



Gardening for Native Bees

EUROPEAN HONEY BEES (*Apis mellifera*) may garner more of the limelight, but North America is also home to approximately 4,000 known native bee species that are just as agriculturally, horticulturally, and ecologically important. While they don't form large colonies like their better known but non-native counterparts, these indigenous bees are among the most essential pollinators in our natural areas, farm fields, and gardens.

Some North American species even appear to do a better job of pollinating

North America's native bees are under threat from habitat loss, pesticides, and climate change. Here's what gardeners can do to help.

BY JESSIE KEITH

crops than honey bees. For example, researchers have found that blue orchard mason bees (*Osmia lignaria*) are far more effective pollinators of cherry orchards, resulting in over twice the fruit yields of honey bee-pollinated orchards. This is not surprising given that many native bees are often more tolerant of cool or moist conditions and have longer foraging times—giving them the pollination edge.

However, like honey bees, native bee populations have been declining over the last several years. This decline “speaks towards land use and the lack of diversity of

An unequal cellophane bee (Colletes inaequalis) visits the flowers of a redbud (Cercis canadensis) in late spring.



Left: A longhorned bee gathers pollen from a common milkweed. Above: A female valley carpenter bee (*Xylocopa sonorina*) steals nectar from a penstemon flower by making a slit near the base.

our vegetation,” says Deborah Delaney, bee specialist and associate professor of entomology at the University of Delaware in Newark. Factors such as habitat loss, widespread pesticide use, and climate change are all part of this decline, but there are many ways gardeners can help.

APPRECIATING DIVERSITY

American bee species “come in a jewel box of different colors—from metallic green to bottle blue, gold, brown, and glossy black,” says Scott Hoffman Black, the executive director of the Xerces Society, an organization dedicated to invertebrate conservation. Sizes vary from the enormous one-inch valley carpenter bee (*Xylocopa varipuncta*) to one of the world’s smallest bees, *Perdita minima*, which is under two millimeters long. Throw in different shapes, hair types, tongue lengths, and other characteristics, and their diversity is staggering.

When it comes to nesting, about 90 percent of these species are solitary, while the rest are social and hive-forming. Nests may be underground or above ground in cavities; depending on the species, nests

may be constructed from mud (mason and plasterer bees), plants (leafcutter bees), earth (mining bees), or excavated wood (carpenter bees). Solitary bees tend to produce few young (often one to 10) in underground nests, while some bumblebees and sweat bees nest in aboveground crevices and produce small colonies.

There is a direct correlation between bee size and flight distances—larger species like bumblebees can fly up to a mile or more when foraging, while medium to small bees may only forage a couple hundred feet from their nests. Most native bees are polylectic, which means they pollinate a wide variety of plant species. Others may be oligolectic (pollinating a few, closely-related plant species) or specialized even further to be monolectic (pollinating one plant species).

NURTURING NATIVES

With these basic facts in mind, there are several things gardeners can do to support native bees. “If every gardener tried to create a haven for bees, it would increase habitat exponentially,” notes Black. Protecting and providing nesting areas and food sources

are key. Equally important is safeguarding bees from pesticides. All broad-spectrum pesticides can kill bees, but research shows that neonicotinoid pesticides used in agriculture and horticulture—such as clothianidin, thiamethoxam, and imidacloprid—are the most harmful. Because neonicotinoids maintain residues in pollen, they can poison pollinators long after application.

To encourage native ground-dwelling bees to nest, avoid disturbing areas of bare, friable earth around plants as much as possible, and avoid applying bark mulch. Choose compost or leaf mold instead. If this is not feasible for you, try doing this in just a small area of your yard that you leave “wild.”

For above-ground nesters, you can create artificial nest sites. For example, layers of clay-mud blocks may encourage certain southwestern bee species adapted to arid conditions to nest in the cool cracks between blocks. “Nest blocks,” either purchased or homemade from wooden blocks drilled with holes, appeal to tunnel-nesting species. Bundles of hollow stems cut and positioned cross-wise are also attractive to tunnel-nesting bees. For tips on creating and maintaining healthy bee nesting materials, see “Resources” on page 38.

Most essential to healthy bee habitat is a variety of plants to ensure a steady supply of nectar and pollen nearly year-round. Nectar is a bee’s main energy source. Nu-

BEE CHARACTERISTICS

Bees are closely related to wasps, so they share several features such as large compound eyes on the sides of their heads and two pairs of wings. However, a number of characteristics distinguish the two insects. Physically, the most obvious difference



Wasps, such as this paper wasp, generally appear less hairy than solitary bees.

between the two is that bees tend to be much hairier than wasps. These soft hairs are feathered or branched, whereas any wasp hairs are straight. While most wasps are carnivorous, all bees are vegetarians.

