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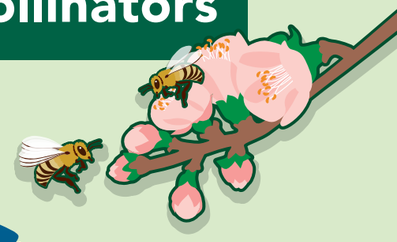
It's a Match!

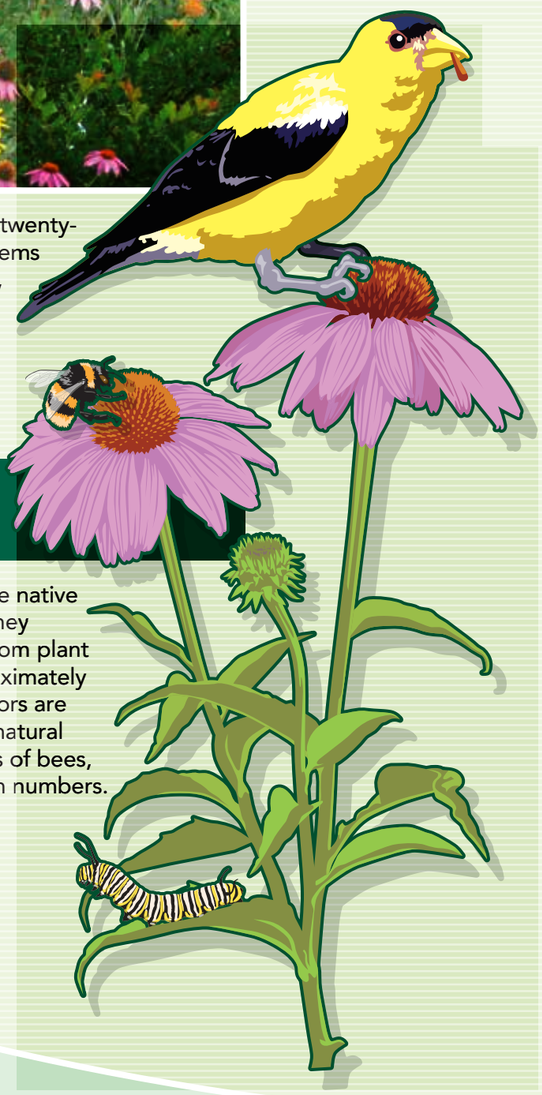
Planting Native Plants for Pollinators



Brought to you by:

Planting Native Plants for Pollinators

Our pollinator populations have been on a steady decline over the past twenty-five years. Pollinators are crucial to maintaining the habitats and ecosystems that many animals and people rely on for food and shelter. In fact, birds, bees, butterflies, and many other **pollinators are responsible for one out of every three bites of food we eat**. The importance of our native pollinators and the native plants that sustain them cannot be overstated. Discover some of the ways you can help our native pollinators thrive.



What is a Pollinator?

Pollinators are insects and animals that have evolved over time alongside native plants. Pollinators depend on many native plant species for the nectar they produce. In turn, the plants depend on the pollinators to move pollen from plant to plant so that they can produce fruits, seeds, and young plants. Approximately 90% of all flowering plants depend on pollinators to reproduce. Pollinators are incredibly important not only for our health, but for the diversity of our natural environments. Unfortunately, in the past twenty-five years, many species of bees, butterflies, moths, and other pollinators have experienced large drops in numbers.

Threats facing pollinators include:

- Loss of habitat
- Climate change
- Disease
- Monocultures (lands of just one species of plants like lawns)
- Pesticide use
- The spread of invasive plants

Types of Pollinators

Generalist pollinators visit many types of plants. Meaning, there is less of a chance for pollen of the same species to fertilize each other, which many plants depend on for reproduction. Generalist pollinators are what you see feeding on the summer annuals in your garden. Seventy-five percent of bees are generalist pollinators, including bumblebees and honeybees.

Bumblebee (*Bombus sp.*)

Specialist pollinators have evolved to have a specific relationship with one type of plant. This type of pollinator will emerge from their nests at the same time their **host plant** begins to flower. The host plant sometimes depends on pollination from one specific type of bee species, while the specialist bee depends on pollen from her specific plant species. For example, the squash bee (*Peponapis pruinosa*) is found all across North America and pollinates the blossoms of squash plants. Squash bees are most active in the early morning when the blossoms open.

