

NATIVE BEES TO THE RESCUE



This page: Brown-winged furrow bee (*Halictus farinosus*).
Opposite, left to right:
Long-plumed cellophane bee (*Colletes fulgidus longiplumosus*),
squash bee (*Pepona pipruinosa*),
mason bee (*Osmia coloradensis*).

As Colony Collapse Disorder continues to kill honey bees, farmers are turning to native bees for help in cultivating crops. And home gardeners can assist by creating native bee-friendly habitats.



BY JANET MCGARRY
PHOTOGRAPHS BY ROLLIN COVILLE

I BECAME INTRIGUED by wild bees while hiking with my husband in Briones Regional Park in San Francisco's East Bay hills. On that hot July 4th, we discovered a pond surrounded by bright green plants with yellow flowers that seemed to vibrate with the buzzing of bees. The oasis in the dry landscape of brown grass was like a bee Grand Central Station at rush hour, bustling with activity. I had never heard such loud humming from what appeared to be thousands of bees at work in a small field, except when I had seen bees swarming around hives while visiting a honey farm. I had read that Colony Collapse Disorder (CCD) was decimating the country's honey bee population, but I knew very little about other bee species and how they were faring so started doing research to learn more.

Although best known of all of the bees, the honey bee (*Apis mellifera*) is not native to the United States; it was initially brought here from Europe for honey production in the 17th century. Subspecies from Italy, Spain and Portugal were later introduced in the 19th century. I was fascinated to learn that a fossilized female worker honey bee discovered in Nevada suggests that honey bees were native to

North America 14 million years ago but died out.

Because honey bees live in hives, which are easily transported and managed, they have become a cornerstone of our agricultural system. Throughout the year, trucks full of honey bee hives crisscross the country pollinating many crops including favorites like almonds, blueberries and cherries.

In the past decade, however, CCD has taken its toll on honey bees, destroying approximately 35% of the population each year in the United States. As well as posing a serious threat to our nation’s food supply, CCD also appears to be a symptom of an unhealthy agricultural system that is damaging ecosystems and biodiversity.

Luckily, honey bees are not the only bees that help farmers; about 4,000 species of native bees in the US pollinate agricultural crops, as well as wild plants. Researchers estimate that native bees pollinate as much as 38 percent of California’s crops, which is worth \$.9 to \$2.4 billion annually.

Furthermore, many native bees are more efficient at pollinating than honey bees, in part because they are more active in cooler and wetter conditions. And unlike honey bees, which use nectar to pack pollen into their pollen baskets, native bees use their hair to transport dry pollen, which is much more available for plant pollination than pollen that is wet with nectar. So although honey bees have been the focus of headline news, native bees are the unsung heroes.

Bee-Friendly Farming

TO FIND OUT MORE about native bees, I spoke with Gordon W. Frankie, professor and research entomologist at the



Below: Green sweat bee (*Agapostemon texanus*).
Left: Green sweat bee emerging from ground nest; 75 percent of native bees are solitary and live in nests tunneled into the soil.



University of California, Berkeley. He told me CCD is forcing biologists and farmers to look for alternative pollinators for their crops. “Before CCD, nobody really cared about native bees except bee biologists like me. We had a lot of knowledge about bees but we weren’t putting that information to work. There is a big surge of interest going on now. At last year’s meeting of the Ecological Society of America, biologists presented 61 papers about pollination and bees.”

Since 1987, Frankie and his research group have documented bee diversity in order to identify plants that are bee magnets. With this knowledge, they planted an experimental bee garden on the Berkeley campus to educate the public about creating native bee-friendly habitat. The Urban Bee Lab promotes native bee

conservation with projects throughout California and Costa Rica, including native bee surveys in 15 California cities, a citizen science project monitoring native bees in Sonoma, CA, an annual Bring Back the Natives garden tour, and urban and wild bee surveys in the Guanacaste Province of Costa Rica. The Lab’s Farming for Native Bees project has partnered Berkeley researchers, the University of California Cooperative Extension and the USDA Natural Resources Conservation Service with small farmers in Brentwood, CA, to create habitat on farms that will conserve and protect the state’s native bees.

Due to California’s Mediterranean climate, a wet winter followed by a dry summer, many native plants grow, bloom and die quickly. Native bees are adapted to this cycle; they are constantly searching



Left: Pacific digger (*Anthophora pacifica*).
Below left: Sweat bee (*Halictus tripartitus*).
Below right: Green sweat bee (*Augochlorella aurata*).
Bottom: Orchard mason bee (*Osmia lignaria*).



WILD ABOUT NATIVE BEES

Native bees come in a wide range of sizes, some as small as ants, others more than an inch long. Some have hairy yellow, white or black stripes, like the stereotypical bee, but others are black, dark brown, iridescent blue or green with red, white, orange or mother-of-pearl stripes. Their names hint at their behavior and appearance: mining, digger, long-horned, carpenter, masked, sweat, leaf cutting, mason, cotton, wool carder, squash, hair belly and cuckoo.