Wasps do not collect pollen, and only female bees collect and transport pollen to nests to feed their young. For this purpose, they often have specific structures on their hind legs or abdomen adapted for carrying pollen. These structures are either corbiculae (“pollen baskets” consisting of a smooth concave area with fringes of curved long hairs) that hold pollen, or scopae (patches of stiff hairs) to which pollen can adhere.

Some wasps—such as yellow jackets or bald-faced hornets—can be aggressive when defending themselves, but there is little to fear from native bees in general. “Most solitary bees don’t or can’t sting,” says Scott Hoffman Black, executive director of the Xerces Society, a nonprofit organization dedicated to invertebrate conservation. “Bumblebees can sting but they rarely do,” he adds. Male bees do not have stingers at all. —J.K.

tritious pollen, rich in protein, nutrients, and oils, is primarily used by bees to feed developing larvae. Solitary females typically roll the pollen into nectar-infused balls of “bee bread” and lay a single egg on each ball. The pollen is all the food larvae need to develop and mature into adult bees. Different bee species produce young at different times, so ideally your planting scheme should ensure that something is in bloom during all the seasons, even winter.

“I recommend planting three good bee plants for spring, three for summer, and three for fall,” says Black, “so there is a buffet of flowers throughout the growing season.”

Gordon Frankie, professor emeritus of urban entomology at the University of California, Berkeley, concurs with this strategy. He and his colleagues at the university’s Urban Bee Lab have surveyed 17 cities in northern and southern California and have found that most cities can expect almost 100 bee species to frequent the ur-

ban plantings. “We do suggest that homeowners diversify their gardens with known bee plants,” says Frankie. “Twenty would be ideal, but good results can occur with 12–15 as well. He recommends planting a mixture of the very best bee plants, which can be researched on the bee lab’s website (see “Resources,” page 38). “The more bee-plant biodiversity you have, the more diverse the bees you will attract,” he notes.

PLANTS THAT ATTRACT BEES

As a general guideline for deciding which plants to include in your garden to attract native bees, it’s helpful to keep in mind that flowering plants that depend on bee pollinators to reproduce have specific suites of floral traits adapted to attract them. These traits include “landing pads” for bees to rest upon while collecting and feeding, sweet fragrance, and sugary nectar. The flowers tend to be shades of yellow, blue, or white with spe-



Planting a wide array of natives with different flower shapes and long, overlapping periods of bloom is the best way to provide habitat for native bees.



Native bees need food sources at different times of the year, so include plants in your garden that bloom throughout the growing season. Vernal witchhazels, left, and Virginia spring beauty, below left, are both good choices for early-emerging native bees.

cial markings that guide bees to nectar. Many are tubular with bilateral symmetry, like salvia and snapdragon flowers, or in heads, as with daisies and sunflowers.

Because native bee and plant species evolved together, growing native flowering plants is a good way to attract local bee species to your garden. For example, the scented, golden flowers of vernal witchhazel (*Hama-*

melis vernalis) will lure early-emerging native bees as will pussy willows (*Salix discolor*). Woodland wildflowers such as sharp-lobed hepatica (*Hepatica acutiloba*), violets (*Viola* spp.), and rue anemone (*Thalictrum thalictroides*) also draw spring-emerging solitary bees. Waves of spring beauties (*Claytonia virginica*) that appear in open woodlands and lawns are favored by a diminutive an-

drenid bee (*Andrena erigeniae*). The bright white flowers of bloodroot (*Sanguinaria canadensis*) are pollinated almost entirely by Carlin's andrena bee (*Andrena carlini*).

Later in the spring, natives such as false indigos (*Baptisia* spp.), lupines (*Lupinus* spp.), and California poppies (*Eschscholzia* spp.) attract a variety of bees. Spring-blooming trees and shrubs, such

NATIVE PLANTS PROVIDE A SMORGASBORD FOR BEES

The following native plants attract a wide variety of native bee species and other pollinators throughout different seasons. They are also relatively easy to grow and adaptable across several regions. For many of the genera listed below, there are several other species that are good pollinator plants, too. See "Resources" on page 38, to find more extensive plant lists.