Squash Bees (*Peponapis pruinosa*)

Did You Know?

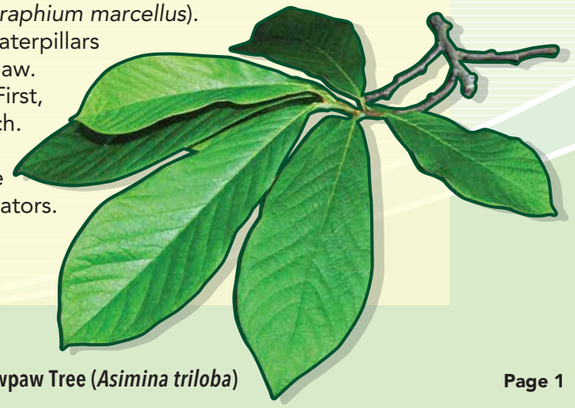
Many specialist bees have physical characteristics that make them uniquely suitable to pollinate their specialist plants. For example, the long antennae of male long-horned bees make them specifically equipped to pollinate composite flowers. Composite flowers are flowers that contain smaller flowers within the main bloom, such as sunflowers. Long-horned bees are most abundant when the flowers are in bloom during the late summer months.

Long-horned Bee (*Melissodes communis*)

Photo by Alan Emerson

Butterflies and moths use **host plants** differently than bees do. For butterflies and moths, adult pollinators depend on their host plant to raise their larval young. Female butterflies or moths will lay their eggs directly onto their host plants of choice. They do this so that when their young hatch, food is readily available for them. One example of this is the pawpaw tree (*Asimina triloba*) and the zebra swallowtail (*Protographium marcellus*). Zebra swallowtail caterpillars feed exclusively on the young leaves of the pawpaw. This benefits the young caterpillars in two ways. First, that they have a food source as soon as they hatch. The second benefit is that the pawpaw tree has toxic compounds in their leaves, which makes the young caterpillars unappetizing to potential predators.

Zebra Swallowtail (*Protographium marcellus*)



Pawpaw Tree (*Asimina triloba*)

Meet the Pollinators

1 Bumblebees are social bees. They live in colonies and have different divisions of labor. Depending on the species and readily available resources, colonies usually consist of 50 to 500 individuals, including a queen.

2 Solitary bees make up about 90% of the 4,000 bee species that are native to North America. Rather than leading social lives, like honey bees do, solitary bees provide for their own young and collect their own food without the assistance of others.

3&4 Butterflies and moths are "accidental" pollinators. Unlike bees, they do not actively seek out pollen and do not have specialized structures that help them transport pollen. Though, they are still important pollinators. When they visit a flower to drink its nectar, some pollen is picked up by their legs. Since they can fly longer distances than bees and visit a high number of flowers, they are still effective pollinators of wildflowers.

5 Wasps are minor pollinators. They often hunt for their offspring's meals on wildflowers, which helps manage pest populations. As they go from flower to flower, they move some pollen with them.

6&7 Beetles and flies are also important pollinators. In fact, they were among the first pollinators to begin pollinating flowering plants around 150 million years ago in the late Jurassic era!

8 Hummingbirds drink up to two times their weight in nectar each day! As they move from plant to plant, they carry pollen with them, pollinating those plants in your garden.

Gardening with Native Plants

Native plants are plants that have adapted to local climate and soil conditions where they naturally occur. Native plants play an important role in their local ecosystems by yielding nectar, pollen, and seeds that provide food for native butterflies, bees, insects, birds, and other animals. In turn, pollinators are also critical in maintaining native plant populations needed to ensure biodiversity and support wildlife populations and ecosystem health. Additionally, once a native plant garden becomes established, it requires much less maintenance than non-native plants do. Whether you have a few feet on your apartment balcony or own several acres, you can make a difference for our pollinators!

Native Plants Help Water Quality!

