CENTRAL COAST BEEKEEPERS NEWSLETTER

Mar., 2025

NEXT MEETING Mar 20, 2025

Important Notice: Our meetings are now the third Thursday of the month, usually at the Newport OSU Extension Office. Please see the schedule on page 4 for dates and locations.

PRESIDENT'S MESSAGE

By Jeremy Egolf

We live in interesting times. Preparing for this newsletter, I checked my email account for the latest issue of the USDA Agricultural Research Service's Weekly Digest Bulletin and found that I hadn't received it since February 9th. Turning to the Service's website, it appeared not to have been updated since January - it still features the January "Photograph of the Month." To find out what was happening with the ARS, I turned to our friend Dewey Caron, who provided this information a few days ago:

> "The websites of federal bee scientists have been taken off-line. Sites that include new items from agencies, such as USDA, NASS (survey data that includes honey prices, pollination rental income, etc.) and the regular USDA, ARS research newsletter (that includes occasional stories about new findings in bee research) have also gone dark. The programs are being reevaluated according to the sources I have consulted. They indicate they are having to respond to urgent lab reviews as they are gearing up for spring research and completing their publications over the winter period when they are not in the field actually collecting data. We know two recent hires (within last three years) were fired but at least one, Dr. Liz Walsh of the USDA Baton Rouge Bee Lab has been rehired.
>
> "Commercial beekeepers have requested an audience with the new Secretary of USDA Brooke Rollins, to discuss the heavy losses of colonies suffered the past two seasons but they have not heard yet if it will be granted. Some USDA research grants have been paused for a 90 day period for a review period. So far, none involving bees seem to have been cancelled. But all say there is great uncertainty and nervousness. The USDA Beltsville was able to send Dr. Zac Lamas to California to sample brood, adults, bee bread and beeswax from dead and dying colonies and from some colonies not recovering from wintering. They plan to prioritize analysis of the 500+ samples. What is not clear is what analysis technique will be employed to look for the possibility of new virus or variants of DWV virus - this is one of the hypothesized reasons for the sudden increases in bee colony losses. Improper fall nutrition leading to bee stress has also been postulated as another possible reason for heavier losses but analysis seems not to be a priority. It will take some time to complete analysis of samples and the sampling may be inconclusive and only correlative - actual experiments to prove cause and effect will take longer to be established and results evaluated."

Probationary employees were fired at the Natural Resources Conservation Service but as of Monday, March 10, reportedly were not yet reinstated despite court orders to do so.

We note the Oregon legislature is considering an amendment to HB 2679 (currently in committee, restricting use of neonicotinoids). The amendment would stop sales at garden and home stores but not require persons applying the neonicotinoids to be licensed (and therefore trained) for proper application.

This newsletter's articles continue some ongoing themes, including science at university and USDA Agricultural Research Service Labs, beekeeping abroad, specifically in Kenya and Pakistan, and on the alarming reduction in pollinator populations, specifically butterflies.

We remind you that we've arranged for Henry Storch to provide bees for paid members this spring. The deadline to place orders is the April 17th meeting. We're tentatively targeting May 7 for packages and May 16 for nucs, depending on the usual vagaries of weather and…

We look forward to seeing you at our next meeting of the year, Thursday, March 20.

CCBA's Queens for 2025:

At last year's OSBA conference, we purchased at auction a set of five queens from Russell Heitkam. The queens are planned for delivery in 2025, so we expect to have them on hand to replace weak or otherwise failing queens as we do our spring colony checks. Russell is a second generation beekeeper & Northern California (Orland) queen producer, and is on the Project Apis m Board of Directors.

The Year's Program -

Meetings are 1:30 p.m. Thursdays, usually at the OSU Extension office in Newport, except the June meeting, planned for the Waldport OSU Extension Office.

March 20 - Charlie Vanden Heuvel, "Bee Nutrition"

April 17 - Carolyn Breece, "Bee Diseases"

May 15 - Dewey Caron, "Swarming and Supering"

June 19 - Lincoln County Master Beekeepers, "Pollinator Gardening" (Waldport Extension Office)

July 17 - Andony Melathopoulos, "Nectar and Pollen Plants of Oregon"

August - Summer break, no meeting

Sept-Oct. - To be arranged.

November 20 - Officer Elections, Plans for 2026

Fighting Tropilaelaps:

Free webinar on the "Tropi" mite!

There is a growing concern about this invasive mite that is moving towards Europe from Asia first discovered in the Philippines in the 1960s. The more we know the better prepared we will be to combat this pest.

Topic: **Tropilaelaps webinar BeeGuards/Apimondia**

Date & Time: Mar 20, 2025 05:00 (note: shortly after the CBBA meeting)

This webinar will cover the biology, distribution, prevention and control options for this exotic mite, Tropilaelaps spp. Experts from across the globe will speak to this pest and be available for a Q&A session of 1 hour at the end of the webinar.

Managing invasive alien species is a major challenge for beekeepers. Pest management takes up significant time and budget in beekeeping operations. And the changing environment and global interconnectedness are accelerating the arrival of new invasive species in Europe. One example is the Tropilaelaps mites, originally found in Asia and parasites of Asian honey bees. Like Varroa mites, these smaller mites are emerging as a significant new threat to Western honey bee (Apis mellifera L.) colonies and their keepers. To tackle this urgent issue, Apimondia Federation and BeeGuards **are jointly hosting a webinar** to raise awareness on the identification and management of Tropilaelaps mites and to provide an update on the geographic expansion in Europe. Scientists and experienced beekeepers will share their knowledge, shedding light on effective mitigation measures to limit the spread of these new mites.

Don't miss out on this opportunity to learn more about this exotic mite. Free registration:

https://www.apimondia.org/mites-webinar.html

Butterflies are disappearing in the United States. All kinds of them. With a speed scientists call alarming, and they are sounding an alarm.

[from Science Daily, 3/6/25]

A sweeping new study published in *Science* for the first time tallies butterfly data from more than 76,000 surveys across the continental United States. The results: between 2000 and 2020, total butterfly abundance fell by 22% across the 554 species counted. That means that for every five individual butterflies within the contiguous U.S. in the year 2000, there were only four in 2020.

