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Bee on Echinacea Flower by U.S. Fish & Wildlife Service | Flickr | CC BY 2.0

The Bee, Part II:
Disappearance of the Bees, What We Can Do to Help

Gioietta Kuo

The importance of bees in our food cycle cannot not be over-emphasized. More than 2/3 of the worlds crop species rely on bee pollinators. Honeybees and wild bees are the most important pollinators of many of the fruits and vegetables we eat. Examples include not only familiar fruits and vegetables, but also many of the herbs we use to season our foods, as well as nuts, berries, cotton for clothing, and even clover and alfalfa which provide the main feed for cattle.

Yet despite their economic importance, for over a decade now bees have been dying at an unprecedented rate. In the United States alone, nearly 44% of bee colonies had collapsed by 2016. Since 2007, an average of 30% of all colonies have died every winter in the United States. This loss is about twice as high as what U.S. beekeepers consider economically tolerable.

Why Are Bees Disappearing?

The main reasons for their disappearance are:

1. Overuse of insecticides:

Worldwide, the intensive agriculture used to provide food for Earth's ever-growing human population has led to the more intensive use of insecticides. One of the deadliest, and most widely used of these, the neonicotinoids, are sprayed directly on the leaves or coated on the seeds of major crops including corn from where they infiltrate flowers and their nectars. This

can have a devastatingly toxic effect on the bees' immune systems and make them vulnerable to pests and can also damage the bees' ability to navigate back to the hive. Although another extremely toxic new insecticide, chlorpyrifos[17], has been found to effect human brains, it has not yet been banned and is still being used as a pesticide.

Ironically, the side effect of harming the bees is counter-productive to the purpose of increasing food production with our intensive agriculture.

2. Loss of habitat:

Here too global overpopulation is posing a threat to bees. As rural areas become urban, the patches of green space that remain are often stripped of all weeds and their flowers, which bees rely on for food. Lack of fresh water in urban areas can also cause bee distress.

3. Climate change:

Drought, storms and inclement weather can destroy the habitat for flowers. Unusually warm winters have caused plants to shift their schedules. When bees come out of hibernation, the flowers they need to feed on have already bloomed and died. Largely as a result of global warming, bees have lost nearly 300 km off the southern end of their historic wild range in both the US and in Europe, a trend that is continuing at a rate of about 8 km every year.

4. Disease:

Increasing transport from different countries brings pathogens like mites that weaken bees and make them more susceptible to pesticide poisoning. The most destructive is the varroa destructor mite which can hitch a ride on a bee into the hive. In the hive, they lay eggs which will feed on the young bees, especially the drones, and ultimately wipe out the entire hive. To control mite infestation early detection is important. A product called Apistan is a strip which can be hung in the brood nest area of the colony for 4 weeks to kill the mites.

5. Radiation:

Although not yet definitively proven, scientists suspect that growing radiation used by communication towers for mobile phones can interfere with the bees' ability to navigate through their antennae. More research is required in this area.

What Can We Do to Help?

Like most animals, bees are not naturally aggressive but will defend themselves if they feel threatened. Sadly, the greatest threats bees face today come from forces against which they have no natural defense. Instead, humans must act for them; and here are some of the things we can do:

1. Take political action by urging our governments to regulate or ban toxic insecticides and replace them wherever possible with effective organic substitutes.
2. Help diversify our farms and urban landscapes by planting flowers along crop borders, in land unprofitable for crop production, along roadsides, power line corridors, in city lawns and on urban roof top gardens. In these locations, lay out beds of native flowering plants from your region. It is important to plant flowers of the same kind together in blocks, as bees, when they find a trove, always report its exact size and location to others in their hive.
3. Homeowners, plan a garden, watch the bees pollinate it and get the pleasure of seeing them while you reward yourself and the world with healthy food and beautiful flowers.
4. Provide a water source like a shallow bird bath with rocks.
5. Consider being proactive and start your own hive! I am glad to say that my son in Philadelphia has just done that on his own balcony.
6. Start a project like the very laudable 'The Navajo Bee Project' initiated by a group of concerned environmentalists near Santa Fe. It aims to reverse the damage wrought by the leaking radioactivity of nearby uranium mines by providing 100 beehives on 25 acres of land to detoxify the soil.

Even though, as individuals, we may only contribute a little, the aggregate of our efforts can lead to a decisive change for the better in the bee environment. It is time for all of us to act.

The above post is the second in a three-part series by Gioietta Kuo. If you missed it, Kuo's first article introducing the social structure and communication system of bees can be found here. Next week, Kuo will conclude the series with a look towards the future with new technologies such as self- pollination, synthetic biology producing new insecticide bacteria, and robot bees with Artificial Intelligence.

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