- Native plants do not require fertilizers or pesticides. This means fewer chemicals in our waterways.
- Native plants require less water than conventional lawns and help prevent erosion.
- The deep root systems of native plants increase the soil's capacity to store water. Native plants can significantly reduce water runoff and flooding.

Thread-waisted wasp (*Ammophila procera*)

Did You Know?

Most of the common plants we like to use in our landscape, such as butterfly bush or nandina, do not provide the resources that our native pollinators need to survive.

Planting a Pollinator Garden

Gray Hairstreak (*Strymon melinu*)

1 Choosing a Location

Flowering plants can grow in both sunny and shady locations (and in places in-between), so consider which pollinators you would like to attract. Butterflies, bees, and other pollinators like to bask in the sun and some of their favorite wildflowers grow best in full or partial sun with some protection from the wind. Next, you will want to take a look at your soil type. Is it sandy and well-draining or is it more wet and clay-like? If you want to be sure, you can always send a sample to your local extension office.

2 Choosing Your Plants

There is a guide in this booklet to help you with plant choices (see pages 7-14), but it is always a good idea to research native plants in your area that do well in the light and soil conditions you wish to plant them in. Native plants are your best choice when planting for pollinators. Perennials are an ideal choice because they will come back year after year and require much less maintenance. It is also important to choose plants with a range of shapes, colors, and sizes. Next, think about more than just the summer growing season; pollinators need food resources early in the spring and in the fall, as well. Choosing plants that bloom at different times will help you create a bright and colorful garden that both you and pollinators will love!

3 Seeds Vs. Plugs

Now that you've identified the plants you would like to use, you'll need to decide whether you want to start them from seed or use plugs. Seeds are a less expensive choice, especially if you are planning to plant a large area of your yard; but seeds require more time to start. Plugs are a bit more expensive but will give you a quicker return on your investment, as you are more likely to see pollinators in your garden the same growing season you plant them. Nanticoke Watershed Alliance offers a cost-share program for native plantings in the Delaware portion of the Nanticoke River watershed. If you live in the Delaware portion of the Nanticoke River watershed and are interested in installing a native planting, we can help! Visit ***Nanticokeriver.org/sitevisit/*** to find out more.

Did You Know?

A water source in the garden will help thirsty pollinators, especially during the hot summer heat. A shallow bowl or birdbath will provide sufficient water. Add a few sticks or marbles into the bowl so that the pollinators will have a place to land to prevent drowning. Make sure you regularly clean the bowl or bath and add fresh water.

A freshly planted pollinator garden in a residential yard. This will fill in beautifully later in the season and for years to come.

A butterfly waystation planted in raised beds, using plugs. It will soon fill in and attract butterflies and moths.

4 Prepping the Planting Area

If you plan on using raised beds or containers, you'll want to make sure you add a nutrient-rich compost or soil to set up your plants for a successful growing season. If you are planning on converting a large area of existing lawn, you will need to remove the grass or current plant cover. There are a few different methods for clearing an area of lawn to prepare it for planting. The first method requires you to remove the sod by hand or with a rented machine like a sod-cutter, alternatively you could mow the grass as low as possible. Next, loosen the top few inches of soil with a tiller or hard rake to create an ideal environment for the wildflower seeds to germinate. You will need to till or turn the soil two to three times over a 6 to 12-week period to exhaust seed banks. Lastly, rake the area flat to prepare the soil for sowing.

Another way to prepare an area for planting is called solarization. In early spring, choose your planting site, then mow the area with the blades on the lowest setting. Next, water the area you would like to solarize thoroughly. Then cover the area with clear plastic or cardboard and keep covered through the summer. In the fall, you can plant your plugs, but be sure to use native plants! See more about converting lawn to meadows in Nanticoke Watershed Alliance's ***Say Goodbye to Mowing: Turn Your Lawn into a Meadow*** brochure.

Pots planted with some pollinator favorites: wild bergamot, purple coneflower and butterfly milkweed.

5 Planting Your Seeds or Plugs

If you decided to use seeds for your garden, keep in mind they will need time to germinate. Fall and late winter are an ideal time to seed the area. Start by dispersing your seeds evenly over the planting area. Place half your seeds in a bucket or hand-crank seeder. Begin to evenly scatter the seeds by walking back and forth in roughly parallel rows, doing your best to portion the first half of the seeds evenly over the whole planting area. Repeat this process with the remaining half of seed. After you're done seeding, begin compressing the seed onto the soil surface. This can be done by walking over the area or renting a lawn roller.

