Science AMA Series: I'm Jon Entine, Executive Director of the Genetic Literacy Project, here to discuss the exaggerated claims that we are facing a Bee-apocalypse caused by pesticides, AMA!

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Hi Jon, and thank you for doing this AMA. I have three questions for you.

First, you say:

My reporting ... has shown that claims of mass bee die offs (bee-appocalypse) due to pesticides grossly misstates the data. Managed honey bee populations are increasing or stable in North America, Europe and worldwide and wild bees are not endangered.

Can you comment on the extent to which bee populations are being decimated? I looked at the most recent Bee Survey from the US Department of Agriculture and saw that for the last year for which there was full data, a little over 40% of all bee colonies were lost during the year. To someone with relatively little knowledge of bee colony management, that number seems very high.

Second, you don't seem to be in favor of banning/restricting usage of certain pesticides. The EPA seems to think that pesticide usage is contributing to bee loss, can you go into a bit more depth on why you think that changing policies on pesticide usage/application would not be appropriate?

Third, you seem to be using honey bees and wild bees interchangeably in your blurb above. Can you be a bit more specific: are there challenges faced by honey bee populations that are not faced by the several thousand other wild bee populations in North America (and vice versa)? Thanks!

SirT6

Answering: Can you comment on the extent to which bee populations are being decimated? Important question, as there is a lot of muddy reporting on this. I looked at the most recent Bee Survey from the US Department of Agriculture and for the last year for which there was full data, a little over 40% of all bee colonies were lost during the year. To someone with relatively little knowledge of bee colony management, that number seems very high.

It's not a reassuring number to be sure, but it does not set off apocalyptic alarm bells. First of all, it's important to understand that that number reflects managed honeybee colonies.

Second, it conflates year-round losses with overwinter losses, which are caused, for the most part, by

separate factors. Overwinter losses for honeybees are a fact of life for beekeepers. Those numbers have been higher than normal in recent years for beekeepers in the U.S. (though interestingly not in Europe, even before the EU ban on neonics took effect; EU COLOSS and EPILOBEE group figures show that colony losses were lowest in 2013-2014, before the ban on neonicotinoids was enacted, and rose to 17.4 percent, during the duration of the ban--well within the 'acceptable' range according to entomologists, EU and US regulatory officials.)

High overwinter losses create difficulties for beekeepers and may cut into their profits, but they don't necessarily translate into overall population declines. Hives naturally experience losses of bees every winter, often between 10 and 22 percent but sometimes the numbers trend higher. These year-to-year fluctuations are considered normal. But even in bad years, bees usually overcome the drop-off in numbers with their rapid reproduction rates. That's because bees — who live only about 6 weeks in the summer anyway — reproduce very rapidly and part of being a beekeeper is building up your hives again in the spring. In very cold climates (cold is one of the biggest killers of bees in the winter) there are sometimes 100% "losses" — that's because the beekeepers there would harvest all the honey in the fall and eliminate all the bees, then use packaged queens to create new hives in the spring. The fact is, bees are a kind of livestock. You're going to have as many of them as economic conditions justify. This might be the price of honey or cost of pollination services. But if it's economically worth their while, beekeepers will create more hives and you'll have more honeybees.

The Bee Informed Partnership (BIP) determines its overwinter colony loss numbers from an annual self-reported survey of beekeepers. It's not a great statistic, but it's the best we have for now. USDA is working on improving it. Third, during the summer, bees may die but they only live for about six weeks. At the same time, bees naturally reproduce and replenish their hives very quickly during the summer. This can more than make up for wintertime losses.

So the 40+ percent one-year figure, while reported with breathless anguish on some blogs and even in some mainstream papers, is misleading, as government officials have noted. It was often reported that bee deaths had suddenly skyrocketed; they hadn't. The BIP only had summer losses going back to 2010, which is not much data. Total losses were below the peak winter of 2012-2013, and most importantly (according to scientists), the trend for overwinter losses in 2015-16 was well below the average of the past decade at about 27% (24% in 2013-14 and 22% in 2014-15; overwinter losses peaked during the Colony Collapse Crisis in 2006 at more than 35%). The 27% number is still higher than entomologists say is ideal (they set that number at about 19% currently).

