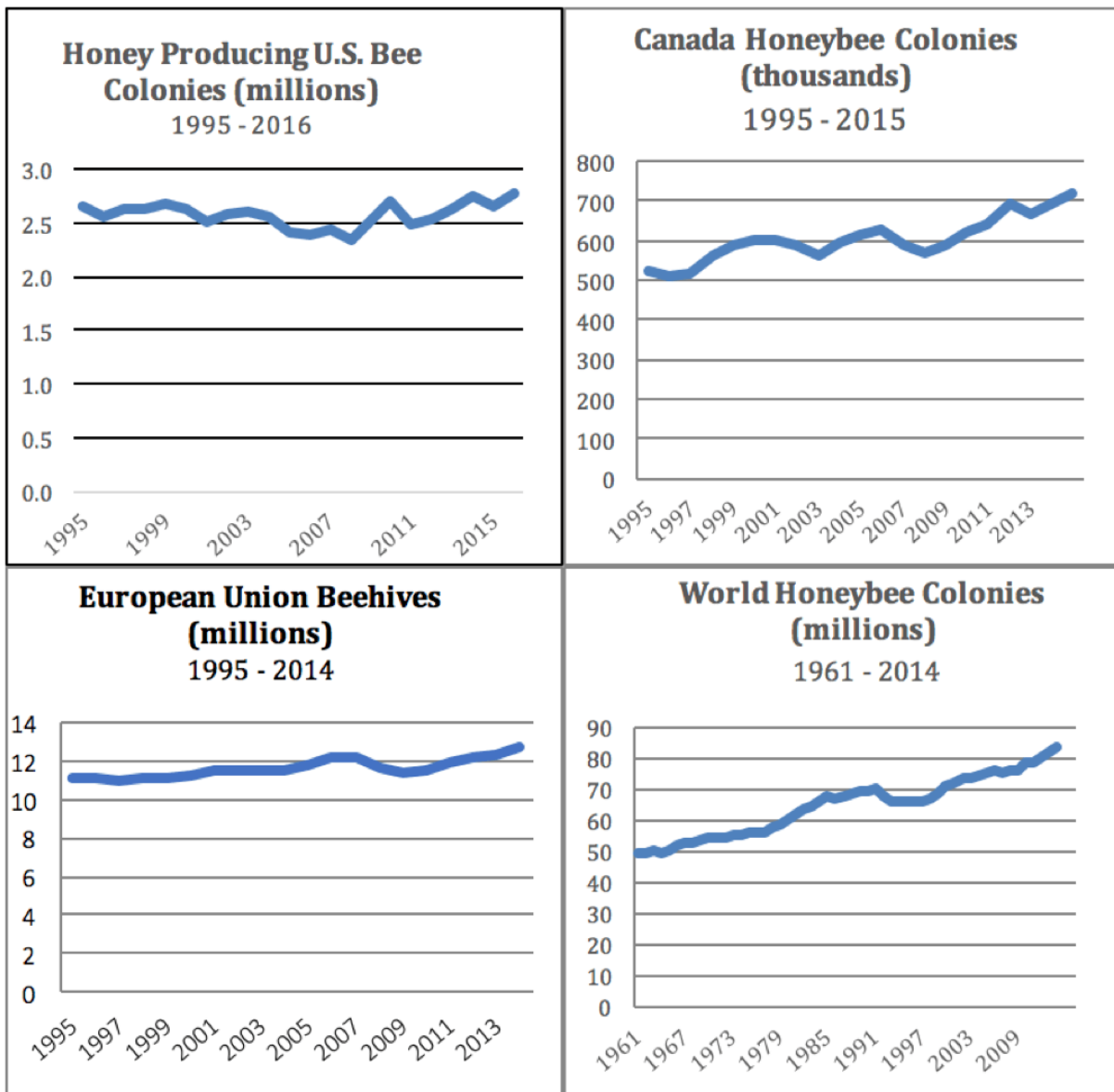
stayed true to form, headlining: “Honeybee Deaths Are Down, But the Beepocalypse Continues.”

