CENTRAL COAST BEEKEEPERS NEWSLETTER

June, 2025

NEXT MEETING Jun 19, 2025

Important Notice: Our meetings are now the third Thursday of the month at the Newport OSU Extension Office. Please see the schedule on page 3 for dates and locations.

PRESIDENT'S MESSAGE

By Jeremy Egolf

We appreciate the dry days and long hours of sun (with perhaps this weekend being the exception that proves the rule), but they mean that we gardeners must resort to providing water for the green living things under our stewardship. The microclimates vary tremendously here on the central coast, but at our place, the overwintered brassicas are just about bloomed out, with the blackberries flowering strongly just in time, which the yellow and black flying insects also under our custody taking advantage with alacrity.

While I'm obsessed with local weather, it's hard to ignore the national news these days. The US Geological Survey's Bee Lab is currently defunded under the President's budget for 2026, not directly but the group (Ecosystems Management) that funds the bee lab has its

budget deleted in the proposal. This mirrors the Project 2025 report that also suggested that this group be eliminated. We have an article on this lab's native bee collection herein.

Speaking of the contributions of federal scientists to our backyard beekeeping, the heavy losses of colonies since last spring have been addressed by the USDA Agricultural Research Service, which declares that the deceased colonies' bees all have a higher than usual load of viruses. The increasing tolerance of varroa destructor for Amitraz (which is used heavily by the commercial beekeepers) and hence the mites ability as vectors hosting and transport the viruses. We reprint their statement within, as well as the results of an ARS study on native bees use of turfgrasses as a food source.

Another recent update is Ramesh Sagili and Andony Melathopoulos' statement on some observers concerns about conflicts between native bees and the honeybees. This piece is too important to ignore and too long to summarize here, so you can find it on OSU's website here:

https://extension.oregonstate.edu/catalog/em-9524-impact-beekeeping-native-bees-urban-settings

I strongly urge you to read this before Ramesh's presents to us July 17th.

Because Mongabay's reporting reminds us (particularly with their so informative photographs) that we are not alone in the world, we have an article on pesticides and honeybees in Bangladesh.

Finally, HELP WANTED: We always want and need to expand the core of volunteers doing the work of Central Coast Beekeepers. We urge members to consider running for office in our autumn elections, and, also, we're looking for a volunteer to pick up the job of newsletter editor.

We look forward to seeing you this Thursday, June 19.

The Year's Program -

Meetings are 1:30 p.m. Thursdays, normally at the OSU Extension office in Newport.

June 19 - Lincoln County Master Beekeepers, "Pollinator Gardening")

July 17 - Ramesh Sagili, "Current Research"

August - Summer break, no meeting

Sept 18 - Charlie Vanden Heuvel, "Hive Inspections."

Oct 16 - Rick Olsen, "Raising Queens"

November 20 - Officer Elections, Plans for 2026

USDA Researchers Find Viruses from Miticide Resistant Parasitic Mites are Cause of Recent Honey Bee Colony Collapses

By: Autumn Canaday
Email: arspress@usda.gov

WASHINGTON, June 2, 2025 – Scientists at the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) are helping American beekeepers solve the mystery behind a widespread honey bee colony collapse and its debilitating effects on U.S. agriculture. Researchers have submitted a manuscript to a scientific journal for peer review based on our research findings that identified high levels of deformed wing virus A and B and acute bee paralysis in all recently USDA-sampled bees.

These viruses are responsible for recent honey bee colony collapses and losses across the U.S. Since the viruses are known to be spread by parasitic *Varroa destructor* (*Varroa*) mites, ARS scientists screened the mites from collapsed colonies and found signs of resistance to amitraz, a critical miticide used widely by beekeepers. This miticide resistance was found in virtually all collected *Varroa*, underscoring the need for new parasitic treatment strategies.

"Our nation's food supply thrives, and is sustained, by the work of our pollinators," said Acting ARS Administrator Joon Park. "USDA scientists continue to research major stressors and new parasite treatment strategies, which will help reduce the agricultural challenge presented by the Varroa mites in honey bee colonies."

In January 2025, commercial beekeepers began reporting severe losses in commercially managed operations. As losses unfolded, it was evident that over 60% of commercial beekeeping colonies had been lost since the prior summer, representing 1.7 million colonies and an estimated financial impact of $600 million.

ARS scientists collected colony and bee samples from across California and other western states in February 2025, prior to almond pollination. The USDA-ARS Bee Research Laboratory in Beltsville, MD, analyzed the parasites and pathogens from all samples and focused on individual bees exhibiting behavior known to precede death by minutes or hours. Viruses were indicated in both pooled samples from surviving colonies, and in individual bees showing behavioral morbidities.

"While viruses are a likely end-stage cause of colony death, these results do not rule out the importance of other long known challenges to honey bees," said ARS Research Leader Dr. Judy Chen.

As the primary managed pollinator, the *Apis mellifera*, is an integral component of agriculture, providing key pollination services for a wide variety of crops and over one-third of U.S. produce. The value of crops that require bee pollination is estimated to be more than $20 billion annually in the U.S. and $387 billion globally.

ARS researchers will continue to screen honey bees and their colonies for other known stressors and determine the best way to mitigate these stressors, mite infection, and subsequent colony loss.