I'm not against banning or restricting certain pesticides in principal; certainly restrictions might be necessary and should be imposed when problems can be linked to specific pesticides. Note how circumspect the EPA was in outlining the potential reasons for pollinator health problems, listing seven possible causes, including 'pesticide poisoning'. But the EPA does not single out neonics, which have become the exclusive focus of some environmental groups. And the data, particularly in field studies but also in laboratory research, suggest that neonics are likely to have a relatively minimal impact on bee health--and are certainly not 'driving' bee health related issues, as some claim and the media often reports.

Answering: You don't seem to be in favor of banning/restricting usage of certain pesticides. The EPA seems to think that pesticide usage is contributing to bee loss, can you go into a bit more depth on why you think that changing policies on pesticide usage/application would not be appropriate?

So based on the information now, considering the likelihood that pesticides are down the list of factor contributing to bee stress (with varroa mite, habitat loss, weather and bee practices at the top), what should the government regulators do? They know they would be throwing darts blindly if they issued pesticide bans based on scanty evidence, so they have not yet recommended any restrictions. We've already seen the restrictions backfire in Europe, which has seen crops losses and no net gains in the health of bees (which were never threatened or even facing high loss numbers like in the US); to control pests, European farmers faced with the neonics ban were forced to turn to far more toxic

chemicals: organophosphates and pyrethroids, both known pollinator destructors.

Canonically, there are 'three Ps' cited by experts as contributors to bee – specifically, honey bee -- health problems: parasites, pathogens and pesticides.

- Of these, parasites – specifically the varroa destructor mite -- is acknowledged by virtually all experts to be the single greatest health challenge confronting bees and their keepers.
- Pathogens – diseases -- are probably second in importance, largely because the varroa mite vectors a dozen or more diseases into honeybee hives, making virulent ailments that, pre-varroa, were much more easily controlled nuisances for beekeepers. Several other factors also importantly affect the health of honey bee colonies, in the U.S. and abroad:
- Lack of genetic diversity (hampering emergence of varroa-resistant honey bees through natural selection)
- Scarcity of clean, varied forage (hampering adequate nutrition) – partly an artifact of large-scale monocrop agriculture and now being addressed by myriad efforts to plant bee-attractive forage on the verges of croplands and in other spaces
- Shrinking bee habitat (leaving smaller and fewer open areas for bee forage) – largely a function of development and agricultural expansion, and now being addressed by multiple initiatives, private and government-funded, to restore bee habitat. • Some of these honey bee health challenges – like the sharing of parasites and pathogens -- are exacerbated by beekeeping practices, like trucking over 60% of all the beehives in the U.S. to California's Central Valley in mid-winter to pollinate the almond crop.

Of these various factors, pesticides emerge as merely one contributor or complicating factor – and not a dominant one – in honeybee health. And, while most discussion has focused on neonicotinoid pesticides in an effort to blame them for Colony Collapse Disorder and other honey bee health problems, neonics are always among the least prevalent of all chemicals/pesticides detected in bee hives via residue studies. The most prevalent chemicals are the ones applied by beekeepers in an effort to control varroa mites--which the EPA noted (in-hive insect or mite control).

So, to understand where pesticides fit into the honey bee health picture, it's important to understand how many more important contributors there are to today's honey bee health challenges -- and how comparatively minor are neonic pesticides, which have become the almost obsessive focus of environmental groups.

You state that managed populations are increasing and wild bees "are not endangered", but that does not mean that they aren't suffering losses. While managed populations might be doing ok, what losses *have* been suffered by the wild bee community, and what impact will it have on the ecosystem in general if they do suffer greater losses?