If you are starting with plugs, make sure you plant after the first frost in spring or plant in the fall before the first frost. Dig a hole large enough for the root system of the plant, then cover and reinforce the roots with soil or compost. Make sure to group plants together in sunny locations around different parts of your yard, as this will help pollinators find and feed on the desired flower. You can mulch the area to help cut down on weeds, but densely planting areas and using green mulch or groundcover plants can further reduce weed pressure.

6 Maintenance

Make sure to weed and water your garden to keep it healthy. Your new plants will need about an inch of rain per week. If Mother Nature doesn't provide it, you'll need to help. Consider purchasing a rain gauge to track rainfall. Pull weeds at least once per month to give your plants space and energy to grow.

Also, keep in mind, it may take a couple seasons for some plants to begin flowering, as many natives devote the first season (or two) to growing strong, deep roots. But with time and patience, you will see bees, butterflies, and other pollinators enjoying your garden.

Did You Know?

Save perennial garden clean-up for spring. Many pollinators overwinter in different life stages: eggs, larvae, pupae, and adults. Some pollinators overwinter in the hollow stems of plants, while others attach to a plant or overwinter in the leaf litter. To protect overwintering pollinators, don't cut down your perennial gardens or meadows until April at the earliest and keep beds of leaves intact through the winter.

Native Plants for Pollinators

In this section we will cover some of the plants that have a high pollinator value. Plants are organized by type: flowering perennials, grasses, and shrubs and trees. If you don't see a plant on here that you wish to plant but want to check whether it is native or not, there are a few helpful search tools you can use to check. One is the Lady Bird Johnson Wildflower Center, and the other is located on the United States Department of Agriculture website. Type in the scientific name or common name in the search bar, and the results will show you whether the plant is native to your area.

FLOWERING PLANTS FOR POLLINATORS

Golden Alexanders, *Zizia aurea*

- **Bloom time:** April through August
- **Bloom color:** Yellow
- **Soil description:** Moist, sandy or sandy-clay soils
- **Light requirement:** Sun, part shade
- **Approximate Height:** 12"– 36"
- **Specialist pollinators:** Golden alexanders miner bee (*Andrena ziziae*)
- **Larval host plant:** Black Swallowtail (*Papilio polyxenes asterius*)
- This plant is favored by species of carpenter bees, sweat bees, bumble bees, mining and mason bees.

Fun Fact: Mining bees are solitary bees, though they do nest in loose groups in a system of tunnels they create underground. Sometimes they will share resources amongst themselves, but they look after their own needs and their own young.

Heartleaf Alexanders, *Zizia aptera*

- **Bloom time:** May through June
- **Bloom color:** Yellow
- **Soil description:** Moist, sandy or sandy-clay soils
- **Light requirement:** Sun, part shade, shade
- **Approximate Height:** 12"– 36"
- **Larval Host:** Black swallowtail butterflies (*Papilio polyxenes asterius*)
- Many species of small short tongued bees, butterflies, flies, and beetles seek out the nectar and pollen from the blooms.

Smooth penstemon, *Penstemon digitalis*

- **Bloom time:** May through July
- **Bloom color:** White
- **Soil description:** Dry to wet, well-draining loams and sandy soils
- **Light requirement:** Sun, part sun
- **Approximate Height:** 24"– 36"
- **Specialists:** Mason bee (*Osmia distincta*) and Pollen-collecting wasp (*Pseudomasaris occidentalis*)

Fun Fact: Mason bees are some of the first bees to emerge in the spring. They can tolerate temperatures down to 55 degrees. This means that mason bees will be active beginning in late March to early April.

Purple coneflower, *Echinacea purpurea*

- **Bloom time:** April through September
- **Bloom color:** Purple, pink
- **Soil description:** Dry, well-draining sandy to richer soils
- **Light requirements:** Sun, part shade
- **Approximate Height:** 30"– 48"
- A preferred nectar plant of bees and butterflies, including leafcutter bees, bumble bees, sweat bees, monarch butterflies, red admiral butterflies, and swallowtail butterflies.
- Leave the seed head intact over the winter to provide birds additional food when it is scarcer.