No beepocalypse

That’s shallow journalism. While the Bee Informed Partnership’s combined loss numbers generate media attention, they provide a very thin sliver of the picture bee health, and the numbers themselves are easily manipulated to fit a narrative. There are three major reasons why this is true:

The first reason is that the macro statistics of the total bee population tell a different story than the BIP numbers. The previous year, when it was reported that “a third of the nation’s honeybee colonies died”, the US honeybee population actually reached a 22-year high. The untold story in the popular media, although reported on science-based websites like the GLP and on university and bee expert sites, is that despite some ups and downs, the number of honeybee colonies has remained remarkably stable since the mid-1990s, when neonicotinoids were introduced.

They’ve hovered around 2.5 million hives in the US, even through the challenges of Colony Collapse Disorder from 2006-2010, with the last five years seeing significant growth in bee numbers. There was indeed a sharp dive in US bee numbers in the eighties and early nineties, when the Varroa mite invaded the US, but those declines leveled off and eventually reversed in the years neonics have been on the market. Overall numbers are steady or increasing in Canada, Europe and on every continent except Antarctica (where there are no honeybees), over the last 20 years—the [entire period that neonicotinoid pesticides have been on the market](#).



[USDA annual report on honey-producing colonies in the U.S.](#) (USDA publishes its final statistics one year after preliminary estimates); [Canada](#); [Global/FAO 1/FAO 2](#)

Based on government statistics, bee population worldwide trend has been positive for over half a century. Between 1995 and 2014, we have seen the following increases in honeybee populations:

- North America: +8%
- Europe: +10%
- Africa: +19%
- South America: +43%
- Asia: +43%
- Oceania: +30%

Despite these rising trends, inflammatory media stories and the NGO social media echo chamber have won the day in Europe, where politicians have put aside the findings of entomologists and appear to be preparing to not only extend their “temporary” 2013 ban, but expand it to almost all uses, even on crops bees never visit. The same activist groups – and of course the media – continue to exert enormous political pressure in the US to follow suit. So far, EPA appears to be resisting, as their recent draft assessments of the three largest selling neonics suggests, but many close observers of the agency believe the process has been touch and go for some time.

How and why bees naturally die off and beekeepers replenish hives

A new Bee Informed Partnership report will be out in a few months. It will be interesting to see if reporters make the distinction between the normal seasonal bee colony losses experienced by beekeepers, which have been a factor in beekeeping since time immemorial, and overall population trends.

Bees reproduce very rapidly—the normal life-span of a worker bee in the summer months is only 6 weeks—and so beekeepers can rebuild their hives very rapidly as well. Not long ago, many beekeepers in northern latitudes, particularly in Canada, where intense cold makes keeping bees over winter a challenge, would empty their hives of bees, harvest all the honey in them, and start over with new queens and purchased ‘packaged bees’ the next spring. They had a self-inflicted 100% loss rate. But they had healthy, thriving bee populations throughout the summer and a stable, thriving beekeeping industry as well.

Colony losses, whether overwinter or in the spring, represent an economic cost to beekeepers, and they can provide clues to overall hive health. But the numbers we see in recent years do not portend calamity. In fact, they can, and do, rise and fall with little effect on the total number of beehives in the country, or in the world—which is almost entirely determined by how many bee colonies beekeepers decide to “grow.” This, in turn, is largely determined by economic considerations—the price of honey or the going rate for pollination services.

Predictably, however, every time the Bee Informed Partnership releases its headline-grabbing annual loss number, the media prophesizes doom. A rough analogy might be if a stock market survey only reported those stocks that had experienced losses at some point during the year, without bothering to mention that overall the market was steady or rising.

One might argue that it’s not BIP’s responsibility to ensure that the media doesn’t misinterpret or misuse its statistics. Fair enough. There’s also no question that

[first research](#) into the mysterious disappearance of worker bees from the hive, a phenomenon they dubbed Colony Collapse Disorder”, and he has been one of the nation’s foremost investigators of the many diseases afflicting bees today.

All of this, however, simply casts the problems with the bee loss survey into starker relief. Any scientist—or indeed any competent science reporter—taking a close look at the BIP’s methodology would have to acknowledge that it suffers from numerous limitations, and some of them are so severe that they make its results practically meaningless as a guide to the true state of bee populations.

Not all bee health data are created equal

This brings us to the second big problem: the BIP’s numbers are drawn from a voluntary survey, to which most beekeepers don’t bother to respond. In fact, BIP data typically represent only a small fraction of all beekeepers in the US—about [13% for 2016-17](#). That would be a large enough sample for a scientifically randomized poll, as we’ve grown accustomed to in politics. But BIP simply mails its questionnaire to beekeepers and tallies up the results of those who send it back. As the respondents are self-selected, one would intuitively assume that the results would be biased toward beekeepers with serious loss problems.