Edit: me no spell so good

bestica

Sam Droege of the US Geological Service is perhaps the foremost expert on wild bees in the U.S. He's now conducting the first ever national inventory on wild bees: http://www.voanews.com/a/native-bees-may-help-save-crops/2424105.html

He estimates that there are some 4000 native species of bees in the U.S. hundreds of which haven't even been named. He's doing the inventory because there are just no good statistics now on wild bees. All indications are, however, that there's no serious decline overall. According to the article:

"Droege says his survey will show whether some species of wild bees are declining or flourishing. He says that so far, scientists don't know the answer, but he thinks most are doing just fine."

One of the reasons, he explains, that wild bees are not in crisis is that they are “more robust” than honeybees because "they nest individually. One female makes one nest at a time. At the end of the year, the female dies and the whole system restarts so you don’t accumulate as many diseases."

Droege’s informed sense of things is backed up by several large scale studies. A according to 2012 study published in the Journal of the Kansas Entomological Society, there's NO evidence of significant wild bee declines: http://www.bioone.org/doi/abs/10.2317/JKES110726.1?journalCode=kent&

Here are a could of quotes from the study: • “The majority of the 770 bee species, representing almost all species known to occur in Eastern North America have been detected at least once within the past 20 years.”

• “Using a collaborative method, we have established that at least 95% of eastern North American bee species recorded historically (into the 20th century) have persisted into the last two decades.”

According to a 2015 study in Nature, only 2% of wild bees species are responsible for most of the crop pollination performed by wild bees and that these bees are thriving. These, of course, are the wild bees that would come into the most extensive contact with neonics.
http://www.nature.com/articles/ncomms8414

According to the report: “The species that are the dominant crop pollinators are the most widespread and abundant species in agricultural landscapes in general.”

A 2013 study published in the Proceedings of the National Academy of Sciences analyzed U.S. native bee populations over a 140-year period. Of the 187 native species analyzed individually, only three declined steeply. All three declining species that declined were members of the genus Bombus (bumblebees), and the declines are known to have been caused by disease.
http://www.pnas.org/content/110/12/4656.full

There are clearly some issues with wild bees, however. 7 different native wild bee species were recently added to the endangered species list. All are in Hawaii and do not produce honey. They are being endangered by--honeybees, who are out competing them for food. The honeybees in Hawaii (and the US mainland(are non native species. It would be terrible if these wild bees went extinct but it would have zero impact on any commercial crops such as strawberries, avocados or coffee.

I know we like to think that honey bees are the only important pollinators out there, but actually there are thousands more species of bees, flies and beetles that are also important pollinators.

You mentioned that "wild bees are not endangered," however I assume you're talking specifically about honey bees (*Apis mellifera*) because other bee species are definitely in trouble. Recently, the first wild bee species was recommended for federal protection under the Endangered Species Act. Furthermore, a recent study in the UK linked pesticide usage with widespread disappearances of wild bee species.

Anyways, I was just wondering if any of your work has focused on the health or impact of wild bee populations (i.e. non-*Apis sp.* bees)

micromonas

In terms of wild bees, Sam Droege, the nation’s foremost authority on them, thinks they’re generally doing fine, with some exceptions of course. See my answer above.

Re the Rusty Patch Bumble Bee. There have indeed been declines in some bumblebee species and it is generally known that the cause of this is a nosema gut virus introduced to this country by commercial bumblebees imported for pollination in greenhouses. http://www.xerces.org/wp-

content/uploads/2008/12/xerces_2008_bombus_status_review.pdf

Pathogen spillover from honeybees may also be a contributing factor. A 2014 study in Nature found that honeybees also are passing nosema to bumblebees, along with deformed wing virus and varroa.

“The prevalence of deformed wing virus (DWV) and the exotic parasite Nosema ceranae in honeybees and bumblebees is linked; as honeybees have higher DWV prevalence, and sympatric bumblebees and honeybees are infected by the same DWV strains, Apis is the likely source of at least one major emerging infectious disease in wild pollinators.”
http://www.nature.com/nature/journal/v506/n7488/full/nature12977.html

As for the 7 endangered Hawaii wild bee species, see my answer above.