"Action must be taken," said Elise Zipkin, a Red Cedar Distinguished Professor of quantitative ecology at Michigan State University and a co-author of the paper. "To lose 22 percent of butterflies across the continental U.S. in just two decades is distressing and shows a clear need for broad-scale conservation interventions." Zipkin and her MSU colleague and co-author Nick Haddad, professor of integrative biology, have been major figures in drilling down the state of U.S. butterflies. Zipkin has been a formidable numbers cruncher with successes gleaning hard facts from imperfect data sets to better understand the natural world.

Haddad is a terrestrial ecologist -- a scientist on the ground specializing in the fates of the most fragile and rare butterfly populations. The widespread decline of butterflies found in this study have shaken Haddad, and reports that the mountain of data is on display in his Michigan neighborhood. "My neighbors notice it," Haddad said. "Unprompted, they'll say, 'I'm seeing fewer butterflies in my garden, is that real?' My neighbors are right. And it's so shocking."

In this paper, Zipkin and Haddad were among a working group of scientists with the USGS Powell Center for Analysis and Synthesis that aggregated decades of butterfly data from 35 monitor programs that included records of over 12.6 million butterflies. Using data integration approaches, the team examined how

butterfly abundances changed regionally and individually for the 342 species with enough data.

Abundance is a term that threatens to become ironic. Butterfly populations dropped an average of 1.3% annually across the country, except for the Pacific Northwest. But even that encouraging result came with a caveat. Further scrutiny of the apparent 10% increase in overall abundance in the Pacific Northwest over the 20-year study period was credited largely to the California tortoiseshell butterfly, which was enjoying a population boom not expected to be sustained.

Butterflies are the most surveyed insect groups, courtesy of extensive volunteer-based and expert science monitoring programs. Until now, studies have focused on individual species -- most notably monarch butterflies -- or limited to specific locations. This new study uses all the available regional butterfly monitoring data within the continental United States and then develops a method of analysis that appropriately accounts for variations in collection protocols across programs and regions to produce comparable results for hundreds of species.

"This is the definitive study of butterflies in the U.S.," said Collin Edwards, the study's lead author. "For those who were not already aware of insect declines, this should be a wake-up call. We urgently need both local- and national-scale conservation efforts to support butterflies and other insects. We have never had as clear and compelling a picture of butterfly declines as we do now." Edwards had been a postdoctoral research associate at Washington State University, Vancouver, and now works at the Washington Department of Fish and Wildlife.

The results reveal that 13 times as many species declined as increased -- with 107 species losing more than half their populations. Zipkin and Haddad say butterflies are more than fluttering symbols of freedom and beauty. They play important roles in cycling nutrients and are a significant food source for other organisms such as birds. Over the last 50 years, North America has lost nearly 3 billion birds, a decline at almost identical rates of the butterflies. Butterflies are important and forgotten pollinators. People often think of bees first, but butterflies (and flies) are responsible for $120 million of cotton production in Texas, for example.

Zipkin said she sees this paper as an important heads up to the country's policymakers. "People depend on plants, microbes, and animals for the air we breathe, the water we drink, and the food we eat. Yet, we are losing species at

rates that rival the major mass extinction events on our planet," Zipkin said. "The U.S. plays an important role in setting policies and creating laws that conserve and protect biodiversity from local to global scales. Our leaders and the federal government, in particular, are responsible for making sure future generations have the necessary resources to thrive."

In 2024, Haddad was part of a study published by the journal PLOS ONE that pinpointed the danger of insecticides, that rose above other threats such as habitat loss and climate change in reducing butterfly abundance and diversity. He points out that saving butterflies isn't a hopeless problem, just one that requires will. A lot of insecticide use, he said, lacks strategy and results in overuse. Some 20 percent of cropland suffers from poor yields. Creating policies that return under-producing land to nature could help the butterflies to rally. "Prophylactic and near-universal application of insecticides harms butterflies and other beneficial insects, with no proven benefit to crop yield," Haddad said. "What is applied as 'insurance' is extracting a great debt to agroecosystems. The good news is that the widespread application of insecticides can be reversed, and butterflies and other pollinators will recover."

In addition to Zipkin, Haddad, and Edwards, "Rapid butterfly declines across the United States during the 21st century" was written by Erica Henry, Matthew Forister, Kevin Burls, Steven Campbell, Elizabeth Crone, Jay Diffendorfer, Margaret Douglas, Ryan Drum, Candace Fallon, Jeffrey Glassberg, Eliza Grames, Rich Hatfield, Shiran Hershcovich, Scott Hoffman-Black, Elise Larsen, Wendy Leuenberger, Mary Linders, Travis Longcore, Daniel Marschalek, James Michielini, Naresh Neupane, Leslie Ries, Arthur Shapiro, Ann Swenger, Scott Swengel, Douglas Taron, Braeden Van Deynze, Jerome Wiedmann, Wayne Thogmartin, and Cheryl Schultz.

Zipkin and Haddad are members of MSU's Ecology, Evolution, and Behavior Program, of which Zipkin is director.