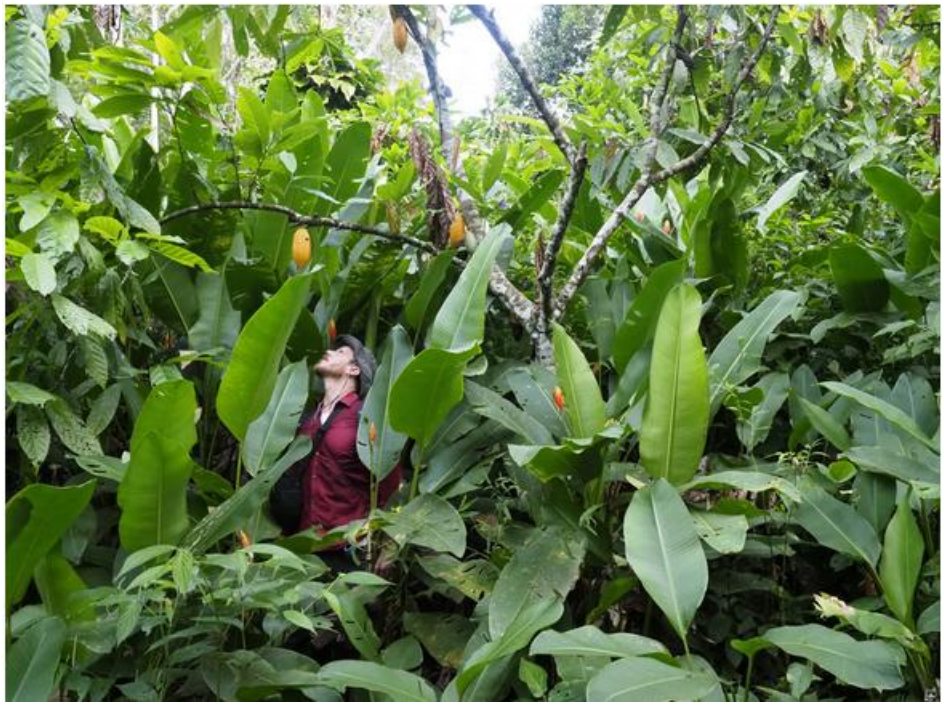
Balancing Agriculture and Environment: Agroecologist Thomas Cherico Wanger-Guerrero

By Jocelyn Eikenburg, March 17, 2022

As climate change threatens the safety of global food systems, our world urgently needs solutions from experts such as Thomas Cherico Wanger-Guerrero, a principal investigator from Germany leading the Sustainable Agricultural Systems & Engineering Laboratory at the Westlake University School of Engineering. "I'm interested in understanding how humans are affecting the environment, how we can improve this interaction, and how we can basically make our life in the long term sustainable. What really strikes me is how the whole field is moving -- that we're now at a point, where we are realizing how agriculture is affecting the environment, and how we can actually change that through diversified systems."

In the field of agroecology, which considers the relationship between agricultural practices and their environmental and social implications, Wanger-Guerrero followed an unusual path to his current work as a full-time scientist. After receiving his Ph.D. in environmental science from the University of Adelaide in Australia and National University of Singapore, and completing two postdoctoral fellowships -- one at Stanford University, and another at the Swedish University of Agricultural Sciences -- he initially looked to industry, not academia, for a livelihood. He held senior management positions in international organizations and agrochemical companies, and even started his own company, experiences he credits with enriching his research today.

"The industry actually works quite differently from what I think as a researcher," particularly the "economic perspective and how that is shaping how the world operates." For example, "the key question that comes up is, if I change my monoculture production into these diversified [agricultural] systems, what does that do to my crop yields? What does that do to my profits?"



Wanger-
Guerrero in the Atlantic Rainforest in Bahia, Brazil, where field sites for his research are located

Wanger-Guerrero says the industry often fails to understand how climate change has made agricultural practices such as monoculture farming -- where only one crop is grown in the fields -- untenable over the long term. "We know that as researchers, but it's very important to actually translate that message to the decision-makers in the industry so that they see."

At Westlake, he currently focuses on developing concepts and technologies that help to diversify agricultural systems and make them more sustainable. "You can think of a rice field. Instead of just having your rice paddies after rice paddies after rice paddies…you can also plant flowering plants on the side. These beautiful flowers that you nowadays see on the rice field sides, diversify these systems, increase yields and minimize the use of pesticides."

He has found that diversifying agricultural systems is beneficial from an environmental and even industrial perspective. "What we showed in recent work is basically that if you diversify your systems, you actually have above 60% positive effects on crop yields and on ecosystem services -- so-called pest control and pollination."

At the same time, his team is developing technology to monitor the outcomes of diversification along with biodiversity. "We have worked hard for the past two years to develop a computer-vision based monitoring device that we can put into our cocoa fields and understand, for example, which insects come to the flowers for pollination and quantify how that affects the crop yields," noting that such devices are also being used with other crops such as rice. "In the future, our devices can also help to monitor biodiversity in rural places and to derive suitable management recommendations when we talk about agriculture."

Wanger-Guerrero is pictured at a cocoa farm in Hainan, China

These and other achievements happen within Wanger-Guerrero's laboratory, which he considers distinctive because of the people. "What I really think is special about my group in particular is that we have about 50% international people. We have people from France, from Germany, and from Mexico. So there's this great mix of Chinese culture and international culture." According to him, Westlake is "about empowering people. As a principal investigator, you have all the freedom that you can hope for. You have the resources. So for me, it's a great opportunity."

The most fulfilling moments come when his work sparks positive change in the world, such as in the Indonesian city of Palu, which was devastated by an earthquake and tsunami in 2018. "There was a lot of discussion of how the city can be better protected from tsunamis," with much of the initial focus on building concrete seawalls. "Then one day I was on the phone and I talked to my friend there. And she was saying, 'You know, we had all these mangroves here in the past -- we could reforest the mangroves.'" So he looked into the benefits of mangrove reforestation for tsunami mitigation. "We wrote a paper that was then used by the local government and by the people on the ground to promote this ecosystem-based approach," which he characterized as "really exciting".