As far as the UK study goes, I’m very skeptical. One, it was a correlation study and didn’t take into account any of the other factors — including massive land use patterns — that could easily have overwhelmed the supposed correlation they found. Second, the basic data were all collected by volunteers, who would look bee pictures up on a website and were somehow supposed to be able to tell all 250 native UK species apart. If even one of these sightings was recorded in a one square kilometer grid it was included in the study. Then all this not very convincing data was put into a model — which the researchers have still not made public — and out comes a result.

Meanwhile, this study shows just the opposite. Note that declines in species were due largely to habitat loss and declined or reversed in the 1990s--when neonics came on the market — and this was especially marked for wild bees in the UK: http://onlinelibrary.wiley.com/doi/10.1111/ele.12121/abstract

"Here, we evaluate whether rates of biodiversity change have altered in recent decades in three European countries (Great Britain, Netherlands and Belgium) for plants and flower visiting insects. We compared four 20-year periods, comparing periods of rapid land-use intensification and natural habitat loss (1930–1990) with a period of increased conservation investment (post-1990). We found that extensive species richness loss and biotic homogenisation occurred before 1990, whereas these negative trends became substantially less accentuated during recent decades, being partially reversed for certain taxa (e.g. bees in Great Britain and Netherlands)."

What is your education and scientific background?

Maca_Najeznica

As the AMA states, I'm a science journalist. Graduated from Trinity College in Ct. with a degree in philosophy and religion. Spent a year studying science at the University of Michigan under a National Endowment for the Humanities grant. Was a network TV news writer/producer/executive in charge of documentaries at NBC and ABC News over 20 years. Best known for a documentary written/produced by me and Tom Brokaw on black athletes, genetics and sports that won Best International Sports Film in 1989, and numerous other awards. Won 19 major journalism awards including two Emmys. Reporter on sustainability issues since the mid-1990s (coined the term 'greenwashing'), and spent a few years in the 2000s working with corporations preparing sustainability/corporate responsibility reports. Written three books on genetics (two on population genetics and one on agricultural genetics)--all of which got very good reviews in the science community. The two population genetics books had boards of advisors consisting of top scientists and social scientists reviewing the manuscript pre-publication. Wrote four other books including one on agricultural chemicals and another on chemicals and risk. Launched the Genetic Literacy Project with foundation support (GLP does not accept donations from corporations) in 2011, and launched the Epigenetics Literacy Project in 2016. Here is a link to a short bio: https://www.geneticliteracyproject.org/our-team/

Would I be making any sort of positive impact if I were to establish a few hives of bees on my property, as suggested by sustainable living magazines?

Also, what are the other factors impacting bee health aside from pesticides and habitat loss? In your opinion, what are solutions for these factors?

MJY13

Probably not, unless you really want to devote full time to it. The fact is hobby beekeeping a growing problem today, because few hobbyists have the time or expertise to properly manage varroa in their hives, which then become breeding grounds for disease that then spread to other hives. I've addressed the other factors driving bee health in other posts.

I'm somewhat out of the loop concerning what exactly the "bee-apocalypse" is, could you briefly summarize the claims surrounding it? Why are the claims considered overblown? Have researchers that refute the existence of mass bee deaths received similar scrutiny as climate researchers?

shiruken

Here is a good primer on the claims of an impending mass extinction of bees. This is way different than the climate change controversy; in this case, the mainstream consensus is there are definitely stressors facing bees but there is no crisis, and to the degree there are problems, they are driven by the varroa mite with pesticides in general, and neonics in particular, way down the list of perpetrators. The fringe scientists, akin to the climate deniers, and the bee-apocalypse criers. Here is a really good backgrounder addressing the context of the debate that I wrote for Huffington Post...and a direct response to the Harvard professor, Chensheng Lu, who has been promoting his "neonics are killing bees" thesis, which he published in a predatory, pay-for-play overseas journal after it was rejected for publication in a mainstream academic journal. Thea article quotes many of the world's most respected entomologists (which Lu is not..he's not a trained insect or bee expert at all):
http://www.huffingtonpost.com/jon-entine/post_8761_b_6323626.html

