# Protecting Our Food Systems: Responding to Honey Bee Population Decline in Michigan

## GLOBAL IMPACT ARTICLE SERIES

### PLUNGING POLLINATOR POPULATIONS

Following a national pattern, Michigan's honey bee populations are declining rapidly. Since 2005, 30% of all honey bee colonies in the US have been lost each year, a condition known as Colony Collapse Disorder (CCD). Because honey bees pollinate nearly all of the fruits, vegetables, and nuts grown in Michigan, this population decline is emerging as a significant threat to the state's food production. The agriculture and food industry generates over $90 billion for the state's economy annually. Fruits like apples, cherries, and blueberries are central to Michigan's cultural identity, with festivals promoting a Made In Michigan pride. It's essential that key stakeholders in the state outline and implement strategies to address the decline in honey bee health before these crucial insects disappear.

### WHAT'S HAPPENING TO THE BEES?

The colony deaths and disappearances can be linked to a host of factors. Some research indicate that fungi, parasites, and viruses are the culprits behind colony losses. Still others blame global climate change, shifting weather patterns, or the increased use of agricultural pesticides like neonicotinoids (neonics). Part of a class of systemic pesticides, neonics remain in plant tissue for a period of time after treatment. Bees are particularly susceptible to pesticides that persist while a plant is in bloom, as they collect plant nectar.

Some common practices in industrial beekeeping may also undermine colony health. For example, commercially popular hive designs can trap moisture and kill honey bee colonies that may tolerate cold but not moisture. Both wild and commercial populations of bees are susceptible to parasites, such as mites. Commercial bee populations are highly concentrated, making the movement of parasites that transmit viruses much easier between bee colonies. Additionally, some bee farmers supplement their hives' food supplies with high fructose corn syrup, which can sometimes form toxic compounds in the bees' guts. Commonly used miticides and antibiotics can give rise to drug-resistant pathogens. Some breeding practices can stunt genetic diversity and create disease-prone colonies.

With so many threats to bees, scientists haven't isolated a single culprit. Population loss is likely driven by a convergence of factors, which weaken colonies and make them more vulnerable to illness or injury.

### BEE-FRIENDLY FARMING

Gaining a better understanding of the ecology of insect pest populations is essential. Information about what parasites consume, when they consume and breed, as well as the natural predators of parasites provides a more complete picture to provide better habitat for honey bees. Evaluating these factors, as well as the local hydrology, geology and climate, will help farmers develop plans to encourage genetic diversity and support resilient honey bee populations.

With this additional knowledge, Michigan's farmers can adopt appropriate practices to encourage healthy honey bee populations, and ensure effective pollination of their crops. Some strategies include: Creating buffer strips of

native vegetation around crop fields can provide bees with protection, nesting sites, and nectar; Planting multiple varieties of crops supports a more varied insect population, including insects that consume harmful insects; reducing or eliminating the need for insecticides and other agrochemicals; avoiding the application of chemicals during blooming periods; monitoring nearby buffer strips for contamination; and communicating with neighboring beekeepers about when the chemicals will be sprayed to significantly reduce the number of bees in fields until the threat has passed.

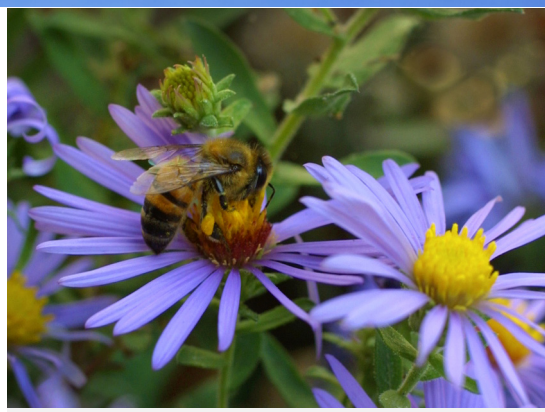
## COLLABORATIVE POLICY DEVELOPMENT

Many efforts are currently underway to find long-term solutions to this challenge. For example, the "Save America's Pollinators Act of 2013," which was reintroduced in 2015, would direct the EPA to suspend the registration of neonicotinoids and other pesticides until they could be proven safe for pollinators. The bill would also drive research and monitoring efforts to identify the scope and causes of bee mortality. Legislation like this could be developed in collaboration with beekeepers, farmers, agrochemists, and environmental advocates.

Given the growing awareness of threats to Michigan's honey bees, the time is ripe for stakeholders to come together and enact meaningful change. Multi-stakeholder conversations, led by trained facilitators, can build the trust and collaboration necessary to address population decline. Biologists, farmers, chemists, government representatives, and beekeepers should come together for focused, repeated meetings to share data, teach best practices, and develop long-term solutions.

## HONEY BEE FACTS

- The earliest record of humans eating honey is approximately 3 million years ago.
- The most common domesticated honey bee species, Apis mellifera, native to Europe, were brought to the U.S. by British colonists.
- Honey bees pollinate a wide variety of crops in the U.S., with about one of three mouthfuls in our diet benefitting from honey bee pollination.
- Almonds are completely dependent on honey bees for pollination, requiring 1.4 million colonies of honey bees.
- Since the mid-1990s, there has been a 214 percent increase in the number of bee mite species, coinciding with a rapid decline of the honey bee population beginning in the late 1990s.
- The varroa mite, Varroa destructor, causes the disease varroatosis and has spread to honey bee populations worldwide.
- Determining how varroa mite reproduction may be disrupted, could help protect honey bees.
- Micro-sensors are used by scientists to collect information about honey bee behavior to identify stress factors, including disease, pesticides, air pollution, water contamination, and extreme weather.
- Many scientists point to the pesticides sprayed on hives to kill pests as the culprit in compromising honey bees' immune systems.



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