In the future, Wanger-Guerrero wishes his work would lead to more such outcomes, for a lasting legacy of sustainable agriculture around the world. "You know, right now we're talking about the global food systems

transformation, that we really need to change how we do agriculture. … I hope that I could influence some of the decisions that are made related to this food systems transformation. If I can say that, or if people would say that about me, I would be happy."

Grass Flowers are Something to Buzz About

Contact: Janice López-Muñoz

Turfgrasses sometimes get a "bad rap" for not giving our bees and other insect pollinators a helping hand on the food front. But Agricultural Research Service (ARS) and University of Georgia (UGA) studies suggest this reputation is unfair—and at least five different genera of bees would agree!

In the world, 70 percent of the main crops used for human consumption at least in part depend on bees and other pollinators. Yet, worldwide, pollinators have been in decline for the last several decades. Turfgrasses are often blamed for the decline and it is often stated that turfgrasses are wind-pollinated, and thus useless for pollinators.

The team's findings, published in the November issue of *Insects*, provided evidence to the contrary. "This is vital research as we aim to protect the natural environment of pollinators that are the foundation of our food supply," said Karen Harris-Shultz, a research geneticist at the ARS Crop Genetics and Breeding Research Laboratory in Tifton, Georgia. "This new knowledge sets the baseline for future research to show that turfgrasses can serve as a food source for pollinators."

Centipedegrass is a popular turfgrass found mainly in the southeastern part of the United States and is known for its heat tolerance and low maintenance, making it a favorite among homeowners and landscapers but prior research had suggested that it is of little use to pollinators.

Inflorescences (flowers) of centipedegrass. The purple anthers, shown here, contain the pollen that is collected by bees. Photo credit: Dr. Shimat Joseph, University of Georgia.

However, for many years Harris-Shultz had noticed bumblebees and honeybees collecting pollen from the flowers of centipedegrass lawns. She mentioned this to UGA entomologist Shimat Joseph and UGA physiologist David Jespersen. They decided to start research projects to identify pollinators that pass through centipedegrass lawns and differentiate them from insects that directly collect pollen from centipedegrass flowers.

To identify the types of pollinators foraging on the grass flowers, the researchers collected specimens from 11 centipedegrass lawns starting mid-August to the end of September. Using sweep nets, they homed in on insects that were foraging pollen from centipedegrass and were later identified in the lab by Joseph. Their specimens included bumble bees, honeybees, sweat bees and hoverflies.

"Our collaboration with the University of Georgia has been exceedingly fruitful," said Harris-Shultz. "We have challenged commonly held scientific beliefs and found that a turfgrass serves as a food source for five genera of bees. We suspect other turfgrasses may serve as a food source for pollinators as well."

Now that it is known that pollinators are transiting in centipede lawns, homeowners can play an important role in helping out the insects by adopting new lawn-management practices, such as changing how often they mow. This will allow the flowers to emerge from the grass and prevent them from producing seed as quickly. Homeowners can also reduce or change their selection of insecticides to limit the pollinators' exposure to chemicals.

The Agricultural Research Service is the U.S. Department of Agriculture's chief scientific in-house research agency. Daily, ARS focuses on solutions to agricultural problems affecting America. Each dollar invested in agricultural research results in $17 of economic impact.

Scientists make concerning discovery about memory of bees: 'We really might be in a tricky position'

The issue could ultimately put our food supply at risk.

by Kristen Lawrence May 19, 2025

Photo Credit: iStock

Scientists have found that microplastic pollution may impair the memory of bees, interfering with their ability to remember floral scents and locate flowers, which could lead to lower pollination rates.

What's happening?

As The Washington Post reported, researchers have discovered that microplastics are impacting the brains of honeybees and other pollinators, including bumblebees, according to a study published in the journal Science of the Total Environment. Microplastics can also physically block plant structures, preventing pollen from being deposited and the plant from being pollinated. Since microplastics are virtually everywhere in the environment — air, waterways, soil, and even remote locations such as the Pyrenees — it's easy for bees to ingest or inhale the particles while foraging for nectar and pollen.

Microplastics are deposited in nature from the incorrect disposal of trash, such as water bottles and food wrappers that contain plastic, as well as stormwater runoff and direct discharge from wastewater or industrial plants, among other sources. As the particles break down into smaller pieces, they travel through the air and land on flowers. When bees unknowingly consume microplastics, it can have a devastating impact on their health, disrupting their gut bacteria and immune systems, according to another study in Science of the Total Environment.

"If plastic is adding to all the stressors that pollinators are facing already, I think we really might be in a tricky position," Thomas Cherico Wanger-Guerrero, an agroecologist at Agroscope, an agriculture research center in Switzerland, told the Post.

Why is this concerning?

Since bees are so vulnerable to microplastic exposure, the particles are likely to end up in honey. The Post reported that Turkish scientists found microplastics in most honey samples taken. In Germany, commercial honey was found to contain about five microplastic particles per teaspoon.

Plastics have been linked to a wide range of human health problems, including hormone disruption, kidney and heart disease, birth defects, and an increased risk of cancer. Since people are already frequently exposed to plastics, the detection of plastics in honey is bad news, as it could lead to further health issues.

If bees aren't pollinating as many flowers and crops, our food supply could be at risk. According to the U.S. Department of Agriculture, pollinators play a crucial role in feeding the world, with scientists estimating that around 35% of the world's food crops rely on pollinators for growth. Bees also pollinate native plants and contribute to the overall health of ecosystems.

University of Reading report says conflicts including war in Ukraine among 12 most pressing threats to pollinator

Helena Horton Environment reporter

Mon 19 May 2025 19.01 EDT

War zones, microplastics and street lights are among the emerging threats to the bee population, according to scientists. Bee experts have drawn up a list of the 12 most pressing threats to the pollinator over the next decade, published in a report, Emerging Threats and Opportunities for Conservation of Global Pollinators, by the University of Reading.