Hey Mr. Entine! Thanks for doing this AMA. I was one of those redditors who linked to your article during Dr. Lu's AMA and I really appreciate that piece whenever he attempts to make public statements that his research does not back up. So, thank you.

On to my question: As an entomologist, its difficult to talk to the public about neonicotinoids because there seems to be conflicting studies about their impact on bees. It's never surprising to me to see an effect when someone force feeds bees an insecticide, so I have my concerns with many of the papers. I think neonics have been targeted by many (entomologists and activists) and would like to see many of the other pesticides that are available to be scrutinized the same way. But every few weeks or so a neonic paper hits headlines with very few quotes from the authors. So what can entomologists and scientists do better to help explain the growing discussion about neonics/all pesticides and pollinator health to the public? Because if the public understanding behind these issues is any indication, we're doing it wrong. No one seems to like the answer: It's complicated.

albopictus

Thanks for weighing in on the Lu AMA!

I agree, the bee health issue is terribly nuanced. To some degree I sympathize with advocacy groups who have been trying to focus attention on a real issue. It's hard enough to get the public (and policymakers) engaged enough to do anything, and saying a problem is multi-faceted doesn't generate the kind of media attention that is often needed to push through policy changes. But bad policy is worth

than no policy, because you fool people into thinking you are addressing a problem when you are really not--and that's the case with the hyper focus on neonics.

One of the key problems is that entomologists and toxicologists are bizarrely enticed to continue to perform laboratory caged bee ('bee-in-a-box') studies, searching for ever more roundabout or indirect effects of neonics on bee behavior (navigational ability; memory; learning; olfactory response; dexterity in manipulating complex flowers; etc.), because they are 'rewarded' with grants and media publicity. That's a tough carrot to take away. As you say, it's hardly surprising that when an experiment force feeds individual bees pesticides in a laboratory, regardless of dosage, they get sick or die.

More professionals -- entomologists and beekeepers – need to be emphasizing that it's effects at the colony level that count – commercially, for the overall honeybee population's size and health, and scientifically – because the super-organism of the hive detoxifies and otherwise compensates for individual bee losses in ways that laboratory experiments on individual bees fail to capture.

The nearly obsessive focus on pesticides -- especially neonicotinoids – at a minimum distracts attention, if not also detracting research resources, from what everyone acknowledges to be the most severe and damaging threat to honey bees: varroa mites and the chemicals used to control them. Focusing more on varroa's role in bee health problems – as well as what's being done to combat them and why it is so difficult -- would re-balance and more properly focus the scientific discussion and research efforts. Maybe entomologists can 'scare' the public with blow ups of the rather ugly varroa! It's not as sexy a target as Big Ag, so it may be tough sledding.

The near-exclusive focus on neonics also obscures the effects and side-effects of other pesticide chemistry classes (including 'organic' substances and compounds) on honeybees and other beneficial species. The on-going, relentless indictment of neonics is presented to the public in a vacuum – as if the alternative to neonic use in agriculture would be some kind of natural nirvana in which honeybees and beneficial species would otherwise face no harmful chemicals or substances. As you know, nemonic bans, such as that in Europe, have led to the re-introduction and expansion in use of organophosphates and pyrethroids, both known pollinator destructors. More attention to the actual pesticide choices confronting regulators and farmers would elucidate the relative pros and cons – for pollinator health -- of neonics compared to older, broadcast or spray-applied pesticides.