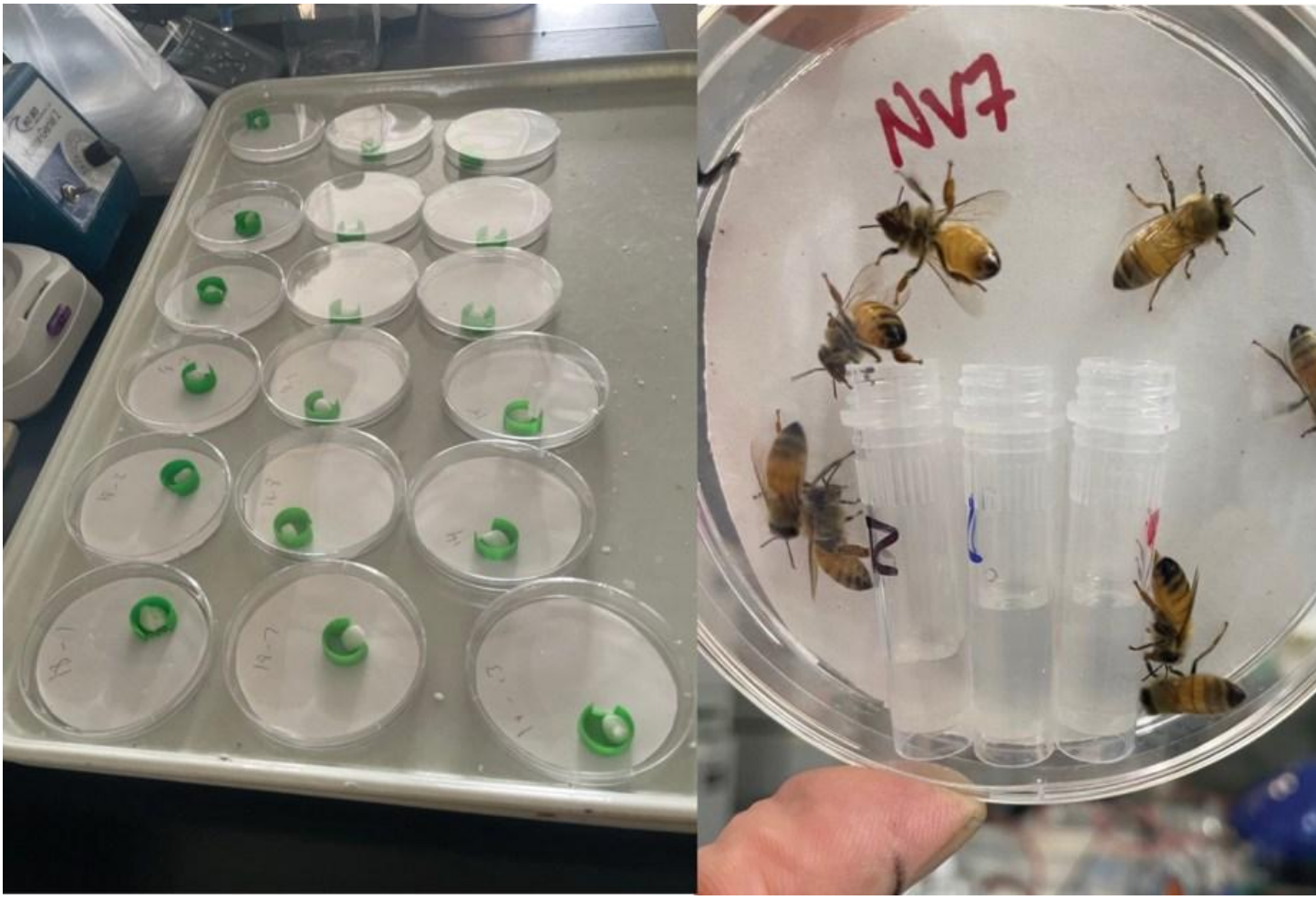
If you'd like to know more about the lab of Eliza Grames at the State University of New York, Binghampton, whose lab used quantitative tools to analyze the data for the butterfly study, see https://elizagrames.github.io/index.html

The *New York Times* online has a handy tool for extracting data from the study. Of 94 species known to occur in Newport 67 are decreasing nationally, 13 have little cahnge, and 14 are increasing. The most dramatic declines are among the West Coast Lady (ha80% reduction), Hedgerow Hairstreak (70%), and the Cabbage White (51%).
In Florence, 68 of 98 species known are decreasing nationally, including the Large Marble (74% reduction) and the Indra Swallowtail (73%).

Although the study depends on the aggregated annual data from observant citizens and scientists and thus detailed local observations may depend on random factors during the time observations were made, the overall trends are nevertheless alarming.

From Hive to Lab: Could “P-Cup” Arenas Redefine Honey Bee Research?

February 27, 2025 Entomological Society of America



Researchers at the United States Department of Agriculture’s Agricultural Research Service have developed a small-scale, inexpensive, and disposable rearing arena for honey bees—using simple Petri dishes—that improves upon existing methods. Different feeders used in the cups include cake fondant (small white ball in each cup at left) and or sucrose syrup (in three microcentrifuge tubes in cup at right). (Image originally published in Evans et al 2024, *Journal of Insect Science*)

By Carolyn Bernhardt

Pesticides weaken honey bees’ immune systems, diseases spread rapidly through hives, and poor nutrition from dwindling wildflower habitats leaves bees vulnerable. Add to this the unpredictable swings of a changing climate, and the

challenges facing honey bee populations become clear. At the same time, researchers turn to these industrious insects for insights into social behavior, aging, and microbiology, using their intricate hive dynamics as a window into larger biological systems.

However, conducting controlled and replicable experiments on honey bee (*Apis mellifera*) biology presents researchers with many challenges, especially due to bees' complex social structure and simultaneous interactions within each hive. While researchers often use tools like hoarding cages and chambers to house bees during experiments, these methods often fall short in terms of cost, efficiency, and ensuring bee survival.

Researchers in the Bee Research Laboratory at the United States Department of Agriculture's Agricultural Research Service in Beltsville, Maryland, recently developed a small-scale, inexpensive, and disposable rearing arena for honey bees that improves upon existing hoarding cage methods. As detailed in a report published in November in the open-access Journal of Insect Science, the researchers developed "P-cup" arenas and performed various tests to compare their design and effectiveness to traditional hoarding cages.

Using 100 millimeter Petri dishes as tiny, transparent, single-use arenas for housing honeybees, the team equipped each "P-cup" with a paper disk, sugar syrup feeders, and sometimes fondant feeders to support bee nutrition. "There have been lots of designed houses for honey bees, scaling down from full-sized hives to wooden and, lately, plastic arenas like [the ones we used in the study]," says Jay Evans, Ph.D. [CCBN editor's comment: this link to the ARS website no longer works}, a lead scientist in the Bee Research Laboratory at the USDA-ARS. "We mainly wanted a sterile space since we were studying disease." The team also wanted a home that could confine the bees at a typical density, even when they were following just a few bees at once.

The experts collected newly emerged bees from frames placed in an incubator. They transferred the bees into the Petri dishes by hand, ensuring sterile conditions between trials. They also provided the bees with either fondant (for longer-term feeding) or sucrose syrup (for controlled feeding experiments). The team kept the arenas in an incubator to maintain appropriate temperature and humidity levels.

While other researchers have used disposable cups for years, the ones the team developed were much smaller and had a higher throughput. But, according to Evans: “Our best breakthrough was in the feeders. Feeders on the roof of traditional hoarding cages can be inaccessible to some bees and can either over-drip or cavitate and run dry. These are basically two-dimensional arenas, so all the bees can reach the food, even newly emerged bees or bees that are less healthy.”

The researchers injected some bees with pathogens or used field-caught bees that they briefly sedated with carbon dioxide before sorting them into arenas. They monitored the bees’ health and recorded mortality daily. After the trial period, the team processed and analyzed the bees for further study using RNA, DNA, or chemiluminescence techniques.