Wild bergamot, *Monarda fistulosa*

- **Bloom time:** May through September
- **Bloom color:** White, pink, purple
- **Soil description:** Thrives in a wide range of soils and soil moisture levels; from acid to lime to rich to poor sandy or clay soils
- **Light requirements:** Sun, part shade
- **Approximate Height:** 24"– 60"
- **Larval host:** The hermit sphinx moth (*Lintneria eremitus*) and snout moths (*Pyrausta generosa & P. signatalis*)
- Wild bergamot is one of the best forage plants for bumblebees. Its flowers open continuously during the day, providing an ongoing source of food resources as older flowers are depleted and replaced by newly opened flowers.
- The black sweat bee (*Dufourea monardae*) is the plant's resident specialist.
- A sweat bee's diet, like most other bees, consists primarily of pollen and nectar. But pollen and nectar lack some of the nutrients they need, so they also consume animal and human sweat.

Horsemint, *Monarda punctata*

- **Bloom time:** April through August
- **Bloom color:** White, pink, yellow, green, purple
- **Soil description:** Dry, sandy soils
- **Light requirements:** Full sun
- **Approximate Height:** 12"– 36"
- Butterflies, skippers, hummingbird moths, hummingbirds, wasps, honeybees, bumblebees, and other native bees eat the nectar.
- The caterpillars of several moth species feed on the foliage.

Scarlet Beebalm, *Monarda didyma*

- **Bloom time:** May through October
- **Bloom color:** Red
- **Soil description:** Rich, moist, acidic soils
- **Light requirements:** Sun, part shade
- **Approximate Height:** 12"– 72"
- **Larval Host:** The orange mint moth (*Pyrausta orphisalis*) and hermit sphinx moth (*Lintneria eremitus*)
- A great nectar source for native pollinators, such as the bumble bee, hummingbirds, butterflies, and moths.

Butterfly Milkweed, *Asclepias tuberosa*

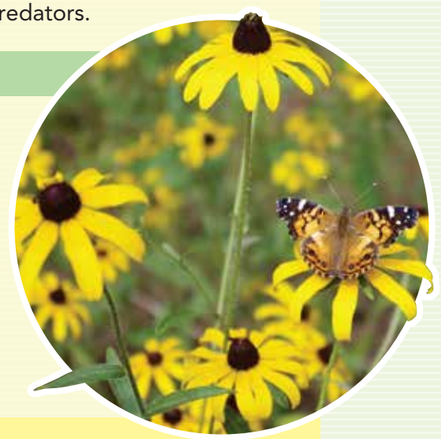
- **Bloom time:** June through August
- **Bloom color:** Orange, yellow
- **Soil description:** Well-draining sandy soils and dry conditions
- **Light requirements:** Full sun
- **Approximate Height:** 12"– 36"
- Many bee, wasp, butterfly, and beetle species visit butterfly milkweed for nectar. Monarch butterfly caterpillars and milkweed leaf beetles feed on the flowers and foliage. Leafcutter bees, crescent butterflies, and the Great Spangled Fritillary butterfly enjoy the nectar of butterfly weed.
- Butterfly milkweed is the larval host plant for Monarch butterfly (*Danaus plexippus*), Queen butterfly (*Danaus gilippus*), and the Milkweed Tussock moth (*Euchaetes egle*).

Fun Fact: Male and female monarch butterflies visit butterfly milkweed for nectar. Look on the undersides of the milkweed leaves to see if a female has laid eggs on that plant; monarchs are specialists of milkweed. Monarch caterpillars eat both the foliage and flowers of the milkweed plant during the first stages of their development before constructing a chrysalis and pupating.

Swamp Milkweed, *Asclepias incarnata*

- **Bloom time:** June through September
- **Bloom color:** Purple, pink
- **Soil description:** Rich, wet, very muddy to average garden moisture. Can thrive in mucky clay.
- **Light requirements:** Sun, part shade
- **Approximate Height:** 24"– 60"
- **Larval host plant:** Monarch Butterfly *(Danaus plexippus)* and Queen Butterfly (*Danaus gilippus*)
- The plant is also widely enjoyed by many types of bees, wasps, flies and hummingbirds.
- Swamp milkweed is a host plant for monarch butterfly caterpillars. Monarch caterpillars eat the toxic compounds found in the leaves of the milkweed plant, which makes them unappetizing to predators.