Putting pesticides in perspective relative to other bee health challenges would also help the public see where the biggest payoffs lie in protecting pollinator species' health. Performing the 'umpteenth' experiment demonstrating that some minute level of neonic exposure somehow affects individual honeybees PER (proboscis extension reflex) may be relatively insignificant if the real, major, limiting factors in honeybee health turn out to be a lack of genetic diversity (a side-effect of long-standing, traditional beekeeping practices), shortage of varied, clean forage (an artifact of cropping practices), or the virulence of Deformed Wing Virus.

Of what value will more such 'bee-in-a-box' studies be should another devastating future threat emerge, like the recently demonstrated ability of varroa jacobsoni to migrate to and parasitize European honeybees from its normal Asian honey bee hosts, just as varroa destructor mites did 60 years ago? The trouble is: often the science goes where the funding and the headlines are to be found – not necessarily where the real problems are. • Because often the real problems are really hard to solve.

Wish I had a silver bullet, but I don't. I write a lot on the crop biotechnology debate. 88% of scientists (according to PEW poll) say GM crops are safe, but a majority of the public think scientists are in the tank. Probably the same here; bees are folk heroes, and what I consider anti-science groups like Pesticide Action Network, Greenpeace and Environmental Working Group splash a dead bee on an appeal letter and rake in big bucks.

I understand that you're very confident that there is no connection between neonics and bee death, but why shouldn't we adopt a sort of precautionary principle? It makes sense to me that we ought to switch to other pesticides just in case.

CAkEBall

I've never written there is "no connection". I think everyone who has studied this issue would acknowledge that there are numerous factors impacting bee health. Pesticides can harm or damage insects, so it would be foolish to believe they are not a factor in some of the health problems. That said, the EPA and other major independent regulatory agencies, backed by the field research, present a fairly clear picture that the driving forces behind bee health decline are the varroa mite and the miticides used to control them, habitat loss and the stress put on bees by commercial beekeepers. If we invoked a precautionary policy, what should we do? First would be to stop using miticides, as they are one of the key drivers. But that would lead to a dramatic increase in the mites. What would banning neonics do? It would result in the substitution of far more harmful chemicals, as has happened in Europe--chemicals that are known lethal agents to bees, other beneficial insects and humans, if misused. As the UN stated in its iteration of the Precautionary Principle, it's important to use cost-benefit and risk-risk analysis before undertaking an action, like a ban, which would result in other consequences. It would do no good to ban neonics--a relatively minor contributor to the bee health issue--to see them replaced as they have been in Europe by something far worse. Sadly, many 'environmentalists' are more interested in symbolic bans and restrictions than in finding real and often complicated solutions.

What do you know about the relationship between pesticides and colony collapse disorder?

MrJPolito

Despite the claims of advocate-scientists like Chensheng Lu, there is no known link between pesticides and CCD. (Lu also claims that CCD is still occurring, which no mainstream entomologist believes is true).

The term CCD was originally used to describe the phenomenon when worker bees suddenly and mysteriously disappeared in 2006, mostly in California. The term, with its alarmist ring, was co-opted by environmentalists in the late 2000s to describe a new development—rising overwinter bee deaths.

CCD, which was reported in 2006, became apparent when some US beekeepers began discovering that their bees had mysteriously abandoned many of their colonies, leaving behind the queen bee, attended by too few, immature worker bees to sustain the colony, yet with ample viable brood and stored food. First genetically modified crops and later neonic pesticides were fingered as the presumed causal agents.

Scientists dispensed of the GMO argument, as each GM crop is different and there is no plausible explanation why a phenomenon noted in the US would not also show up in other countries using similar modified crops.

The focus on neonicotinoids was more complicated. Neonics are a class of systemic pesticide introduced in the early 1990s and popular in the US, Australia, Europe and elsewhere to help corn, soy, cotton and canola farmers. They have been embraced as a less toxic replacement of organophosphate pesticides, which are known to kill bees and wildlife (and have been linked to health problems in workers). Applied to the soil, sprayed on the crop or used as a seed treatment, neonics eventually reach the pollen and nectar, which is ingested by insects, discouraging pests from wrecking havoc on crops. The seed treatment lowers the amount of the neonic used 10 to 20 fold, decreasing the need for open spraying of the plant, a genuine sustainability benefit.