The study’s findings showed that the P-cup system significantly improved bee survival rates and experimental efficiency. In trials with newly emerged bees, just over 4 percent died over 12 days, a much lower mortality rate than researchers have previously seen in traditional setups. This finding suggests the system has strong viability for long-term studies.

Even when injected with the deformed wing virus (DWV), over 95 percent of bees survived for at least 96 hours, showing that the P-cup system supports robust bee health despite experimental stressors. Evans says he was surprised by how long the bees lived, noting that even small groups survived without additional water sources. He suggested that future studies incorporate elements like a “jungle gym” to further assess the impact of viral infections on behavior.

The P-cup system also had practicality perks. First of all, the fondant feeders outperformed liquid feeders, keeping bees alive for weeks without maintenance and eliminating the risk of messy leaks. Researchers also had the chance to streamline experiments by running multiple trials in small incubators, effortlessly studying temperature effects on disease. Evans also highlights the setup’s value for testing new bee medicines, enabling cost-effective, high-replication trials with ease. The team has already used them to screen hundreds of possible antiviral drugs.

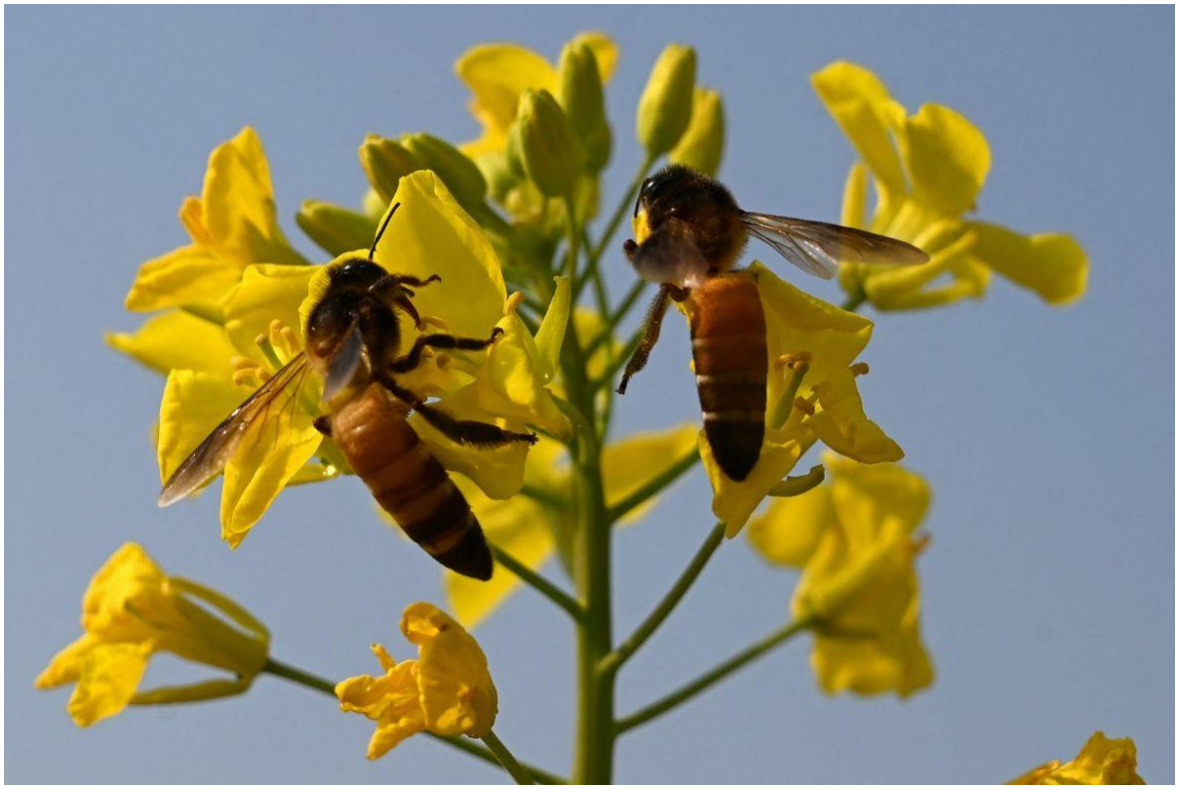
“These studies will probably always have to be followed up with ‘real-colony’ studies given the complexities of nutrition and social interactions in large colonies,” says Evans. “But these approaches will certainly play a role in screening

for the factors that have big effects on bee health, from pesticides to viruses, and for monitoring behavior interactions among workers in a way that can be recorded and repeated."

The team is exploring automated methods to track long-term bee behaviors in P-cup arenas to study the effects of virus infections, building on advances from colleague Zachary Lamas, Ph.D., a researcher in Evans' lab, and work at the University of Illinois Bee Lab. "While our benign virus assay did not cause mortality, we have been able to start using these to measure mortality caused by a more virulent paralysis virus and they are easily monitored daily for dead and dying bees," says Evans. "We think these arenas will be a good addition to replicated studies of pesticide and disease impacts."

Climate crisis threatens Pakistan’s bees and honey trade

Pakistan’s bees once produced 22 varieties of honey but that has plummeted to 11 as flowering seasons shorten.



Bees collecting nectar from mustard flowers near a honeybee farm at Lak Mor village in Sargodha district, Punjab province [Aamir Qureshi/AFP]

Published On 4 Mar 20254 Mar 2025

Under a dry, smoggy sky, a beekeeper in Pakistan’s Punjab province carefully loads boxes filled with tens of thousands of bees onto the back of a truck. Together, they will travel 500km (about 300 miles) in an increasingly desperate chase to find flowering plants, clean air, and moderate temperatures for honey production as climate change and pollution threaten the industry. Pakistan’s beekeepers typically move seasonally to avoid stifling heat or freezing cold.

Summers are spent in northwestern Khyber Pakhtunkhwa province, and winters in central Punjab province.

But weather patterns made unpredictable by climate change, coupled with some of the worst pollution in the world, mean beekeepers must move more frequently and travel further. This winter was marked by soaring, hazardous smog levels that the government declared a national disaster. Research has found air pollution can make it harder for bees to locate flowers. Diminished rainfall, meanwhile, failed to clear the choking air and triggered drought warnings for farmers.

The bees of Pakistan's 27,000 beekeepers once had diverse foliage fed by reliable rainfall, offering a rich source of nectar. Their honey is used in local flu remedies, drizzled over sweets, and given as gifts. Since 2022, however, Pakistan's honey production has dropped 15 percent, according to the government's Honey Bee Research Institute in capital Islamabad.