And indeed, this appears to be the case. The vast majority of respondents are small or hobby beekeepers, with only a vanishingly small fraction of commercial beekeepers—[1.4%](#)--participating. There are in fact many more hobby beekeepers in the US than commercial beekeepers, but they represent a small fraction of the overall bee colonies.

Why does this matter? It’s well known that many small and hobby beekeepers have the worst bee problems, most likely because of inexperience. They often neglect to treat for Varroa and other diseases and can have much [higher losses](#). BIP’s survey, however, has no mechanism for adjusting for these biases and it performs no analysis of the data to make its conclusions more representative.

One sees this clearly as well in the enormous regional disparities. Twice as many honeybee colonies are located west of the Mississippi as east of it, but twice as many beekeepers are located east of the Mississippi. In other words, larger beekeeping operations in the west; smaller and backyard/hobbyist beekeepers in the east. But the over-concentration of BIP respondents in one region – or even in certain states within regions—can easily skew the results. In the 2015-16 BIP survey, for instance, Ohio and Pennsylvania were heavily over-represented (with some colonies from those states being double-counted for Florida as well).

survey his operations in California and Montana – yielding more than 10 times the number of BIP data points from his operations alone than for the entire remainder of California. In another instance in Montana, a single large operator who experienced devastating losses (due to error, carelessness or bad luck) caused the state to be depicted by BIP as a ‘heavy loss’ state even though none of the other beekeepers in the state experienced abnormal losses.

Given the BIP survey’s limitations, and particularly its skewed representation of the size and geography of the beekeeping operations responding, perhaps its findings would be more useful if they were portrayed not as national honey bee colony loss statistics, which they are not, but rather as the losses experienced by those sectors of the beekeeping industry that actually respond to the BIP survey.

Do other US bee hive data present a similar, problematic picture?

A third reason to be skeptical of the value of the BIP survey is that we have a [more comprehensive survey](#) conducted by USDA’s National Agricultural Statistics Service. Not surprisingly, it paints a very different picture of honeybees, and yields a much more dynamic picture of beekeepers’ operations over the course of the year. Unlike BIP, the NASS constructed a stratified sample of honey operations with which the Department has regular contact, backed up by telephone calls and, when necessary, enumeration for non-respondents. USDA charted colony losses, colonies added or renovated and total honeybee colonies in the U.S. by quarter, January 1, 2015 through March 1, 2016.

Over the course of those 15 months, the total number of U.S. honeybee colonies fluctuated dramatically from a high of 3.1 million to a low, in the survey’s last quarter, of 2.6 million, with most quarters registering more than 2.8 million colonies. Along with losses, the NASS also charts additions. For examples, a total of 662 thousand colonies were added and 693 thousand colonies were “renovated” in just the one quarter of April-June 2015.

In other words, normal beekeeping operations, in which operators decide to add or shed colonies in response to market conditions (demand and price, domestically and abroad, for different types and grades of honey, and/or anticipated commercial pollination needs and opportunities) can easily cause the total number of U.S. honey bee colonies to fluctuate by almost 20% within a 15-month period—even while populations compared year to year are steady or growing.

This underscores the mistake of imagining U.S. honeybee colonies as a sort of natural population subject only to declines caused by environmental factors (e.g., pesticides). Rather, state-by-state and nationally, farmers and beekeepers are constantly adding

survey data needs to be compared with more comprehensive USDA data to be seen in proper perspective.

Varroa challenge

One fortunate upshot of all of these survey efforts to assess honeybee losses of recent years is that they have thrown into relief the real, critical problem facing honeybees. It's varroa mites—not pesticides, and particularly not neonicotinoid pesticides that consistently rank among the least detected residues in honeybee colonies. Recent years' Bee Informed Partnership surveys have correctly highlighted parasitic varroa and the dozen or more viruses and diseases that they vector into honey beehives as the #1 threat to honey bees.

USDA's NASS survey points to the same conclusion. So, does the practical experience of beekeepers in Australia, where there are no varroa mites, and Alberta, Canada, where authorities have made varroa control the overwhelming priority for beekeepers. This conclusion has been further reinforced by the [2016 multi-year study](#) of disease incidence in honeybees co-authored by none other than vanEngelsdorp. It found varroa prevalence (as well as the bee gut fungus/parasite *Nosema ceranae*) among U.S. bee colonies far more extensive than previously thought and identified these, along with Deformed Wing Virus, as the principal scourges of honeybees today.