Did the use of pesticides or neonics in particular cause or contribute to CCD? The scientific consensus now firmly says 'no.' Upon further investigation, CCD was shown to be a centuries-old, periodic phenomenon that, by other names, has occurred in specific locales, ranging from Egypt to Europe and the British isles to North America. What made CCD's appearance in the United States stunning and alarming was that episodes were being reported from widely separated states across the continent.

The precise causes of the latest CCD incident remains undetermined, however. Most likely, the combinations of factors that affect honeybee colony health more generally (discussed below) are involved. But CCD has now come and gone, as it has many times over the centuries.

According to the University of Maryland's Dennis van Engelsdorp (who was part of the team that coined the modern term "CCD"), no case of CCD has been reported from the field for the last five years.

But the direction of the media narrative, like the travel path of a 250,000 ton ocean liner, was established in the late 2000s, and you don't turn that mega myth around very easily.

If a bee-apocolypse were to occur, would the repercussions be as serious as many people claim?

Mi7che1l

"Seventy out of the top 100 human food crops — which supply about 90 percent of the world's nutrition — are pollinated by bees," writes Greenpeace USA on its 'save the bees' fundraising campaign that fingers pesticides as the primary cause of the "bee crisis."

That's just pure hokum, as I analyze below. But the 'scare scenario' has led to some pretty shoddy speculation that have made their way into "reports" and "studies", including one that appeared in a very prestigious journal.

Before the House Agriculture subcommittee last year, for instance, the Environmental Protection Agency's top pesticide regulator, Jim Jones said, "As you well know, pollinators are responsible for nearly one in every three bites of food you eat.

Let's examine the situation:

In July, 2015 the British medical journal The Lancet published a study positing the disappearance of all pollinators and the impact of such an event on human health.
http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)61085-6/fulltext?rss%3Dyes

I analyzed this study on the Genetic Literacy website:
https://www.geneticliteracyproject.org/2015/07/21/how-to-scare-people-into-supporting-bad-policy-on-bees-and-other-pollinators/

Doomsday scenarios are great as sci-fi pulp or to bolster ideological campaigns, but such musings offer no practical or public policy value, to science or to the general public. Outside of the realm of cartoon fantasy, the sun is not going to rise tomorrow and an asteroid is not going to smash into the earth, and pollinators are not about to disappear.

The point of that paper wasn't to explore an actual imminent catastrophic threat. It doesn't analyze the current state of bee health, as it states wrongly that bees face an imminent threat to their existence and are in decline because the facts don't support that. So, what was the point, if any, of what amounts to an exercise in modeling scare mongering?

According to the researchers, the extinction of all animal pollinators would cut global fruit supplies by 22.9 percent, vegetables by 16.3 percent and nuts and seeds by 22.1 percent. The analysis claims the resulting drop in nutrition would kill 1.42 million people.

Once you get past the editorial elisions on the first page of the Lancet study, the authors throw in a giant caveat about its claimed findings.

"We made no assumptions about human adaptation to pollinator-related food or nutrient losses (eg, use of alternative modes of pollination, dietary or crop variety substitution, nutrient supplementation, increased imports of affected foods) because of the high uncertainty and country-specific variability associated with each possible intervention."

In other words, the scare headlines about millions dying wouldn't actually come true because farmers would grow different crops, and food manufacturers would adjust their recipes to match availability. Human beings are very good at adapting to difficult circumstances.

Let's assume for the sake of argument, though, that the Lancet study gets everything right and all pollinators disappear overnight. How bad is a 22% reduction in crop production? Many of the same environmentalists who claim that pollinators are in decline also demand that we shift from conventional agriculture to supposedly "bee friendlier" organic farming.