Only 10% of the world’s bees are social and only a small percentage of social bees live in hives.

Approximately 75% of bees are solitary and live in nests in the ground or in cavities, such as cracks in logs or walls.

Honey bees and bumble bees make honey but most native bees do not.

Since they are solitary and don’t share their food, native bees don’t perform the “waggle dance” of the honey bees to alert other bees to pollen sources.

Unlike honey and bumble bees that return to their hives at night, male native bees sleep on plant stems, under leaves or in flowers; females return to their nests.

Whereas honey bees die after stinging, native bees can sting without losing their stinger or dying.

Sources: California Bees & Blooms: A Guide for Gardeners and Naturalists;
Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms



Far right: California digger (*Anthophora californica*). Right: California digger nesting in soil. Below: Black-tailed bumble bee (*Bombus melanopygus*). Below right: Black-tailed bumble bees nesting in a birdhouse.



for new sources of nectar, moving from one species to another as flowers bloom and then die. To keep bees happy, farmers need to provide constant supplies of pollen and nectar on their land. In choosing plants, Frankie recommends paying attention to the cardinal rule of bees' foraging styles: "Certain plants will attract certain groups of bees and rarely others." For example, California poppies attract one species of bumble bee, four species of sweat bees, and honey bees. In contrast, 60 different kinds of bees visit purple tansy.

The color of flowers is also important. Bees see UV light and are sensitive to polarized light, but don't see red. Therefore, they are attracted to blue, purple, yellow, orange, pink and white flowers.

Frankie recommends that farmers

plant both native and non-native flowering plants alongside their crops. "So many non-natives are super attractive — lavender, salvias — the list goes on and on." Since native plants seem to be a mantra of sustainable gardeners, I was surprised that Berkeley researchers are encouraging farmers to grow non-native plants. However, farms are not wildernesses; farmers use pesticides and fertilizers to cultivate crops, which are typically non-native plants. As long as they are not invasive, non-natives can be less harmful to the environment than the chemicals used to get rid of them.

Weed-Wise Gardening

FRANKIE CHARACTERIZES the allegedly "eco-friendly" methods of suppressing weeds and conserving water by piling on

thick layers of mulch or black plastic as "mulch madness" and "black plastic insanity." He recommends keeping areas of bare dirt where native bees can dig tunnels and create nests. And he advises farmers and gardeners to relax about weeding as weedy flowers are food sources for native bees. "If a garden is too clean, that's a problem."

Patrick Johnston, a managing partner of Dwelley Family Farms in Brentwood, CA, has adopted new weed management practices as a result of collaborating with Frankie: "One thing that has definitely changed is our mindset on getting rid of all weeds. We used to keep all surrounding areas on the orchard mowed down. However, after walking around with Gordon and identifying some native bee habitat, we now leave those areas alone

so as not to destroy any bee habitat."

After creating bee-friendly habitat, farmers and gardeners must care for the plants and monitor them to verify that the native bees are using the plants. "You have to go out and observe, see what the bees need and plant accordingly. There is no great science to this. Go out and look. Get your bee eyes," advises Frankie. He has found that gardeners are more receptive to making changes than farmers. "The farmers are harder to convince because they are looking at the bottom line, the economics. They still think that honey bees are the answer."

Johnston has found it easy to adopt practices on his farm that have attracted 82 species of native bees, "Overall it has been a very small financial investment. Most of our watering infrastructure was

already in place." And it hasn't meant extra labor costs. A few times a year, Johnston just shifts employees from their normal duties raising crops to helping with cultivating plants that bees like.

A Future for Bees

PLEASED WITH the farm's collaboration with the Berkeley researchers, Johnston has spoken to other farmers about the benefits of attracting native bees. "Gordon and his staff have been doing fantastic work. They are a wealth of knowledge about bees and their ideal habitat, plant species and interaction with other bees. Their work is important and will have significant impact if we continue to see the decline in honey bee populations. We have spoken to other farmers about what we are doing here. There is definite



Far left: Valley carpenter bee (*Xylocopa varipuncta*). Left: Horsefly-like carpenter bee (*Xylocopa tabaniformis*). Below: Urbane digger (*Anthophora urbana*).



interest as commercial hives become more and more expensive. I think that more long-term data would sway more farmers to consider planting hedgerows to attract native bees."

Working at the intersection of nature and human society, farmers like Johnston are struggling to abide by both the rules of the market and those of the natural world. With the help of scientists, they are at the forefront of searching for solutions that allow mankind to benefit from our planet's resources without destroying them. Our future depends upon caring for native bees and thousands of other organisms that sustain life on our planet. **WH**

To find out more about native bees and the Urban Bee Lab at the University of California, Berkeley, visit helpabee.org.