Increasing war and conflict around the world is harming bees, the scientists warn. This includes the war in Ukraine, which has forced countries to grow fewer crop types, leaving pollinators without diverse food throughout the season.

The researchers found microplastic particles were contaminating beehives across Europe, with testing from 315 honey bee colonies revealing synthetic materials such as PET plastic in most hives. Artificial light from street lamps has been found to reduce flower visits by nocturnal pollinators by 62%, and air pollution has been found to affect their survival, reproduction and growth.

Antibiotics, used in agriculture, have made their way into beehives and honey. They have also been found to affect the behaviour of pollinators including reducing their foraging and visits to flowers. Pesticide “cocktails” also play a significant and emerging role; although some pesticides are now regulated to be kept below “safe” limits for bees and other wildlife, research has found they can interact with other chemicals and cause dangerous effects.

Prof Simon Potts of Reading University, the lead author on the report, said: “Identifying new threats and finding ways to protect pollinators early is key to preventing further major declines. This is not just a conservation issue. Pollinators are central to our food systems, climate resilience and economic security. Protecting pollinators means protecting ourselves.”

The authors have called for a number of measures to protect bees, including stronger laws limiting antibiotic pollution that harms bee health, transitioning to electric vehicles to reduce air pollution affecting pollinators, creating flower-rich habitats within solar parks, and breeding crops with enhanced pollen and nectar for better pollinator nutrition.

The report’s co-author Dr Deepa Senapathi, also from the University of Reading, added: “It will take effort from everyone to address these threats. We need to maintain, manage and improve our natural habitats to create safe spaces for pollinators. Individual actions like providing food and nesting areas in our own back gardens can help in a big way. But policy changes and individual actions must work together so everything from gardens and farms to public spaces and wider landscapes can all become pollinator-friendly habitats.”

Science of The Total Environment
Volume 912, 20 February 2024, 169362

Microplastics reach the brain and interfere with honey bee cognition

Elisa Pasquini [a b], Federico Ferrante [a c], Leonardo Passaponti [a], Francesco Saverio Pavone [d e], Irene Costantini [a d], David Baracchi [a]

Highlights

PS reduces bee sucrose response; PMMA has limited effects; MIX has adverse effects.

Both PS and PMMA impair learning and memory in bees, with PS being the most severe.

PMMA and PS synergistically affect sucrose responsiveness but not learning and memory.

The effect of MPs on bee cognition varies with the chemical nature of the polymer.

1–5 µm microspheres reach bee brains suggesting that PMMA and PS might do the same.

Abstract

Scientific research on the impact of microplastics (MPs) in terrestrial systems is still emerging, but it has confirmed adverse health effects in organisms exposed to plastics. Although recent studies have shown the toxicological effects of individual MPs polymers on honey bees, the effects of different polymer combinations on cognitive and behavioural performance remain unknown. To fill this knowledge gap, we investigated the effects of oral exposure to spherical MPs on cognitive performance and brain accumulation in the honey bee Apis mellifera. We evaluated the acute toxicity, after a two-day exposure, of polystyrene (PS - 4.8-5.8 µm) and plexiglass (Poly(methyl methacrylate), or PMMA - 1-40 µm) MPs, and a combination of the two (MIX), at two environmentally relevant and one higher concentration (0.5, 5 and 50 mg L^{-1}) and analysed their effects on sucrose responsiveness and appetitive olfactory learning and memory. We also used fluorescent thermoset amino formaldehyde MPs (1–5 µm) to explore whether microspheres of this diameter could penetrate the insect blood-brain barrier (BBB), using Two-Photon Fluorescence Microscopy (TPFM) in combination with an optimized version of the DISCO clearing technique. The results showed that PS reduced sucrose responsiveness, while PMMA had no significant effect; however, the combination had a marked negative effect on sucrose responsiveness. PMMA, PS, and MIX impaired bee learning and memory in bees, with PS showing the most severe effects. 3D brain imaging analysis using TFPM showed that 1–

5 µm MPs penetrated and accumulated in the brain after only three days of oral exposure. These results raise concerns about the potential mechanical, cellular, and biochemical damage that MPs may cause to the central nervous system.

Here is a link to the full pdf to read at your leisure:

https://www.sciencedirect.com/science/article/pii/S0048969723079925?ref=pdf_download&fr=RR-2&rr=8fe50a567bc09eb0

The race to save the bee collection at a lab stung by Trump cuts

Brenna Smith and Kaitlin Newman

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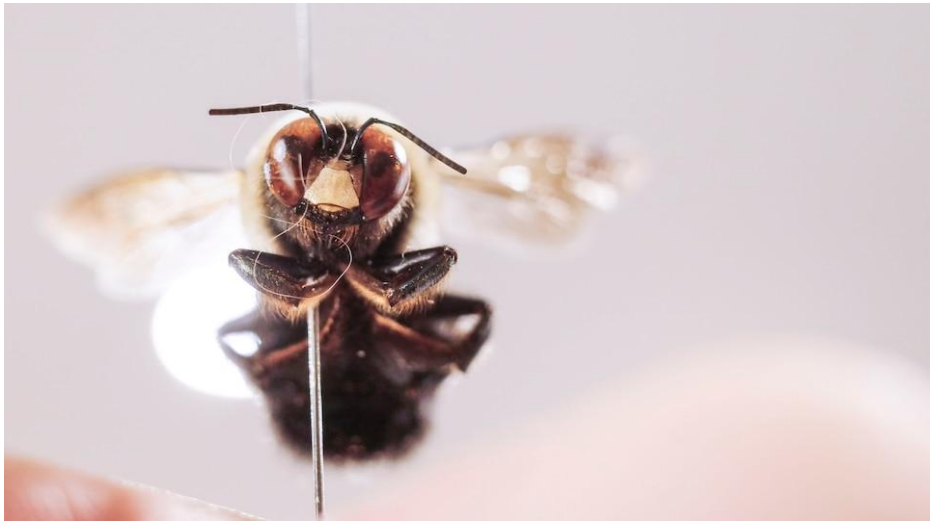