Bees are threatened globally by changing weather patterns, intensive farming practices, land-use change, and pesticides. Their loss threatens not just the honey trade but food security in general, with a third of the world's food production dependent on bee pollination, according to the Food and Agriculture Organization.

Pakistan's bees once produced 22 varieties of honey, but that has plummeted to 11 as flowering seasons shorten. Three of the country's four honeybee species are endangered. Also, moving so often is expensive for beekeepers in a country where fuel prices have risen dramatically in recent years. And beekeepers seeking better weather can face harassment if they set up in areas without permission from landlords.

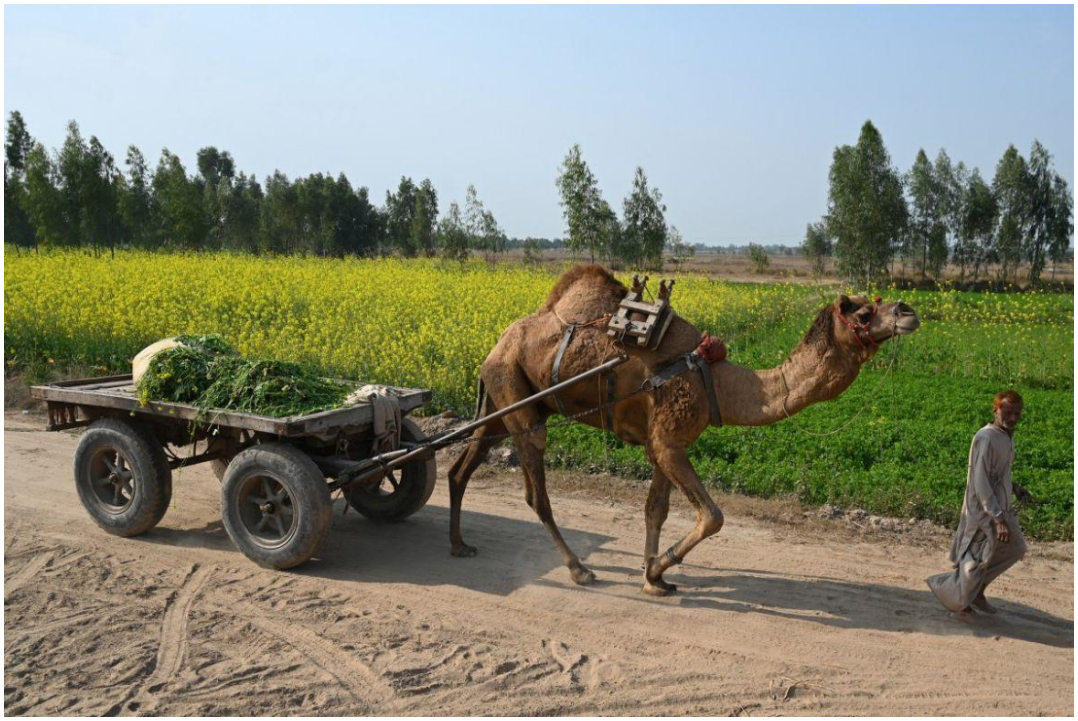
Some hope is offered by new technology intended to keep bees cool, addressing the problem of how extreme temperatures affect the insects, if not their food source. Abdullah Chaudry, a former beekeeper, developed new hives with improved ventilation based on inspiration from other honey-producing nations dealing with rising temperatures, including Turkiye and Australia. Early signs suggest the boxes improve production by about 10 percent, but they are just part of the adaptation puzzle.

Malik Hussain Khan walks in a mustard field near his honeybee farm at Lak Mor village. [Aamir Qureshi/AFP]

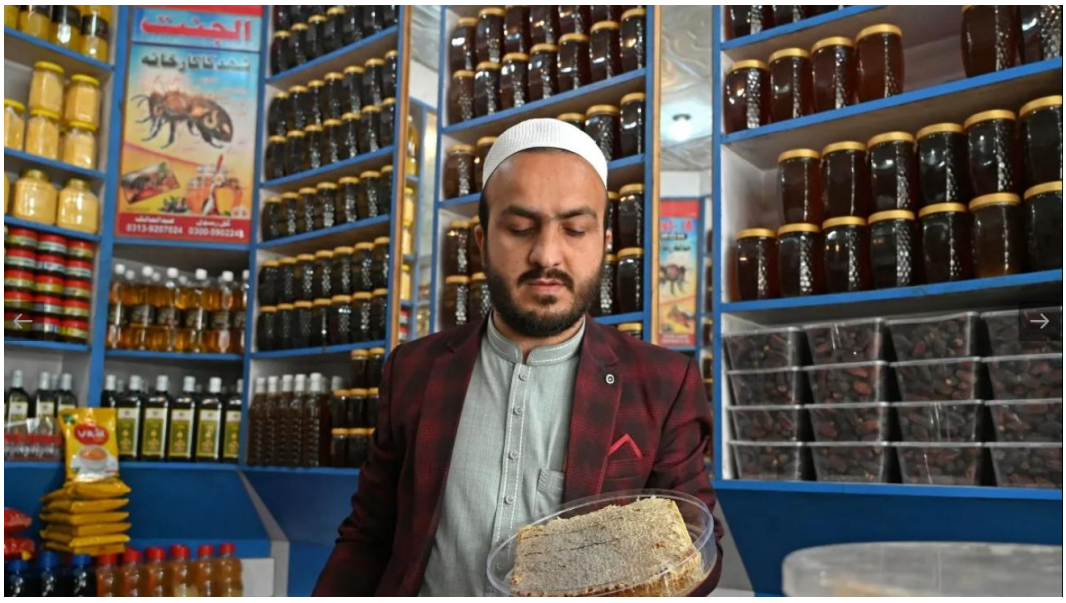
“We Move the boxes according to where the weather is good and the flowers bloom,”said Malik Hussain Khan [AAmir Qureshi/AFP]

”Almost half of my bees died when the smog and fog hit this winter because they could not fly. There was hardly any rain,” said Malik Hussain Khan, who moved his bees as frequently as every few weeks in January and February. [Aamir Qureshi/AFP]

Beekeeper Gul Badshah inspects a honeycomb at a farm in Chamkani, on the outskirts of Peshawar. [Aamir Qureshi/AFP]