Common Name (Botanical Name)	Type	Height (feet)	Season of Bloom	USDA Hardiness Zones
Basket flower (<i>Centaurea americana</i>)	Annual	3–5	Midsummer to early fall	0–0
Blue camas (<i>Camassia quamash</i>)	Bulb	1–3	Late spring to early summer	4–11
Blue sage (<i>Salvia azurea</i>)	Perennial	3–5	Midsummer to fall	5–9
Common sunflower (<i>Helianthus annuus</i>)	Annual	3–15	Summer	0–0
Giant ironweed (<i>Vernonia gigantea</i>)	Perennial	5–10	Mid- to late summer	4–8
Great blue lobelia (<i>Lobelia siphilitica</i>)	Perennial	2–4	Mid- to late summer	4–8
Lanceleaf coreopsis (<i>Coreopsis lanceolata</i>)	Perennial	1–2	Early to midsummer	4–9
Lead plant (<i>Amorpha canescens</i>)	Shrub	2–3	Midsummer to early fall	2–8
Prairie rose (<i>Rosa arkansana</i>)	Shrub	1–3	Summer	3–8
Sassafras (<i>Sassafras albidum</i>)	Tree	20–80	Spring	4–8
Smooth beardtongue (<i>Penstemon digitalis</i>)	Perennial	3–4	Spring to early summer	3–8
Spotted geranium (<i>Geranium maculatum</i>)	Perennial	1–2	Spring	4–8
Wild bergamot (<i>Monarda fistulosa</i>)	Perennial	2–4	Summer	3–9

For Further Reading

Attracting Native Pollinators: Protecting North America's Bees and Butterflies by Xerces Society. Storey Publishing, North Adams, MA, 2011.

Bees: An Identification and Native Plant Forage Guide by Heather Holm. Pollination Press, Minnetonka, MN, 2017.

Bumble Bees of North America: An Identification Guide by Paul H. Williams et al. Princeton University Press, Princeton, NJ, 2014.

Resources

Native Bee Conservancy, www.nativebeeconservancy.org.

Pollinator Partnership, www.pollinator.org.

University of California—Berkeley Urban Bee Lab, www.helpabee.org.

Virginia Tech Tips for Bee Houses: <https://vtx.vt.edu/articles/2020/03/ext-entomologists-tips-for-installing-and-maintaining-native-bee-houses.html>.

The Xerces Society, www.xerces.org.



Late-summer and fall-blooming plants such as paniced aster are also important food sources for native bees. The aster is being visited by a yellow-banded bumblebee (*Bombus terricola*).

as American linden (*Tilia americana*), serviceberries (*Amelanchier* spp.), eastern redbud (*Cercis canadensis*), and hawthorns (*Crataegus* spp.), are also essential nectar and pollen providers.

In summer, perennials such as blanketflowers (*Gaillardia* spp.), penstemons (*Penstemon* spp.), and coneflowers (*Echinacea* spp.) attract all sorts of different native bees. The violet-purple spikes of giant blue hyssop (*Agastache foeniculum*) are favored by bumblebees (*Bombus* spp.), digger bees (*Melissodes* spp.), and leaf-cutter bees (*Megachile* spp.). Summer and winter squash are sure to attract tiny squash bees (*Peponapis* spp.). Native roses (*Rosa* spp.) are almost exclusively bee pollinated, and though milkweeds are often associated with butterflies, several species are important to native bees as well—particularly showy milkweed (*Asclepias speciosa*) and common milkweed (*A. syriaca*).

Fall-blooming asters (*Symphotrichum* spp.), perennial sunflowers (*Helianthus* spp.), goldenrods (*Solidago* spp.), and Joe Pye weeds (*Eutrochium* spp.) supply bees with the requisite food stores to overwinter.

The flowers of many non-native plants also can feed bees, including lavenders (*Lavandula* spp.) and other aromatic herbs. Fragrant, showy-flowered species that belong to the mint (Lamiaceae), composite (Compositae), and rose (Rosaceae) families make good choices, too, and offer options that can be grown in most regions of the United States. If you opt to grow specific cultivars in these families, avoid those with double or non-fragrant flowers—their supplies of pollen and nectar have sometimes been unintentionally bred out of them.

THE BIG PICTURE

Awareness of pollinators and their vital agricultural and ecological roles is definitely increasing. As a result, more and more over-manicured, urban and suburban green spaces like parks, school yards, libraries, and golf courses are being converted into managed meadows and savannahs

rich in plants for bees and other wildlife. Green roofs offer further opportunities for flowers to blossom in city spaces, as do “eco-lawns” planted with low-growing flowering plants for pollinators. And in rural areas, intentionally planted nectar- and pollen-rich wildflowers line a growing number of agricultural fields, old railways, highways, and roadsides.

All are steps in the right direction, but there is still a lot to do, beginning with your home garden. As Black puts it, “Plant a variety of native bee flowers, heirlooms, and vegetables. Avoid insecticides, cultivate your garden well, and let the bees come.”

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