



Providing Native Bee Habitat in Your Garden

Bees are essential pollinators of many flowering plants in natural and managed ecosystems. While *Apis mellifera* is still the queen of all pollinators, there is increasing awareness of the other 4000 species of bees in the United States. Some of these bees provide “ecosystem services” to us in the form of pollination that supports natural landscapes and also provides fruits and vegetables.

There are some simple modifications to your home landscape that can provide habit for native bees, providing hours of fun as you watch the curious behaviors of solitary bees going about their business in your garden. Native bees require food sources and nesting sites, and we will describe simple ways to provide these basic requirements.



Agapostemon sp. *Megachile* sp. *Bombus impatiens*



Xylocopa virginica *Halictus ligatus* *Andrena carolina*

NATIVE BEE GROUPS. Native bees are quite diverse in Michigan, with five families, more than twenty common genera (a selection of which are listed here), and as many as 390 different species. They include members of the Colletidae (*Colletes* and *Hylaeus*), Andrenidae (*Andrena*), Halictidae (*Agapostemon*, *Augochlorella*, *Halictus*, *Lasioglossum*, and *Sphecodes*), Megachilidae (*Coelioxys*, *Osmia*, and *Megachile*), and Apidae (*Bombus* *Ceratina*, *Epeolus*, *Melissodes*, *Nomada*, and *Xylocopa*).

Most bee species are solitary nesters; male and female bees emerge together, mate, and then females go off to build and provision their own nests. Often solitary bees will nest in large aggregations with females of the same species (*Andrena*, *Melissodes*, and various halictid species). Other bees are communal nesters, with multiple females sharing a single nest entrance, but provisioning for their own off-

spring (*Ceratina* and various halictid bees). Solitary and communal nesters tend to only produce one generation of offspring per year, often emerging in time to pollinate particular groups or species of plants.

Other bee species (*Bombus*, *Halictus*, *Augochlorella* and many *Lasioglossum*) have social hierarchies that range from having one to several queens and few to thousands of workers who help with the care of colony offspring. In this case, males are often produced at the end of the season when mating occurs, and then females find places to hibernate for the winter, emerging the following spring to start a new colony of female workers. Social bees produce multiple generations per year and require a wide range of flowering resources throughout the growing season.

NESTING RESOURCES. The nesting requirements of native bees cuts across multiple families, and bees are often grouped into the following nesting guilds: soil excavators (*Andrena*, *Colletes*, *Halictus*, *Lasioglossum*, and *Melissodes*), wood or pithy stem excavators (*Xylocopa* and *Ceratina*), pre-existing cavity dwellers (*Bombus*, *Osmia*, and *Megachile* spp.), or cleptoparasites, which are bees that lay their eggs in the nests of other bees (*Nomada*, *Sphecodes*, and *Coelioxys*).

The majority of bee species are soil excavators, known generally as “digger bees.” Bees that nest in the ground will benefit from patches of bare sandy soil. These types of areas may already be common around your yard or garden. Because these bees spend most of the year developing in underground chambers, disturbances such as digging or tilling in these areas will discourage them. You may want to set aside a patch of soil kept free of weeds but otherwise undisturbed to encourage these types of bees. Sunny patches that are well drained with a gradual slope are best.



Nest entrance of soil-nesting bee.

Bumble bees (*Bombus*) prefer dry, well-insulated pre-existing cavities such as abandoned rodent burrows, but they will also nest in man-made boxes. A quick search online will yield several different designs (e.g. <http://tomclothier.hort.net/page38.html>), but in general the box usually has two compartments, a larger one in the rear

for the nest and a smaller one in the front that serves as a foyer. It is usually recommended that the entrance to the nest be made to appear as though it were coming up from underground, by attaching a short piece of tubing to the entrance hole and burying most of the tube under soil. It is also recommended that the box be placed in a sheltered area, with the entrance exposed to morning sun, and the nest compartment filled half full with an insulating material such as cotton batting. In order for them to be used, nesting boxes have to be set out very early in the spring before queens emerge and start searching for a nest site.

Other bees (*Osmia* and *Megachile*) nest in hollow stems or beetle borings in logs. These bees will also nest in artificial cavities such as the 6 x 5 x 6 inch nest box shown here. You can also purchase pre-manufactured cardboard tubes made to the specific dimensions preferred by certain bees.



Nesting box used by Megachilid bees and cavity-nesting wasps.

An inexpensive alternative is to simply drill holes, about 6 inches deep, in blocks of wood or logs around your yard. Depending on the size of the hole, different bee species will be attracted. We have good success with both sizes of holes shown in the nest box (5/16" and 1/4"). Holes \geq 1/4" wide should be at least 5" deep. Holes 1/8 to 3/16" wide need only be 3" deep. The holes should not go all the way through the wood

unless you use a backing board. Drilling perpendicular to the wood grain results in a smoother hole. Mason bees (*Osmia*), leaf cutter bees (*Megachile*), and wool carder bees (*Anthidium*) will nest in the type of structure pictured here. To encourage bees, we recommend that you place nest boxes facing east and near wooded areas or up against the house under some shelter, where they will stay dry and receive sunlight during the morning hours.

These nesting habitats will also be attractive to a variety of other cavity nesting hymenopterans. Most of these insects will be beneficial to your garden and a joy to watch as they carry mud, grass, and prey insects to the nest. We have found mason wasps (*Eudynerus*), grass-carrying wasps (*Isodontia*), and other solitary wasps nesting in these boxes in southwest Michigan. These wasps feed their



Cross-section of a reed used to make a simple nest site, and occupied by *Osmia* sp. bees.

young with paralyzed caterpillars, grasshoppers, and other insects.



***Osmia* sp.**

Photo: S. Bambara

FLOWERING RESOURCES.

Many bee species are active throughout the growing season and require energy for themselves and food for their larvae. Most native bees search for food within close range of their nest, so providing flowers in the garden will reduce the amount of time bees need to search for food, thus increasing the number of offspring they can raise.

As a first step, consider how abundant blooming plants are around your garden in spring. Early-blooming woody plants such as willow (*Salix*), wild cherry (*Prunus*), redbud (*Cercis*) and elderberry (*Sorbus*) can provide resources for bees emerging in early spring. For flowers in summer and early fall, herbaceous plants such as beebalm (*Monarda*), hyssop (*Agastache*), goldenrod (*Solidago*) and asters (*Aster*) can be encouraged or planted in the garden to provide food for bees. In other words, there should always be some bee-friendly flowers blooming in the garden at any one time throughout the season.

If you have space, commercially available wildflower mixes may be sown to provide a variety of flowers for foraging bees. Specific seed mixes are available for this purpose, and native plant suppliers can help select seed or plants that are adapted to Michigan's climate that will provide bees with these resources.

Every effort made towards bee conservation will help improve the environment for these insects, and a good strategy is to start by making small changes and then to build on them over time.

KEY STEPS FOR ENHANCING NATIVE BEES

- **Provide habitat suitable for nesting.**
- **Encourage or plant flowering plants to provide blooms through the growing season.**
- **Provide access to clean water, such as a birdbath.**
- **Provide nest-building materials, including mud and waxy-leaved plants.**
- **Minimize insecticide and herbicide use, and switch to more bee-friendly pesticides.**

For information on some of our current research in collaboration with Doug Landis' lab, see the Enhancing Beneficial Insects with Native Plants website at www.ipm.msu.edu/plants/home.htm.

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