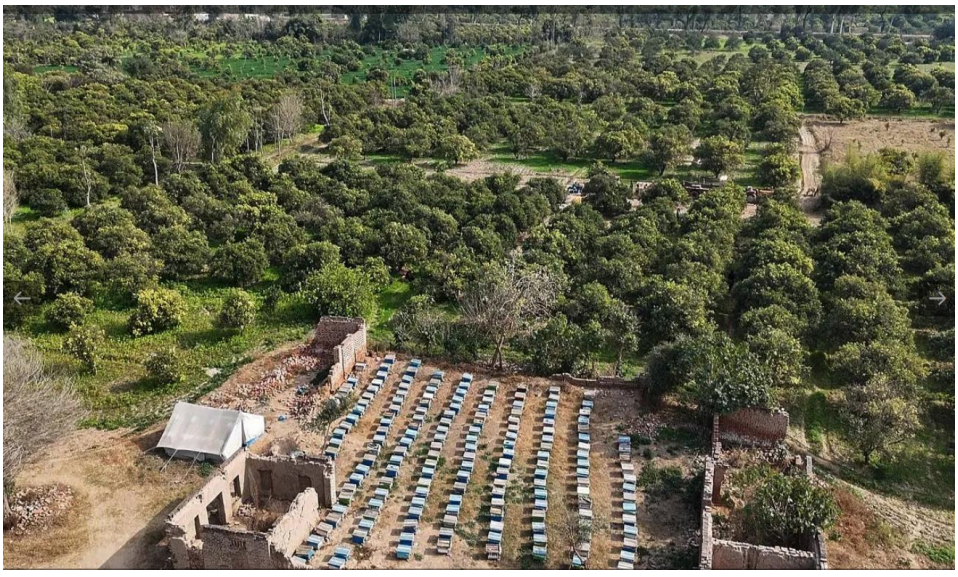


Bees are threatened globally by changing weather patterns, intensive farming practices, land-use change, and pesticides. [Aamir Qureshi/AFP]

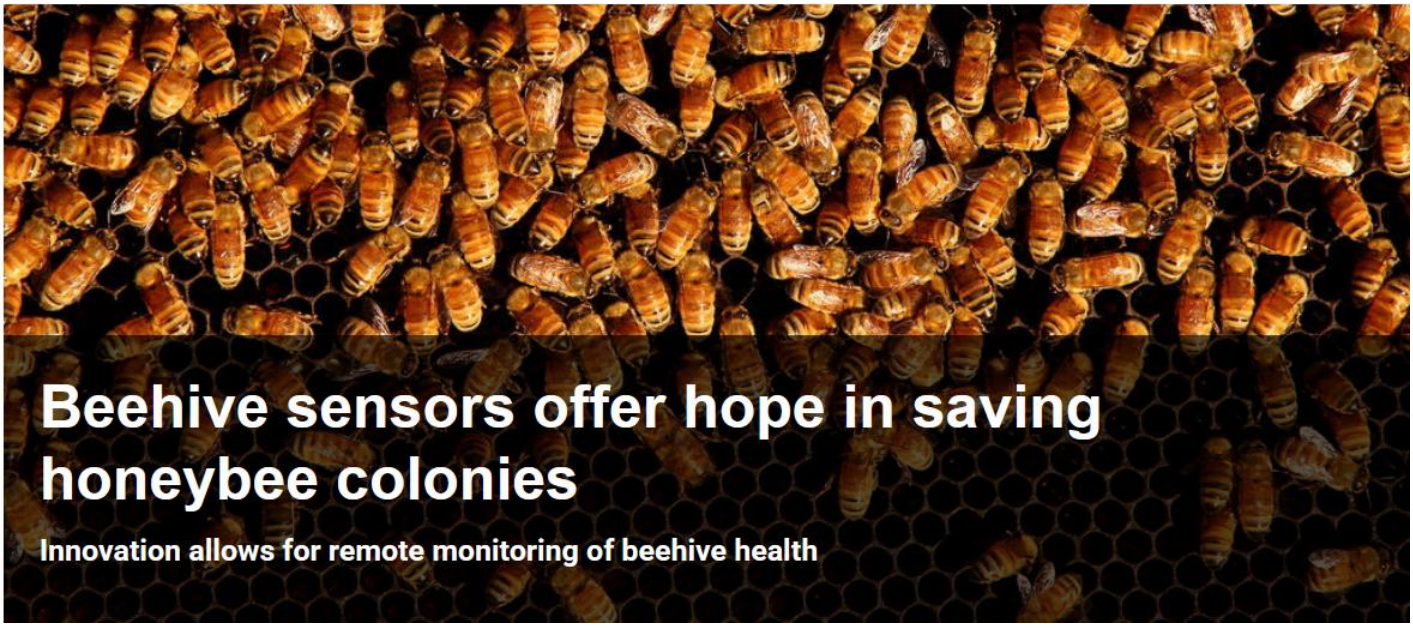


Since 2022, Pakistan's honey production has dropped 15 percent, according to the government's Honey Bee Research Institute (HBRI) in the capital Islamabad. [Aamir Qureshi/AFP]

The loss of bees threatens not just the honey trade but food security in general, with a third of the world's food production dependent on bee pollination, according to the Food and Agriculture Organization. [Aamir Qureshi/AFP]

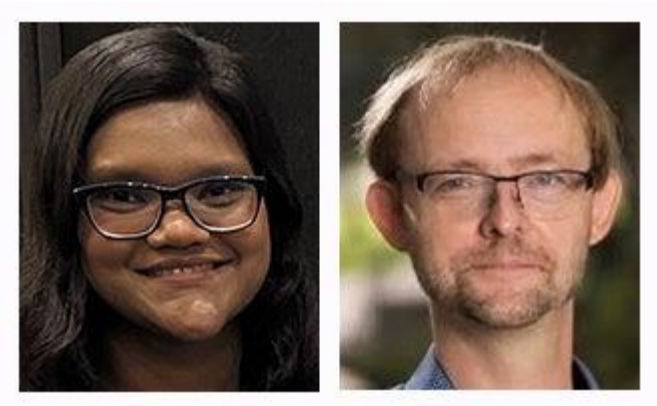


A honeybee farm at Lak Mor village in Sargodha district, Punjab province. [Aamir Qureshi/AFP]



UC Riverside computer science team has developed a sensor-based technology that could revolutionize commercial beekeeping by reducing colony losses and lowering labor costs.

