

**CASE STUDY**

## How can we keep the world's bees buzzing?

Bees have been dying at a startling rate for over a decade. Why should you care? It turns out, they matter a lot more than many think. When bees are in danger, so is our food supply. So what can be done to save them?

### Investigate Phenomena

Think about many of the foods you love to eat every day—everything from watermelon and apples to that tasty Thanksgiving pie. Did you know that they would disappear without bees? That's because bees are pollinators. Bees spread pollen from one plant to another, which helps the plant reproduce. According to researchers, up to a third of our favorite foods would never reach our plates without the help of bees.

But bees are in danger. A disease called Colony Collapse Disorder (also called CCD) has been killing bees at an alarming rate over the last ten years. CCD is a condition where almost all the worker bees suddenly leave the hive and don't return, causing the entire hive to die. According to the Department of Agriculture, over 40% of American bee colonies died off in 2015, many due to Colony Collapse Disorder. In response, governments around the world created task forces to save bees and the huge food crops that depend on them.

Scientists are unsure of the exact cause of CCD. There are several different factors that could lead to Colony Collapse Disorder. In some cases of CCD, scientists have associated infestations of harmful Varroa Mites, which are tiny insects, that invade hives and affect the bees. Speculation about the use of certain pesticides, which are chemicals used to kill unwanted insects on crops, could also be responsible for killing large numbers of bees. Another area of study is the loss of the bees' natural habitat due to climate change and city growth as possible reasons of CCD.

Governments around the world have launched programs to save bees, and some have stopped using pesticides. Due to these efforts, approximately 28% of bees died in 2016—an improvement, but still far above the acceptable limit of 15%. So there is still work to do.

When bees suffer, so do we. So it's in our best interest to keep them buzzing.

## CASE STUDY WRAP-UP



# How can we keep the world's bees buzzing?

### Make Your Case

1. **Conduct Research** Research the most recent findings on CCD and report on which factors you feel might be primarily responsible for CCD. Prepare a summary report that uses evidence to support your claim of the primary cause of CCD and cite the specific articles and references you used.
2. **Construct a Solution** Imagine that you're a beekeeper. Your job is to manage your bee colonies properly to ensure that they have the best chance of survival. What are different hive management techniques you could use that would increase the health of your colonies?  
(Representative responses could include: provide supplementary nutrition to maintain bee health, track mite infestations and identify ways to eliminate them, research information on new genetic stocks that are resistant to mites and other environmental factors.)
3. **Writing Skills** Research how urban sprawl is leading to the destruction of bees' natural habitats. Develop a presentation directed at community leaders outlining at least three ways that communities can encourage bees to thrive in urban and suburban landscapes.  
(For example: Host a native plant sale to encourage natural plantings. Rent rooftop space to cultivate beehives. Build community gardens with native plants.)
4. **Develop a Model** Imagine you are a geneticist tasked with developing a honeybee breeding program. Your goal is to produce colonies exhibiting certain traits that increase the bees' chances of survival against risk factors that cause Colony Collapse Disorder. Which traits would you breed for? How would the possession of these traits impact a colony's survival against CCD?

# CASE STUDY WRAP-UP



## Careers on the Case

### Honeybee breeding and genetics

Selective breeding could hold the key to bees' long-term survival.

### Entomologist

Entomologists are scientists that study insects, including aspects of their classification, distribution, and interactions within their ecological niche. Some entomologists study honey bee genetics. They investigate ways to develop breeding programs that produce bees with traits that increase their chances of survival. Through selective breeding, these scientists work to develop bee colonies that are resistant to the Varroa mites, are more cold hardy, and can tolerate certain types of pesticides. Entomologists must have a detailed knowledge of genetics, statistics, and the insects they study.



## Technology on the Case



### The heat is on

The traditional method of destroying the invasive Varroa Mite in beehives is with pesticides. But the chemicals can both hurt bees and cause resistance in mites. But what if there was a surefire way to kill these lethal parasites without harming the bees? Roman Linhart, a Czech scientist, may have come up with the perfect solution. He invented the Thermosolar Hive, which uses solar power to heat the hive to over 100 degrees F for 150 minutes. The heat destroys the mites without affecting the resident bees, erasing the risk of pesticide resistance. Investigate other new technologies that are being used to combat Colony Collapse Disorder.