Researchers at the Eastern Ecological Science Center Bee Inventory & Monitoring Lab have spent a quarter-century studying the country's bees. (Kaitlin Newman/The Baltimore Banner)

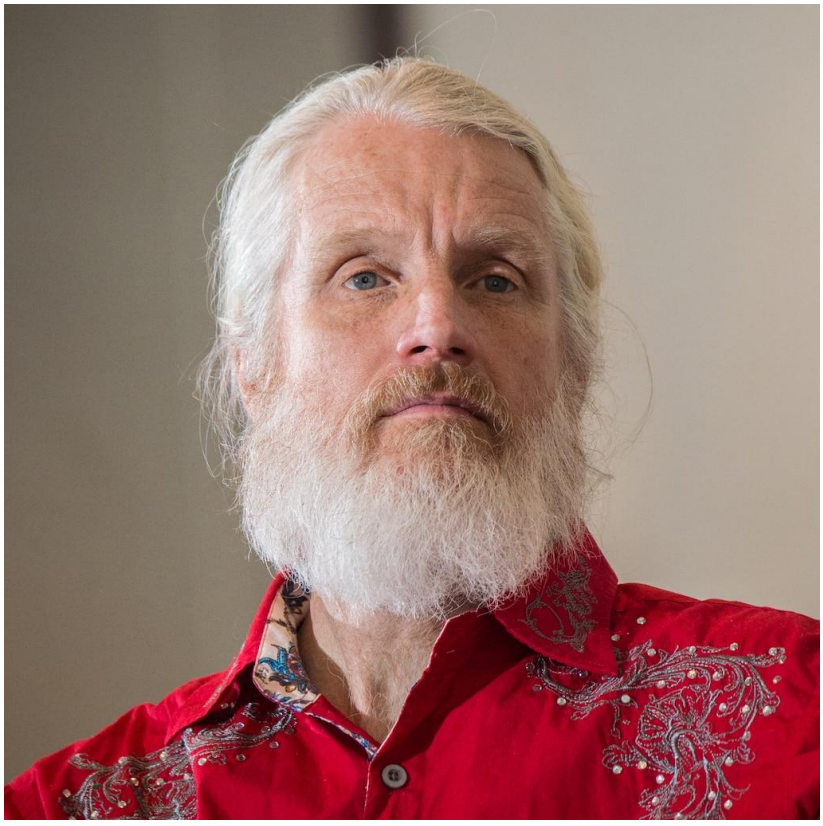
Volunteers are working to preserve nearly 300,000 specimens

Along a pine-lined road in Prince George's County, the entrance to the Eastern Ecological Science Center's Bee Lab is marked by a sign with a hovering black and yellow bee, big as a baseball. Wildlife biologist Sam Droege built the Bee Lab from the ground up over the past quarter-century. Here, some pollinate the native plant garden, and hundreds of thousands more are pinned and ready for study.

The collection holds specimens from across the country, a trove that has helped hundreds of researchers better understand the fragile, essential insects that keep food growing. The lab's online database includes nearly 800,000 bees, each one a tiny clue in the fight to keep them alive.

The lab is funded by the U.S. Geological Survey. Droege is a federal employee. About two weeks ago, Droege sent a beacon across social media and email, with an unusual request: "Come help the Bee Lab put bees to bed." The Trump administration's executive orders and moves by the Elon Musk-led Department of Government Efficiency, or DOGE, have gutted federal agencies at breakneck speed — nuclear engineers, park rangers and researchers alike. The Bee Lab, Droege warned the public, could be next. Its parent agency has already faced deep staffing and resource cuts under DOGE's plan. Droege declined to be interviewed, saying he was not authorized to speak for the federal agency.

Bees in the lab's collection have been carefully collected, frozen, pinned and prepped for study. Once they are fully identified by species and genus, they're sealed up for study. A sudden shuttering would put at risk nearly 300,000 bees in the collection that hadn't yet been properly preserved. Their little bodies left to rot in an empty lab building. Gnawed by mice, scattered by insects. Decades of research, gone.

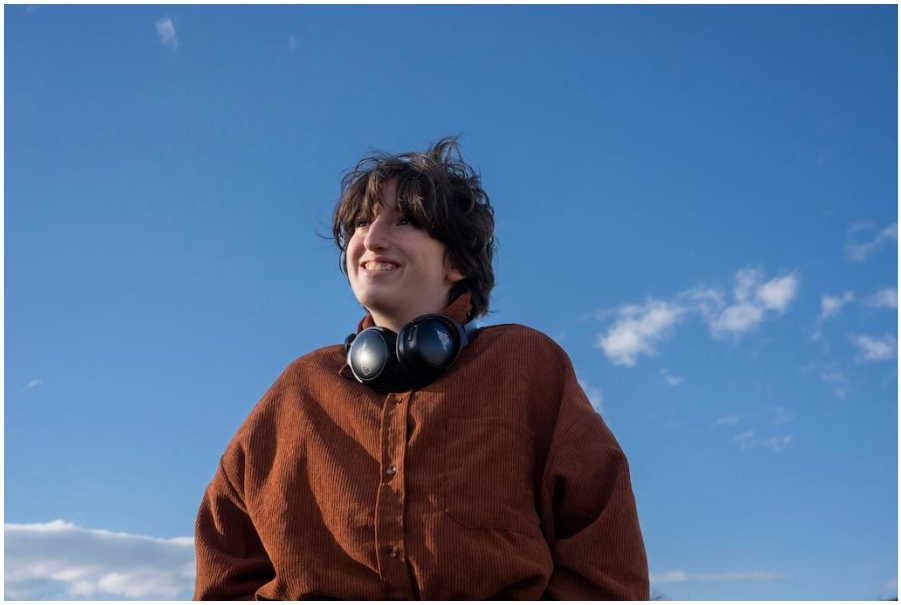


Sam Droege at a 2015 event in Crystal City, Virginia. (Lance Cheung/USDA)