Called the Electronic Bee-Veterinarian, or EBV, the technology uses low-cost heat sensors and forecasting models to predict when hive temperatures may reach dangerous levels. The system provides remote beekeepers with early warnings, allowing them to take preventive action before their colonies collapse during extreme hot or cold weather or when the bees cannot regulate their hive temperature because of disease, pesticide exposure, food shortages, or other stressors.



Shamima Hossain and Boris Baer

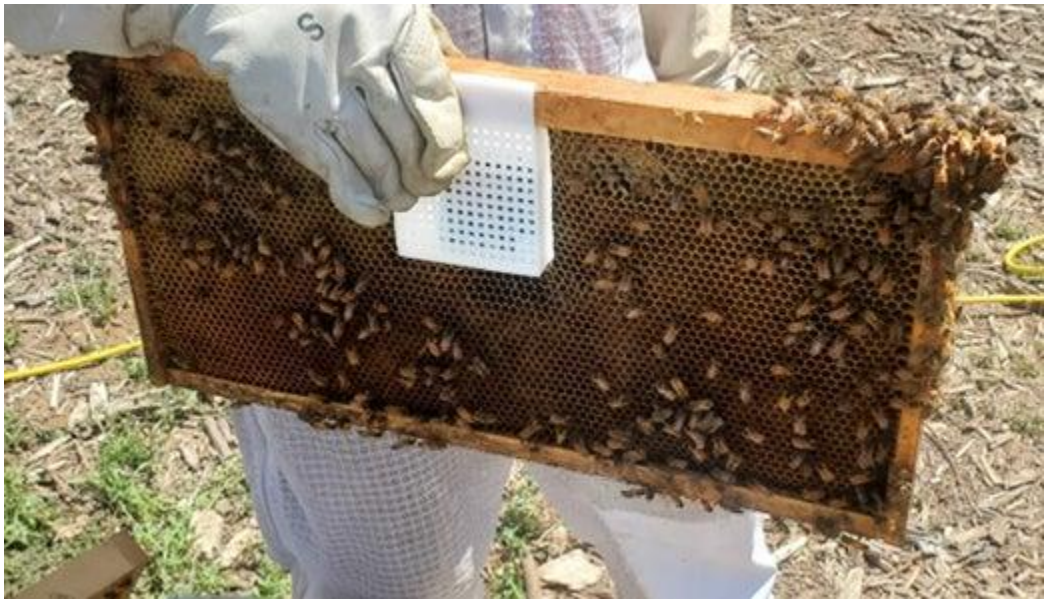
“We convert the temperature to a factor that we are calling the health factor, which gives an estimate of how strong the bees are on a scale from zero to one,” said Shamima Hossain, a Ph.D. student in computer science at UCR and lead author of a paper explaining the technology. This simplified metric — with a score of ‘one' meaning the bees are at full strength — allows beekeepers unfamiliar with the underlying model to assess hive health quickly.

Boris Baer, a UCR professor of entomology, believes the technology could revolutionize beekeeping, which is essential to vast sectors of global agriculture. Honeybees pollinate more than 80 crops and contribute an estimated $29 billion annually to U.S. agriculture. Yet bee populations have declined due to various factors, including habitat loss, pesticide exposure, parasites, and climate change. “Over the last year, the U.S. lost over 55% of its honeybee colonies,” Baer said, citing data from Project Apis m., which monitors beehive losses throughout the U.S. “We are experiencing a major collapse of bee populations, and that is extremely worrying because about one-third of what we eat depends on bees.”

Beekeepers now rely on their own judgment and manual inspections to detect problems, often leading to delayed interventions. With EBV, they can get real-time insights and predict conditions days in advance, significantly reducing labor costs, said Baer, who collaborated with Hossain and other scientists at UCR’s Bourns College of Engineering. “People have dreamed of these sensors for a very long time,” Baer said. “What I like here is that this system is fully integrated into the hive setup that beekeepers already use.”

Temperature fluctuations are among the first responses to any kind of threats to a hive's health. Honeybees maintain a precise internal hive temperature between 33 and 36 degrees Celsius (91.4–96.8°F), a requirement for proper brood development and colony survival, Baer said. The EBV method is based on thermal diffusion equations and control theory, making its predictions interpretable to both scientists and beekeepers, Hossain said. The model uses temperature data collected from low-cost sensors installed inside the hive, feeding that information into an algorithm that predicts hive conditions several days in advance.

In tests conducted at UCR's apiary, the EBV method analyzed data from 10 hives during initial development and later expanded to 25 hives. The technology has already proven its effectiveness, detecting conditions that required beekeeper intervention. "When I looked at the dashboard and saw the health factor dropped below an empirical threshold, I contacted our apiary manager," Hossain recalled. "When we went to check the hive, we found that there was actually something wrong, and they were able to take action to manage the situation."



A low-cost heat sensor on a beehive frame (UCR photo)

Hyoseung Kim, an associate professor of electrical and computer engineering at UCR, explained that keeping costs low — under $50 per hive — is a high priority. "There are commercial sensors available, but they are too expensive," Kim said. "We decided to create a very cheap device using off-the-shelf components so that beekeepers can afford it."

The research team is already working on the next phase, which is to develop automated hive climate controls that can be installed on hives and respond to EBV's predictions, adjusting hive temperatures automatically. "Right now, we can only issue warnings," Hossain said. "But in the next phase, we are working on designing a system that can automatically heat or cool the hive when needed."

The title of Hossain's paper is "Principled Mining, Forecasting and Monitoring of Honeybee Time Series with EBV+" In addition to Hossain, Baer and Kim, the co-authors are Christos Faloutsos, professor of computer science at Carnegie Mellon University, and Vassilis Tsotras, professor of computer science and engineering at UCR. All the authors are with UCR's Center for Integrative Bee Research, one of the largest pollinator health research hubs in the nation.

The interdisciplinary collaboration was made possible through the UCR Data Science Center and the RAISE@UCR AI Institute. The research also has been supported by the U.S. Department of Agriculture's National Institute of Food and Agriculture grants No. 2024-67022-43695 and No. 2024-67021-43696; UC Multicampus Research Programs and Initiatives award # M21PR2306; a UCR's SoCal OASIS™ funding award; and the UCR Delfino Agriculture Innovation Seed Fund.

