

Befriending Our Native Bees

By Joy Stewart

Tennessee Conservationist

Featured Article - July/August 2017



Bees enjoying Slender Mountain Mint. Photo by Joy Stewart.

It is hard to wrap one's mind around the fact that our well-being is directly tied to that of an insect only 1/16th of an inch long, or more correctly, to the survival of a group of insects ranging from 1/16th to one inch in length. We are too often oblivious to their existence. Yet if we are fortunate, they are un-thanked visitors to our yards and gardens. They are the taxonomic superfamily of bees (*Apoidea*).

Bees are our most important group of pollinators. Bees pollinate about 75 percent of our fruits, nuts and vegetables and about 80 percent of other flowering plants. Bees provide one out of every four bites of the food we eat. Without bees, our diets would be severely impoverished.

We are all familiar with the agricultural importance of the honey bee, an insect imported from Europe about 400 years ago. Yet our wild or native bees do the yeoman's share of pollination, especially of our native plants, and they had been doing

that work for thousands of years before the arrival of the honey bee. Native bees pollinate many fruits and vegetables that honey bees either cannot or do poorly.

Without our native bees, we would suffer the loss of tomatoes, eggplants, squash, cranberries, blueberries, pumpkins, cherries and apples as well as some ornamental species such as azaleas. Many native bees are also more effective at pollinating flowers on a bee-per-bee basis than honey bees.

Our native bees include a rich diversity of over 4,000 species in the United States, about 700 of which occur in the eastern U.S. They come in a whole array of colors—dark brown, black, blue, red, metallic green and blue and with stripes of white, orange, yellow or black. Unlike our familiar butterflies, most do not have common names, and if we happen to notice them at all, we don't think twice about their presence.

Yet like butterflies, their populations are suffering. Insecticides and herbicides are having a disastrous effect on native bee populations. Most wild bees are small and thus more sensitive to pesticides because they have a larger surface area on their bodies relative to body volume. Their decline is also compounded by habitat loss created by changes in land use, residential development, and intensive agricultural practices as well as by climate change. All of these events are leading to a long-term, downward population spiral.

All this dire information can leave one feeling a bit gloomy. Yet for all that, we are missing out on the fun opportunity to attract and benefit these remarkable creatures. Even more surprising is the ease with which you can do just that. There are a lot of hungry bees out there who need three basic things – food, shelter and a pesticide-free home.

Before exploring what we can do, let's first take a quick look at some bee basics. Bee species are generally grouped into one of three categories—social and ground-nesting, solitary and ground-nesting and solitary and cavity-nesting. Social bees live in small colonies, from just a handful of bees to a few hundred, such as our native bumble bee species. In contrast, each solitary bee lives alone. She is her own queen. She does all the work herself—builds the nest, gathers the nectar, and lays the eggs. Less than 10 percent of our native bee species are social, and over 90 percent are solitary. Ground-nesting bees live in tunnels constructed in soil. Cavity-nesting-bees generally make their nests in existing holes which include pithy stems of plants, existing holes in wood left behind by other insects, or holes in rotting logs or tree stumps. About 70 percent of all our native bee species are ground-nesting and 30 percent are cavity-nesting.

The complete life span of a bee ranges from a few months to a couple of years, with most solitary bees living about one year. However, the adult stage is the only one that we actually observe and generally lasts only three to six weeks. Similar to butterflies, bees go through four distinct stages of development – egg, larvae, pupa in a cocoon and adult.

The female solitary bee is an amazing engineer. Using tunnels in the ground or in wood, she busily provisions her brood cells. She lays an egg, provisions the egg with a loaf of bee bread (a mix of nectar and pollen), seals the cell, and repeats the process up to five times until she reaches the entrance. She then seals the entrance and leaves. When the eggs hatch, larvae consume the bee bread and go through the remaining life stages, all within the tunnel. Adult bees then emerge from the nest when their preferred plants are in bloom.

Since most of our bees are solitary, there is no colony to defend which is good news for those of us wanting to attract native bees. There is little risk of being stung. Some native bees lack the ability to sting altogether. The sting of others is more akin to a mosquito bite and many species will only sting if significantly harassed such as getting caught inside one's clothing and unable to escape. So we can happily proceed with our efforts to provide food and homes for our native bees without much fear, although a dash of caution is always a good thing.

Food is the number one priority in attracting native bees. If you provide homes, such as the bee hotel described below, without a nearby food supply, your efforts will not be rewarded. You cannot provide housing and expect bees to go somewhere else to find food. Unlike honey bees which will travel up to six miles to find food, wild bees do not travel great distances, and the smaller they are, the shorter the distance. Our smallest bees travel only about 200 feet; medium bees, 400-500 yards; and large ones, a mile or more.