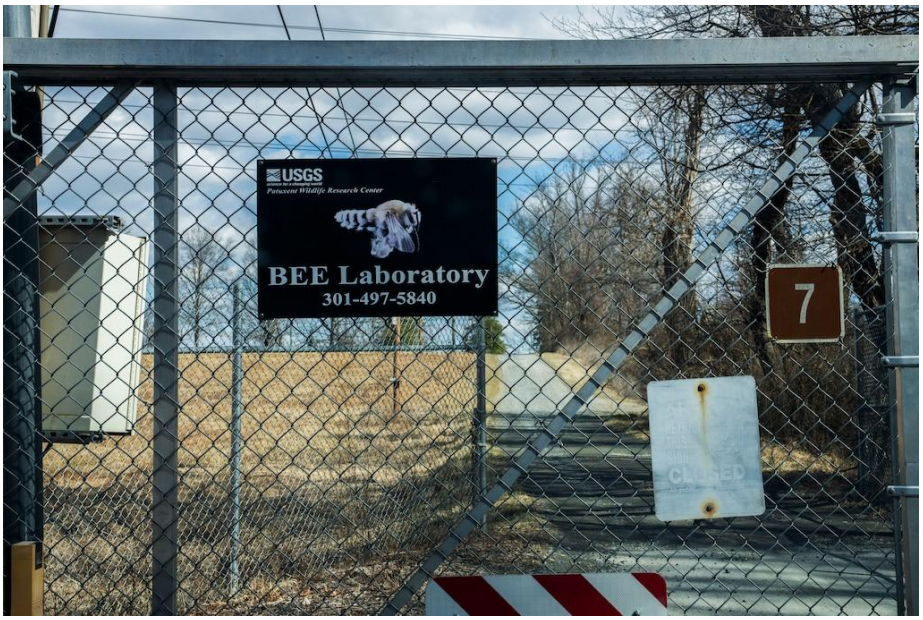
But if there were any "new taxonomists in training" willing to help, Droege wrote, there was still a way to save them. A way to tuck the lab in for days, weeks — even months. Long enough to keep the collection intact. His request buzzed across the Internet — he maintains one of the federal government's biggest Instagram accounts — flying between biologists and bee lovers alike. And suddenly, Droege had a hive. Dozens of volunteers, ready to work.

The task, in theory, was simple: Transfer the bees from pizza-style boxes into black-and-brown, glass-topped scientific cases. Seal them tight. Safe from ruin. Dubbed “the working collection,” these pizza boxes meant the bees were awaiting proper preservation. Some still needed to be identified.

Sadie Lachman had never driven on the highway before. But Saturday afternoon, the 18-year-old high school senior climbed behind the wheel, left his home in D.C., and made the drive to Beltsville to spend the day elbow-deep in dead bees. Some were the size of a blueberry. Most, no bigger than a grain of rice. There were the familiar ones, yellow and black. But just as many shimmered green, their colors shifting in the light.



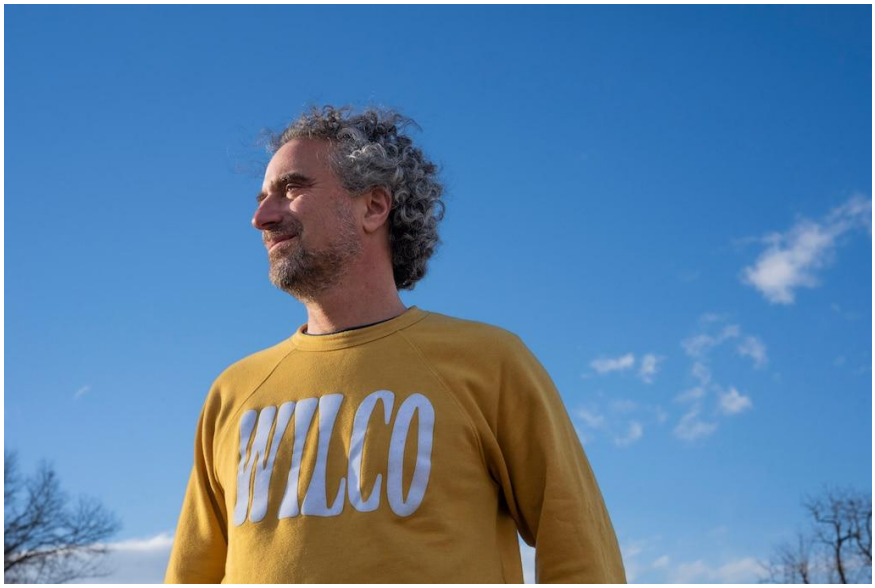
High school student Sadie Lachman volunteered to help organize and safely preserve bee specimens at the Eastern Ecological Science Center Bee Inventory and Monitoring Lab. (Kaitlin Newman/The Baltimore Banner)



The entrance to the Bee Lab, officially called the Eastern Ecological Science Center Bee Inventory and Monitoring Lab, in Prince George's County. (Kaitlin Newman/The Baltimore Banner)