Header photo: Bees a honeycomb cell in Sydney, Australia. (Photo by Lisa Maree Williams/Getty Images)

Adjusting to temperature and providing water can help save Kenya farmers' bees, study says

Wilson Odhiambo 28 Feb 2025

[Published on https://news.mongabay.com/features/, which carries stories on environmental issues in various parts of the world]

- *Temperature can increase bee colony loss in dry, hot and wet seasons, and beekeepers practicing water supplementation experience up to 10% less decrease, a study says.*
- *Bees, particularly honeybees, are crucial for plant pollination and agricultural production, with the Western honeybee being the most preferred species globally, contributing significantly to economic growth.*
- *Honeybee production is affected by extended drought seasons, with dried-up water points and limited access to plants and fruits like mangoes, a beekeeper explains.*
- *An expert calls for the evaluation of the impact of beekeeping education on the adoption of climate adaptation practices, such as water supplementation.*

NAIROBI — Temperature can increase bee colony loss in dry, hot and wet seasons, but a study has found that beekeepers practicing water provision to the bees experience up to 10% less decrease. The yearlong research conducted among bee farmers in Kenya revealed that between October 2021 and September 2022, the farmers lost an average of 36% of their honeybee colonies due to climate change effects.

Bees play a vital role in the pollination of plants, with honeybees offering additional benefits to farmers through the production of valuable commodities such as honey, beeswax, royal jelly and propolis. Among the various species of bees, honeybees are particularly significant for agricultural producers due to their substantial economic contributions. The Western honey bee (*Apis mellifera L.*) is the most preferred species among beekeepers globally.

The study used face-to-face interviews as its method of data collection to estimate honeybee decrease and to explore environmental (temperature and precipitation) and water provision effects on colonies decrease. It found that the colony losses were greater during the hot and dry periods (up to 31.9%) compared with the wet and cold periods (up to 20.2%). The study was done on a total of 589 beekeepers from different areas including coastal areas, semiarid regions, and tropical forests in Kenya, ensuring a representative sample of climate variations and beekeeping practices.

Bees at their beehive in Kenya. Image © Tom Vandenbosch via Wikimedia Commons.

Despite worldwide programs committed to addressing concerns about the health of managed honey bees, this study found little data available on colony losses in Africa, especially in sub-Saharan Africa. “This study provides the first large-scale estimates of honeybee livestock decrease in Kenya. It highlights that higher temperatures increase livestock decrease, but precipitation can mitigate these effects,” says Malena Sibaja Leyton, co-author of the study and a Ph.D. candidate at the French National Centre for Scientific Research.

“Additionally, it identifies water supplementation as an adaptive management strategy, reducing livestock [bee colonies] decrease by up to 10% during the dry and hot season. These findings are of interest to beekeepers in Kenya and sub-Saharan Africa, where similar climatic conditions prevail, by helping them to develop strategies to sustain their honeybee livestock,” Leyton tells Mongabay. “We found that providing water to bees helps reduce livestock decrease during hot and dry periods, which could represent a strategy for beekeepers to maintain their colonies,” she says.

Other than providing water to their colonies, Leyton also explains that seasonal temperature and precipitation patterns could help beekeepers take other preventive measures, such as relocating their colonies, providing supplementary feeding during food shortages or ensuring sufficient shade to protect their colonies from high temperatures. “The information gathered can be used by beekeepers and policymakers as evidence for supporting sustainable beekeeping initiatives. Scientists can also use our findings for further research on climate-bee interactions in the tropics and to explore further factors we did not consider,” Leyton adds.

Honey Bee, *Apis mellifera* flying back to its hive carrying pollen in a pollen basket. Image courtesy of Muhammad Mahdi Karim via Wikimedia Commons (GNU Free Documentation License).

Daniel Waigwa, a beekeeper and manager of Urban Beekeepers, a beekeeping consulting company, understands the economic value of bees, and as such has a hands-on approach when managing his honeybee farm in Nyeri county in Kenya. Waigwa concurs with the study, saying there is a direct effect of climate change on honeybee production. “We do indeed experience losses in honeybee production during certain periods, especially in cases [of] extended drought seasons,” Waigwa tells Mongabay. “Such periods are characterized by dried-up water points and limited access to plants and fruits such as mangoes, which are a honeybee favorite. Also, while precipitation can support plant growth and provide forage for bees, its variability matters,” he says. “Honeybee losses translate into money losses [for] people who rely on their products as our primary source of income,” he adds.

Waigwa says there is a need to come up with lasting solutions to counter the adverse effects of climate change on their livestock and produce. “Kenyan beekeepers may need to adapt their practices, such as relocating hives, providing supplementary feeding or water and selecting bee strains more resilient to heat and the ever-changing environmental conditions,” Waigwa tells Mongabay.

Beehives in a farm in Kenya. Image © Cheryl-Samantha Owen / Greenpeace.

According to Ezekiel Ndunda, a lecturer in environmental and natural resource economics at Kenya's Kenyatta University, studies should be conducted over several years to determine how declines in honeybee populations fluctuate with longer-term climatic patterns and variability. "The interaction between temperature and precipitation emphasizes the complexity of climate impacts on beekeeping, thus the need for even longer study periods. We need to integrate climate change models to predict future scenarios for honeybee populations, examining how projected changes in temperature and precipitation will likely affect beekeeping," Ndunda says. "These findings highlight the necessity for adaptive management practices in beekeeping to improve colony survival amid climate change. The potential for water supplementation as a mitigation strategy is encouraging, implying that beekeepers could adopt supportive practices to lessen the negative effects of climate variability," he adds.

Ndunda emphasizes the need to investigate other regions in sub-Saharan Africa to compare results and understand how different climates impact honeybee survival. Also, he proposes an evaluation of the impact of beekeeping education on the adoption of climate adaptation practices, such as water supplementation, and to identify what types of training would be most beneficial for Kenyan beekeepers. "We should also combine climatic data with socioeconomic factors, such as market access and beekeeping practices, to develop a more comprehensive understanding of the challenges faced by beekeepers," Ndunda says.

Banner image: *Honey Bee, Apis mellifera flying back to its hive carrying pollen in a pollen basket. Image courtesy of Muhammad Mahdi Karim via* Wikimedia Commons *(*GNU Free Documentation License*).*

Club Information and Contacts

Visit our website at: https://www.ccbaor.org/

Address: POB 1916 Newport, OR 97365

Email: centralcoastbeekeepers@gmail.com

facebook: CCBA meta