Except that switching to organic farming could result in a huge reduction in output—an average 34 percent according to a report in Nature, and it wouldn't necessarily be any friendlier to bees.

Here are the facts about crops and bees:

Sixty percent of America's crops can grow just fine without bees. Wheat, corn and rice are wind-pollinated. Lettuce, beans and tomatoes are self-pollinated. The 12 crops that worldwide furnish nearly 90 percent of the world's food — rice, wheat, maize (corn), sorghums, millets, rye, and barley, and potatoes, sweet potatoes, cassavas or maniocs, bananas and coconuts — are wind pollinated, self-pollinated or are propagated asexually or develop without the need for fertilization (parthenocarpically).

It's true that about 35 percent of America's crops — about a third — rely to some extent on bees. Sometimes the bees are essential. In other cases, they're nice to have around, but their absence does not present a crisis. A 2007 study in the Proceedings of the Royal Society quantified the importance of bees on a crop-to-crop basis.

We found that pollinators are essential for 13 crops, production is highly pollinator dependent for 30, moderately for 27, slightly for 21, unimportant for 7, and is of unknown significance for the remaining 9.

So crops like strawberries, sunflower and chestnuts are classified as having a "moderate" yield boost from bee pollination. That means they see a 10 to 40 percent addition to production from bees.

The only way you can say bees "are responsible" for a third of our food supply is by giving bees 100 percent credit for the value of each and every crop over which a bee might hover when, in reality, bees play a minor role in 28 crops.

The fact that the economic benefit of bees adds up to $15 billion acknowledges this reality The figure comes from a 2000 Cornell University study by Roger Morse and Nicholas Calderone that puts a dollar value on the honeybee's contribution to agriculture. The researchers arrived at their total by taking, for example, 100 percent of the value of the almond crop and attributing it to the honeybee on the theory that, without the bee, there'd be no almonds. They then assign a proportional value for the other crops where bees are less essential. For example, bees are responsible for giving strawberries a 20 percent boost in yield, so they put 20 percent of the value of the strawberry crop in the bee value column. And so on.

All of those suitably proportioned values added up to less than $15 billion using data from 1996 to 1998. According to the USDA's census of agriculture, the market value of our food supply then was $197 billion, which means bees would account for about 7.4 percent of agriculture's value. To be sure, that's a substantial amount, but it's hardly one third.

Where does the money come from that pays for your research?

yacob_uk

The GLP does no first hand hand research. We are not an advocacy group except to the point that we advocate good science. We aggregate stories daily on human and agricultural genetics (6 on farming/food and 6 on human/medical issues) and run one original story (minimum) each on a human genetics and ag genetics topic. We are funded entirely by foundations and individual contributions, as noted in the post below. We became an independent 501c3 in 2015.

What are your thoughts on the recent proposed re-evaluation decision from Health Canada to phase out the use of imidacloprid based on the results of an environmental assessment showed that, in aquatic environments in Canada, imidacloprid is being measured at levels that are harmful to aquatic insects?

Doc_Fish_PhooD

I think this is outside my area of expertise, unfortunately.

Do you think bees will be able to survive and pollinate enough food when our population reaches 10billion?

wooki_cooki

Bees have been around for about 60 million years, it's estimated. A 14 million-year-old fossil of a bee has been found in North America. And archeological evidence – the oldest coming from Turkey – indicates that human beings have been keeping bees and harvesting/exploiting their by-products – at a minimum for beeswax – for at least 9,000 years. All of which would lead me to bet that bees will still be around whenever the earth's population reaches 10 billion humans. (By contrast, there are already trillions of bees sharing our environment with us!)

Jon, I see that honey bees have been subject to CRISPR in the labhere. Would it be possible to engineer a honey bee resistant to neonics or whatever Bayer and Monsanto can dream up, without conferring that resistance to other insects?

WAbeeguy

It's a great question. I do not have an answer to it, but will pursue with some top entomologists and hopefully post an answer!