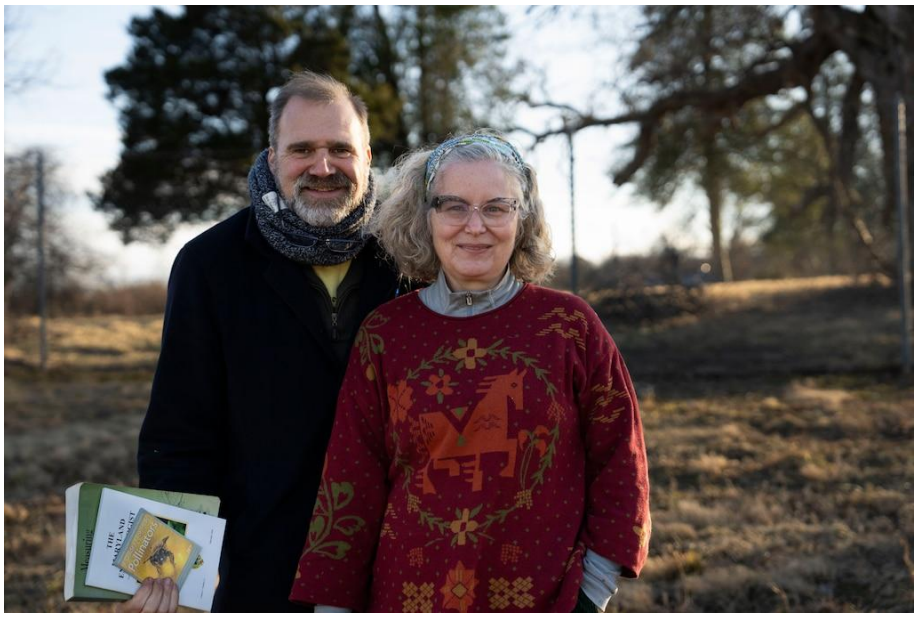
This was Lachman's second weekend volunteering, moving the pinned insects into labeled boxes. "All seniors at my school have to do a senior project," Lachman said, grinning. "I'm considering doing mine here. If it's still open, of course." He found his way to the Bee Lab through his dad, Gideon Lachman, 53. A former biologist, Gideon Lachman and Droege researched frogs together years ago. Life pulled them in different directions.

Then, one morning in 2012, Gideon Lachman was riding an Amtrak through Cumberland when he caught a glimpse of someone out the window. "Are you in Cumberland this morning?" Gideon Lachman texted Droege. "I swear I saw your golden hair, walking along the railroad tracks with a net in hand around 9 a.m." Droege texted back: "Weird. I was thinking that someone on the Amtrak train might recognize me." He was out collecting bees.



Gideon Lachman joined the volunteer effort with his son, Sadie. He had met the lab's director years ago while studying frogs. (Kaitlin Newman/The Baltimore Banner)

They reconnected, staying in touch on Facebook. Then two weeks ago, Gideon Lachman saw Droege's post about preserving the bee collection. And now, more than a decade after their chance Cumberland reconnection, here he was with his son, moving mummified bees, one by one, into their new homes. Like the Lachmans, most of the dozen or so volunteers interviewed by The Banner weren't just there out of anger over federal cuts or love for bees. Mostly, they were there for Droege. "It's incredible, the impact that Sam and that lab has — and had — on so many careers. It's hard to overstate that," said University of Maryland entomology professor Anahi Espindola. She first met Droege in 2018, not long after she arrived at the university to research pollinators. "Everybody told me: 'You need to meet Sam,'" she said. Soon, she was consulting him on taxonomy, asking him to help identify specimens and bringing students to his lab to study.



Mary Sue Twohy, 56, and Grand Godfrey, 54, both volunteered at the Bee Lab. (Kaitlin Newman/The Baltimore Banner)

When Droege's email landed in her inbox a few weeks ago, she didn't hesitate. She forwarded it across the university and scientific community. At least a dozen volunteers from UMD alone signed up to help. "I was like, 'We can't not help him. This is the minimum we can do," Espindola said.

For now, the Bee Lab stays open. But any day Droege and his team could be told they're done for good. By 6 p.m. Saturday, the last volunteers packed up. Some carried out pizza boxes with lab leftovers — a surplus of bees no longer needed in the center's overflowing inventory. Photos from Facebook showed the lab transformed: rows of neatly stacked boxes, each cradling dozens of tiny bodies. The bees had been put to bed. All that was left to do was wait.

Indiscriminate pesticide use threatens Bangladesh honeybees

Sadiqur Rahman

27 Mar 2025

- *In Bangladesh, honeybee populations are dwindling as unaware farmers use insecticides, particularly neonicotinoids, which disrupt their foraging and survival.*
- *Experts are seriously concerned about the use of chemical cocktails comprising neonicotinoids without extensive research.*
- *Despite worldwide concerns over neonicotiniods, Bangladesh authorities are yet to address the issue due to lack of awareness.*

In February, during the flowering time of black cumin (*Nigella sativa*), beekeeper Pavel Hossen set up an apiary on leased barren land adjacent to farmer Abdul Hakim's crop field in Kazirhat of Shariatpur, a district under Dhaka division and an emerging hub of spices, including the black cumin seeds. Pavel deployed Apis mellifera honeybees to collect nectar from the blooming cumin flowers. However, the hive boxes didn't yield as much honey as expected. "Bees cannot forage freely across insecticide-treated crop fields. Their population growth is also slowing down," Pavel recently told Mongabay.

During a visit to Kazirhat in late February, the village's agricultural landscape appeared fragmented by plots of different crops, including rice, wheat, coriander, black cumin, garlic, mustard and other vegetables. The use of agricultural chemicals like neonicotinoids as insecticides is popular with the cultivation of most of the mentioned crops. However, very few farmers know the permissible doses or potential effects of excessive use of insect killers on bees. Most of the farmers, like Abdul Hakim, said, "I spray the amount of chemicals that the sellers advise." In a village market, agricultural chemical sellers with expertise in conservation of biodiversity is a rare thing.

