



# Perspectives: Secret Life of Bees; Pesticides are thinning population

By Reese Halter

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More than 50 billion honeybees have died around the world over the last three years. Scientists understand the causes, and now we need everyone to lend a helping hand.

For bees? Yes. The humble honeybee has been inextricably linked to humankind since prehistoric times - at first we were drawn to this remarkable creature because of its sweet honey. But there's lots more to it than that.

Honey is to a bee what electricity is for humans - energy. One teaspoon of honey weighing 21 grams contains 16 grams of sugar, and it took 12 bees their entire foraging lives, over about 6,000 miles, to produce.

Every third bite on your plate is a result of their primary role on the planet as pollinators.

Honeybees contribute at least \$44 billion a year to the U.S economy, pollinating everything from almonds, apples and avocados to kiwis, tomatoes, zucchini. They also pollinate clover for the beef and dairy industries, cotton for our clothes and honey goes into candles and medicines.

Bees have been on the planet for over 100 million years - about 14 times longer than the first human progenitor. Bees are helping people as an early detector of disease by sniffing skin and lung cancers, diabetes and tuberculosis.

The Red Cross estimates there are 80 to 120 million land mines in 70 countries and that 40,000 new landmines are being deployed weekly. Each year these brutal weapons of destruction maim tens of thousands of children. Researchers from the University of Montana are using bees to find residue from TNT - the primary ingredients in land mines - while conducting surveys miles away from the hive.

Now, a combination of factors are responsible for bees' memory loss, appetite loss and autoimmune system collapse, resulting in the rapid decline in honeybee populations worldwide.

Each year 5 billion pounds of pesticides are applied globally. Many of them are neonicotinoids, a nerve poison that prevents acetylcholine from allowing neurons to communicate with each other and muscle tissue. In humans it could trigger Parkinson's and Alzheimer's diseases.

Imidacloprid killed millions of bees in France before eventually being banned in that nation, yet it's still used widely throughout the United States.

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In 2008 researchers from Penn State found 43 different pesticides in a Pennsylvania apple orchard.

Research from Europe showed that bees exposed to electromagnetic radiation from cellular towers made 21 percent less honeycomb and that 36 percent, taken a half mile from the hive, were unsuccessfully able to navigate home.

In 2006 the honeybee genome was decoded and their genetics revealed only half as many genes for detoxification and immunity compared to other known insects. Scientists found specific "good" bacteria inside their stomachs and intestines crucial for fighting pathogens and digesting the silica casing around each pollen grain, providing access to its protein.

Bees evolved to feed on a wide assortment of pollens, but today we use them in monoculture fields. Pollens provide their only source of protein. Proteins grow eggs, larvae, brains and autoimmune systems.

The abnormally high temperatures of 2006 were likely the tipping point for bees in North America. The searing springtime temperatures during the onset of flowering are believed to have caused sterile pollen in many plants. Sterile pollen produces little if any protein.

In 2007, almond, plum, kiwi and cherry pollen exhibited little if any protein content. Infertile soils lacking along with climate change were implicated.

Beekeepers around the globe are now feeding their hives a form of a protein shake with eggs, brewers yeast, pollen, honey and other special ingredients.

We must all be beekeepers. Clearly, agriculture must reduce the levels of toxicity from pesticides, herbicides and miticides globally.

There is hope on the horizon, as organics are the fastest growing sector in the U.S. at \$24 billion a year. First lady Michele Obama has an organic garden on the White House lawn, with two honeybee hives close by.

Each of us can help by purchasing organic foods and cottons and supporting local beekeepers by buying organic honey.

Then we can act even more locally. Don't use herbicides, pesticides or miticides in your own yard. Plant a wide variety of native yellow and blue flowers. Help scientists in the U.S. National Phenology Network - go to [www.usanpn.org](http://www.usanpn.org) for suggestions.

Without the bees, we cannot survive.

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Reese Halter is a conservation biologist and founder of Global Forest Science. His latest book is "The Incomparable Honeybee and the Economics of Pollination."

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