So, why aren't we concentrating on addressing the acknowledged parasite threat? One reason is that the varroa mite problem is very hard to address—trying to 'kill a bug on a bug', keeping one of them safe, is incredibly challenging. That's especially true since varroa have shown a remarkably rapid ability to develop resistance to different treatment methods as they're developed. For another, pesticides, and the large corporations that manufacture them, make a convenient and tempting target.

One other thing is very clear from all these surveys—whether from the BIP, NASS, or various European efforts: bees are not facing an apocalypse or serious endangerment as the result of pesticide poisoning.

Jon Entine is the Executive Director of the Genetic Literacy Project. His biography is [here](#). Twitter: @jonentine.



Join the discussion...



Garrett Brinton • a day ago

Leaving aside the question of what the "main cause" of colony losses is, it's certainly appropriate to note that overall colony numbers are still increasing despite those losses. However, making up all these replacement colonies is not cost-free. It involves more labor, more feed, more new queens, and in many cases may cost the beekeeper some of the honey production capacity of the strong colonies that have to be split during the nectar flow in order to make these replacement colonies (rather than being kept in the large population sizes that are generally much better honey producers).

And the ability to make up for these losses by splitting strong colonies is not unlimited -- you have to have enough surviving colonies to make a sufficient number of splits, or else you have to buy your replacements from someone who had a better year...or go out of business, which many beekeepers have in recent years.

So far, the beekeeping industry has been able to keep up with the high colony losses. But that doesn't mean everything is hunky-dory and there is no cause for concern.

Articles that only cite colony loss numbers without taking into account replacements and overall year-over-year colony numbers are indeed misleading as this article

[see more](#)

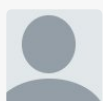
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Rebecca Hughes • 2 days ago

This is one specific angle of the debate on neonics & doesn't address concerns about impacts on wild pollinators, carabids, aquatic inverts etc; honeybees being essentially farmed livestock, and one that behaves very differently to all other insects, they are largely irrelevant to discussing the environmental impacts of neonics. This does raise an interesting question though about whether we should also be looking at the impact of fungicides and other treatments on bee health if it makes them less or more resilient to disease and pests!

1 ^ | v • Reply • Share >



Wackes Seppi • 5 days ago

In French here:

<http://seppi.over-blog.com/...>

On beekeeper education and expertise, you may look up:

<https://www.ncbi.nlm.nih.go...>

1 ^ | v • Reply • Share ›



RobertWager • 7 days ago

A great resource for anyone interested in the real state of bees globally. It blows my mind the after the disastrous (for bee health in Europe) results of the three year ban of neonics they are considering making it permanent.

Forrest Gump said it well "Stupid is as stupid does"

Hopefully the real science will head off a very bad "green induced" policy decision in Europe.

4 ^ | v • Reply • Share ›



Robert Bennett • 6 days ago

A bunch of moronic assumptions based on half understood data or an agents

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Dr sandra smith • 17 minutes ago

This is changing the ways you keep the bees.

If BEES and BIRDS are exposed to these "Tesla Purple Energy Healing and Reviving PLATES",

"Their immunity system is strengthened and injured, hit by Electric Cables, Dehydrated, effects of Pesticides and Radiation and DYING and UNCONSCIOUS Birds, Bees and Butterflies are REVIVED, ENERGISED within seconds and gather more pollen and foods and MULTIPLY in healthy manner.

Just place the plate at the Entrance of your weakest HIVE. These are Trans-receivers of Life Force Energy and transmits the same to the users

You can even TEST these plates in your Home or HIVES and on BIRDS as Big a an EAGLE

They are unconscious and seems like dead and don't even respond to Water and die within a few minutes. The vets explain that such birds/bees hardly survive, even if timely medicines are provided. These Life Force Energy Transmitting Plates help revive and Energise the DYING birds/bees and they fly off within SECONDS.

[see more](#)

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Garrett Brinton • a day ago

Tried posting a comment here, at first the system showed it but said it was awaiting

^ | v • Reply • Share ›



Ray E. • 4 days ago

Hoping this new information about what the Varroa mite feeds on will better focus the research in managing the pest. It also explains why they have evolved resistance so quickly.