Entomologists and apiculturists have observed that rampant use of agricultural chemicals like neonicotinoids, present in different doses in nearly 600 brand products in Bangladesh, poses serious threats to bee colonies and other pollinators. "Because of food shortages, limited foraging grounds and frequent poisoning from insecticides, the population of honeybees is decreasing alarmingly," said Bangladesh Institute of Apiculture's executive director, Nurul Islam.

There is no survey on the bee population in Bangladesh. However, in 2019, the Food and Agricultural Organization of the United Nations warned that the population abundance of bees and other pollinators was declining in many parts of the world. The major causes were identified as excessive use of agricultural chemicals, monocropping, intensive farming practices and climate change-induced rising temperatures.

Honeybees hovering around hive boxes. Image by Sadiqur Rahman.

Full-time farmer Abdul Hakim, unaware of the side effects, applies insecticides as per advice from the sellers. Image by Sadiqur Rahman.

Neonicotinoids: Threats to bees

In Bangladesh, farmers widely use neonicotinoids and their cocktails with other chemicals in the fields of rice, chiles, beans, sugarcane, mangoes, tomatoes, mustard, banana, brinjals, marigold, cotton, jute and tea. Bangladesh's Department of Agricultural Extension (DAE) permits the use of acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid and thiamethoxam, all neonicotinoid insecticides, for the protection of crops. The insecticides mainly eliminate brown planthoppers, aphids, jassid leafhoppers, termites, hispas, helopeltis, thrips, hairy caterpillars, mealybugs, hoppers, semiloopers, and yellow stem borers, among other insects harmful to agriculture, according to the list of permitted pesticides.

However, these agricultural chemicals can cause behavioral alterations and physiological disruptions among beneficial insects like bees, sometimes killing them. A study published in 2024 finds the use of imidacloprid, clothianidin and thiamethoxam as highly toxic to bees. Mamunur Rahman, a corresponding author of the study and professor in the Department of Entomology at Gazipur Agricultural University, said chronic neonicotinoid exposure results in a significant decline in adult bee populations through reduced brood surface (the eggs, larvae and pupae of honeybees) and diminished pollen collection capacity.

“These neurotoxic compounds of neonicotinoids selectively target nicotinic acetylcholine receptors (nAChRs) in insects, leading to disrupted neural signaling, impaired foraging efficiency and colony-level dysfunction,” Mamunur said. He added that the cascading ecological consequences extend beyond bee mortality, contributing to suboptimal pollination efficiency and potential honey contamination. Currently, importers of crop protection chemicals in Bangladesh are searching for alternatives as they have found a high level of resistance to neonicotinoid thiamethoxam among brown planthoppers and stem borers in rice fields. Mahadee Hasan Pathan, secretary-general of the importers’ platform Bangladesh Crop Protection Association, said, “Combinations of neonicotinoid with carbamate, cartap, acetamiprid, nitenpyram and pymetrozine are being popularized among farmers for better outcome [pest control].”

Bangladesh Agricultural University’s Department of Agricultural Chemistry professor Zakir Hossen understands that pesticides, though harmful to all kinds of insects, have become an integral part of ensuring food security in Bangladesh. “Despite this, I am seriously concerned about the application of chemical cocktails without extensive research,” he said, adding that these cocktails could be more lethal to beneficial insects.

Chronic neonicotinoid exposure results in a significant decline in adult bee populations, reduced brood surface, and elevated queen supersedure (replacement) rates with low colony stability. Image by Sadiqur Rahman.

Beekeepers monitoring hive boxes at Kazirhat, Shariatpur. Image by Sadiqur Rahman.

Why does restricting neonicotinoids matter?

Bangladesh imports crop protection chemicals mostly from China, India and some Western countries. Researchers have found that bees in China are at high risk from exposure to neonicotinoids.

Indian researchers, studying the impacts of imidacloprid, acetamiprid, thiacloprid, thiamethoxam, clothianidin and dinotefuran, have found thiamethoxam and imidacloprid as "least safe to bees." In 2013, the European Commission restricted the use of plant protection products and treated seeds containing clothianidin, imidacloprid and thiamethoxam to protect honeybees.

Biodiversity conservationists in Bangladesh often demand banning pollinator-killing agrochemicals, especially neonicotinoids. But the DAE that licenses agrochemical imports hardly responds to the call. The department's pesticide administration and quality control wing approve pesticides, insecticides and miticides upon clearance from the Department of Environment and related crop research institutes.

Surprisingly, in a recent visit to the DAE's headquarters in Dhaka, none of the particular wing officials entertained questions about the neonicotinoids and their impacts on pollinators. "We are unaware of the side effects of neonicotinoids," said Nur E Alam Siddique, deputy director at the pesticide administration and quality control wing.

Dead bees lay on the ground beside hive boxes. Image by Sadiqur Rahman.

To mitigate the threats of neonicotinoids and ensure the resilience of pollinator-dependent agroecosystems, entomologists suggest the enforcement of stronger laws on the application of neonicotinoids.

“The integration of biorational approaches and biopesticides presents a scientifically robust and ecologically adaptive alternative,” Mamunur said.

Banner image: *Beekeepers monitoring hive boxes at Kazirhat, Shariatpur. Image by Sadiqur Rahman.*

Citations:

Sadia, H., Karki, P. R., Afroz, M.,Khan, H., Hossain, M. M. & Rahman, M. M. (2024). The Exposure of Pesticides to Honeybees: A Global Threat to Food Security. *Online Journal of Biological Sciences*. 24. 232-243. doi:10.3844/ojbsci.2024.232.243

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