natural awakenings

Phoenix & Northern Arizona Edition

Reader Bee-ware, You're in for a Scare:

How the Humble Honey Bee Still Needs Our Help

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It is estimated that approximately 30 percent of the world's crops and 90 percent of its wild plants are angiosperms. Angiosperms are flowering plants that require animals to pollinate their flowers to reproduce through seeds. It is hypothesized that flowering plants first evolved at least 140 million years ago, but, more importantly, the first pollinating bees co-evolved with these flowered friends.

Bees are amazing. One single worker bee can pollinate up to 7,000 flowers per day, while the bees in a single hive can pollinate 500 million flowers per year. Without the bees to pollinate the flowers that plants produce, the male and female part of the plant do not meet and will not produce the fruits or vegetables of today's markets. Bees also pollinate most of our country's alfalfa crops, which, in turn, feed the beef and dairy industries. We use beeswax for everything from candles to makeup to medicine to food.

Beehives come and go. Queens run hives of bees, which can move on or give birth to a new queen that can create a new colony. This is the circle of life for these gentle insects. However, in 2005 and 2006, U.S. beekeepers started seeing strange happenings in their colonies. In what seemed to be an overnight problem, the colonies were just gone. The queens, younger larvae and only several hive members remained, yet they refused to eat. There was no evidence of parasitic mites or infections, and no dead bees in the surrounding areas or near the hives themselves. Other bees would not take over empty hives that were abandoned and animals that eat leftover pollen or honey would not steal the honeycomb. The most common predators—the hive beetle and wax moths—left the empty hives completely alone, as if they sensed something was wrong.

The disappearance was named Colony Collapse Disorder (CCD), and from 2006 to 2013, approximately 10 million colonies in North America were lost, including agricultural hives as well as wild colonies of Apis mellifera, commonly known as the European or Western honey bee. The rate of loss was the highest we have ever seen, approximately two times the normal loss rate from such factors as weather, adverse reactions, pests and infections. Many hypotheses have been posited; however, there has been no official conclusion as to the specific cause of CCD. While many think the cause is all the suggested factors combined, others have come to conclude that the use of a specific type of pesticide is the problem.

In 2006, The Honey Bee Genome Sequencing Project was completed from a collaboration of scientists worldwide. Some interesting facts about the Western honey bee were gleaned. They are intelligent learners in comparison to other insects. For example, when a worker bee finds food, she can direct others to the exact location of the bounty by performing a "waggle dance." Honey bees have a far more advanced olfactory system; they navigate completely by smell. They also lack the normal amount of immunity and detoxifying genes when compared to the average fruit fly and mosquito genomes. This makes them far more sensitive and susceptible to pesticides and pathogens, like the Varroa destructor mite, which can decimate entire colonies within months.

Is it a Pesticide?

In 1994, before the world started paying attention to CCD, France noticed similar symptoms after Bayer released a new pesticide that it claimed, "Stopped an insect's drive to feed, prevented insects from maintaining colonies, and made insects more susceptible to infections."

The specific type of neurotoxin, known as a neonicotinoid, is a chlorinated nicotine-based insecticide that is extremely similar to dichlorodiphenyltrichloroethane (DDT). It was designed specifically to target only insects and be safer for mammals, including humans. These pesticides work by inhibiting the acetylcholine receptors in the nervous system, which stops nerve transmissions. From 1994 to 2001, French beekeepers and farmers started noticing that shortly after sunflowers were treated with

this specific type of pesticide, symptoms of CCD appeared in hives. By 1999, the Beekeeping Federation of France protested to have the use of this specific pesticide, commonly called Gaucho or IMD, suspended.

Between Bayer's research and France's government research, several important effects of this pesticide were noted:

- IMD stays in soil years after being applied.
- Bayer originally claimed that it only persisted into the roots of a plant, yet independent studies found amounts of the product in the flower as well as the pollen and nectar.
- Bees have more nicotinic acetylcholine receptors than do their fruit fly and mosquito counterparts, causing them to be more susceptible (less than a few parts per billion of this pesticide can make bees groggy, impair short-term memory and block normal foraging behaviors).
- It took less than a week after feeding on flowers treated with the product for the onset of CCD to appear in a hive.

With the findings, the ban on neonicotinoids has continued in the European Union, and a vote was placed in 2016 regarding permanent banning of the top three common pesticides containing this type of neurotoxin. However, the research, pesticide bans and lobbying were not as popular in this country. It is interesting that Australia and New Zealand have no reports of CCD symptoms and do not use IMD. Also Vermont, Maine, New Mexico, Nebraska, Nevada, Louisiana, Alabama, Kansas, Rhode Island and Alaska all currently have no reports of CCD, and they do not have issued IMD Section 18 Approvals—meaning that this pesticide isn't used in these states' agricultural practices.

It is important to stress that the use of this pesticide is still being debated by many national governments. But by realizing that we apply approximately 90 million pounds of pesticides on our own home lawns each year in the U.S., what could it hurt to try a more organic approach? According to the Environmental Protection Agency, current losses have improved over the past decade in the U.S. but are still far more substantial than they have been in the past century.

It is not the goal of this article to create fear of pesticides, as they are necessary when dealing with harmful and invasive pests, such as subterranean termites and scorpions. However, we must pay attention to the overuse and abuse of something that may be potentially harming the honey bee. Hopefully, what was once shrugged off and possibly thought of as a nuisance will be considered a critical player in the synergistic relationship that we hold with this planet that feeds all of us.

How Can We Help?

The hobby of beekeeping is on the decline, but that doesn't mean we need to start it up ourselves to help (though this is an option). We can do small things in our own backyards to help our fuzzy pollinators.

1. **Plant a Bee Garden:**

- Keep flowering plants, fruits and veggies, and try to keep a diversity so you get blooms through multiple seasons.
- Bees love purple, blue and yellow flowers, and need shorter or no tubes on their flowers in order to get to the pollen and nectars.
- Bees need water. Keep a shallow bowl of water with marbles, or perhaps a birdbath, pond or fountain that they can land on safely for a drink without drowning.

2. **Limit Pesticide Use:**

- Limit pest control treatments within reason. Treat inside your home rather than the exterior. Opt for quarterly treatments in winter when pests tend to lie dormant, instead of monthly treatments recommended in warmer months.
- If you come across a problem hive, call a local beekeeper or hive relocation company, not a pest control company.
- Find ways to keep your garden organic. Concentrated vinegar can be ordered online for herbicide, and Bacillus thuringiensis spray is a natural microbial pest control to keep caterpillars and beetles off your garden.

Bee-Friendly Plants:

- Bee Balm
- Buckeyes
- Butterfly Bush
- Cosmos
- Creosote Bush
- Daisy (any variety)
- Desert Honeysuckle
- Fairy Duster
- Firecrackers
- Lantana
- Lavender
- Marigold
- Mint
- Poppy
- Potato Vine
- Roses
- Sage (Texas variety)
- Sunflowers
- Thyme
- Verbena
- Yellow Bells
- Zinnia (desert variety)

Bee-Friendly Trees:

- Alder
- Citrus (any variety)
- Mesquite
- Palo Verde

- Pomegranate
- Purple Orchid
- Texas Mountain Laurel
- Willow

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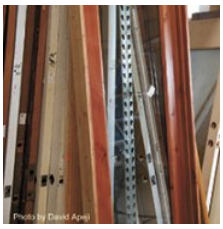

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