>>For nearly 50 years, researchers have believed that the mite fed on the hemolymph (the “blood”) of the honey bee. Ramsey has done extensive research on the feeding habits and nutrition of the Varroa mite that provides strong evidence that this model is incorrect, and that current methods of controlling the parasite are not only ineffective, but may contribute to pesticide resistance.

Ramsey’s research establishes that the mites are primarily feeding on the honey bee’s fat body tissue—an organ in insects that serves a similar role to the human liver.<<

<https://umdrighnow.umd.edu...>

^ | v • Reply • Share ›



Wind Chapman • 6 days ago

Great article! The short "boiled down" articles are okay but I like something with a bit more detail. Thanks!

^ | v • Reply • Share ›



runningfish • 7 days ago

The link doesn't work to the "more comprehensive survey".

^ | v • Reply • Share ›



Sue King → **runningfish** • 7 days ago

this page has all published Honey Bee Colony reports referenced in the story. <https://usda.mannlib.cornel...> Here is the link to the exact document in the "more comprehensive survey" <http://usda.mannlib.cornell...>

1 ^ | v • Reply • Share ›



ralphhobbs • 6 days ago

Wrong to focus on just one species that happens produces honey, when there's plenty of evidence of adverse impacts on many many other insect pollinator species and hence the whole ecosystem

^ | v • Reply • Share ›



zoe • 6 days ago

Your site is Fake News.

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...our brains are **1 are brains**. Now that we've got the kindergarten playground name-calling out of the way, can we have a serious discussion?

^ | v • Reply • Share ›

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1 comment • 8 days ago

 **mem_somerville** — I looked at Mark's [twitter replies](#). It doesn't look like this took off. I'm shocked, of course. But I eagerly


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 **Aguirre15** — Philpot doesn't know shit from shinola. He's preaching to his choir in SF and manhattan. Pfffft!


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 **Realist** — I've always been a fan of Mr [Avatar](#) Mencken.

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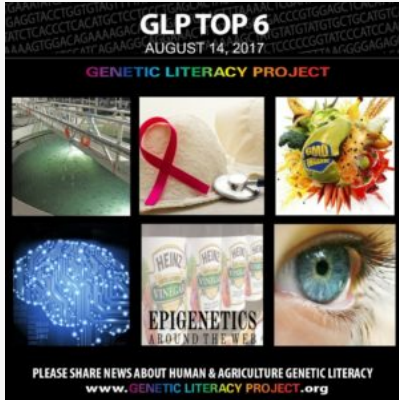
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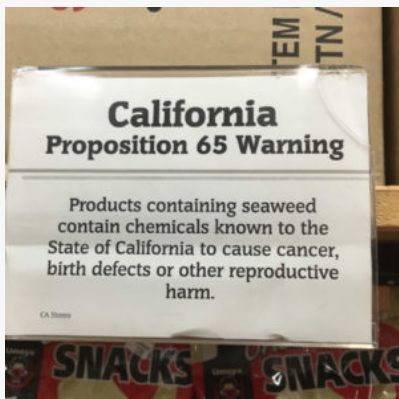
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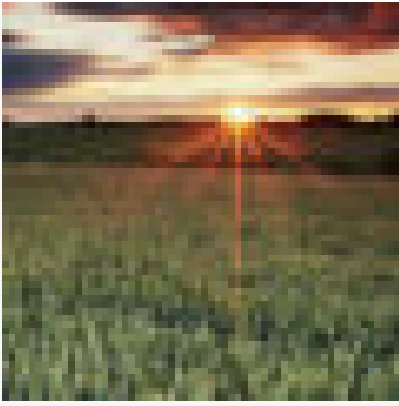
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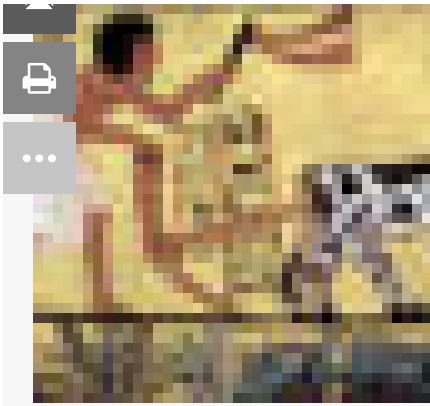


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