A few simple guidelines will let you maximize the benefits of your plantings without requiring large quantities of effort and space. Stick with using native flowers, shrubs and trees. Native bees and native plants have mutually adapted to one another over millions of years. Native plants are simply more likely to attract native bees.

The Xerces Society for Invertebrate Conservation recommends the following planting strategies: (1) Select plants that grow best in full sun. (2) Group single species in clusters closer to each other as opposed to small groupings of plants scattered in isolated patches. (3) Offer a minimum of three different species of plants blooming in each warm season – spring, summer and fall – so that there are blooms in succession throughout the growing season. You can find a list of recommended plant species for our region at www.xerces.org/wp-content/uploads/2015/03/SoutheastPlantList_web.pdf. Researchers have found that a single, properly planted yard can attract 70 or more different species of bees.

Once you have food, you can branch out into some creative home building. Attracting ground-nesting species simply requires providing a spot in your yard that is clear of vegetation, has not been tilled and is not mulched. The site is best in full sun, having a slight slope and well-drained soil. (Heavy clay soil makes a poor site.) Holes are often difficult to notice, ranging from less than 1/8" to 1/2".

Construction of bee hotels is a fun way to attract solitary, cavity-nesting species. A bee hotel is typically a series of holes of various sizes drilled in a piece of untreated wood. Holes should vary in diameter, ranging from $3/32$ " to $3/8$ ", which will allow different species of bees to use the same hotel. Holes $1/4$ " or less should be 3 "- 5 " deep. Holes greater than $1/4$ " should be 5 "- 6 " deep. Space the holes at least $3/4$ " apart and $3/4$ " from the edge of the board. Be sure holes are smooth and without splinters, and do not drill all the way through the wood. A 2 "x 6 " board makes a good choice because it can be cut into short segments, drilled in on its side, and then stacked.

Hotel placement is also important. Bees need warm morning sun to become active as well as protection from both the hot afternoon sun and from getting wet in the rain. Mounting the bee hotel on the east-facing side of your house under the eaves makes a warm, dry location. Wherever you mount it, make sure it is firmly attached so it does not move in the wind.

Two other potential materials for bee hotels include bundles of bamboo and bundles of manufactured cardboard tubes with paper liners. You can purchase yellow bamboo canes, which are hollow, from cane and rush supply companies on the Internet. Bamboo poles with a diameter of $1/4$ ", $3/8$ ", $1/2$ ", $5/8$ " and $3/4$ " have the correct internal diameters for bee hotels. Cut the pole in sections above the node which will leave one end closed. Tie the pieces in a tight bundle and place them in a permanent container such as a section of PVC pipe.

Some bee supply companies sell 6 " long mason bee cardboard tubes with 6 " paper liners, $1/4$ " in diameter. Once a tube has been used, the old paper liner can be removed, and a new liner put in. Pinch and bend the back end of the liner before inserting into the tube to prevent the female bee from attaching the liner to the cardboard tube. The main limitation to these tubes is that they are made specifically for the Blue Orchard Mason Bee, an important native pollinator of spring-blooming fruit trees, and thus only come in one diameter. As such, they can only be used by bees needing a $1/4$ " hole.

Whatever material you use, a simple maintenance regimen is essential. Neglected bee hotels become bee death traps. Bee hotels attract not only bees but bee predators and parasites, such as bee mites. For example, a young bee emerging from its cavity can be so covered in bee mites that it is unable to take flight. Bee hotels should be discarded and replaced every two years. If some of the holes in the old hotel are still sealed, this means that there are still bees inside. Place it in a cardboard box. Seal the box against predators, cut a small hole along the bottom and put the box in a shady place. Any bees exiting the hotel will follow the light from the hole, and eventually you can discard the box and old hotel.

If you search the Internet for creative ways to build bee hotels, you will likely come across some huge, striking hotels that are pieces of yard art. While the photos may elicit a “wow” response and make you want to run out and build one, try to resist that urge. Although impressive, these structures are nearly impossible to keep clean and it is unlikely that you will have sufficient plants to support that many bees.

To summarize, consider providing dinner and a room at the Bee Hotel. In addition to being educational and entertaining, it is also a means of reminding ourselves that our fate is profoundly linked with the fate of the natural world and its pollinators.

(Master Gardener Joy Stewart of Bristol has devoted her yard to native plants and pollinators. She is a current board member of the Southern Appalachian Plant Society. She volunteers with the Tennessee Smart Yards Program and helped to create their native plant database.)