Black-eyed Susan, *Rudbeckia hirta*



- **Bloom time:** June through October
- **Bloom color:** Yellow
- **Soil description:** Moist to dry, well-draining soils
- **Light requirements:** Full sun, part shade
- **Approximate Height:** 12"– 36"
- **Larval host plant:** Wavy-lined & Southern emerald moth (*Synchlora aerate & S. frondaria*); Common eupithecia (*Eupithecia miserulata*); Silvery checkerspot butterfly (*Chlosyne nycteis*)
- **Specialist bee:** Mining bee (*Andrena rudbeckiae*)

Fun Fact: **Wavy-lined and southern emerald moths use "mimicry" to hide from predators. While feeding on the black-eyed susan the caterpillar will attach bits of the plant material to its back with a small amount of silk in order to blend into its surroundings and avoid predation.**

Green-headed Coneflower, *Rudbeckia laciniata*

- **Bloom time:** July through October
- **Bloom color:** Yellow
- **Soil description:** Moist, slightly acidic soil
- **Light requirements:** Sun, part shade, shade
- **Approximate Height:** 36"– 72"
- Blossoms attracts a variety of bees, flies, beneficial wasps, butterflies, skippers, and moths.
- The caterpillars of silvery checkerspot butterflies forage on the foliage and the seeds are eaten by goldfinches.

Joe-Pye weed, *Eutrochium fistulosum*

- **Bloom time:** July through September
- **Bloom color:** Purple, pink
- **Soil description:** Moist, fertile, humus-rich soils that do not dry out
- **Light requirements:** Full sun, part sun
- **Approximate Height:** 6 to 12 feet
- Popular with bumble bees, red admirals, red spotted purples, tiger swallow tails. Some species of birds enjoy the seeds of the plant.
- Hollow stems are used by stem-nesting bees and wasps and can be collected, cut, and bundled together to create pollinator nesting areas.

Green-stemmed Joe-Pye weed, *Eupatorium purpureum*

- **Bloom time:** July through October
- **Bloom color:** Purple
- **Soil description:** Rich, moist soils
- **Light requirements:** Full sun, part shade
- **Approximate Height:** 3 to 6 feet
- This flower attracts many types of butterflies, hummingbirds, and bees.
- On cooler nights, native bees will hang-out under the flower clusters of the Joe-Pye plant and wait for the sun to warm them in the morning.

Large-leaved Aster, *Eurybia macrophylla*

- **Bloom time:** July through October
- **Bloom color:** White, blue, purple
- **Soil description:** Moist to dryer soils
- **Light requirements:** Full sun, part shade, shade
- **Approximate Height:** 12"– 36"
- **Larval host:** Silvery Checkerspot (*Chlosyne nycteis*) and Pearl Crescent Butterfly (*Phyciodes tharos*)
- The mining bee (*Andrena hirticincta)* is a specialist of goldenrods and asters, foraging in the late-summer through to fall when its host plants such as the large-leaved aster are flowering.

Swamp Sunflower, *Helianthus angustifolius*

- **Bloom time:** August through October
- **Bloom color:** Yellow
- **Soil description:** Moist, sandy or sandy loam, well-draining soils
- **Light requirement:** Part shade
- **Approximate Height:** 12"– 36"
- Native bees, wasps, honeybees, flies, butterflies, and beetles seek out the pollen and nectar of this flower. Many native birds enjoy the seeds of this plant in the fall months.
- Larval host for silvery checkerspot, bordered patch, and painted lady butterflies.

New England aster, *Symphyotrichum novae-angliae*

- **Bloom time:** August through October
- **Bloom color:** Purple, pink
- **Soil description:** Moist, well-draining soils
- **Light requirements:** Full sun, part shade
- **Approximate Height:** 36"– 72"
- **Specialist pollinators:** Aster miner bee (*Andrena asteris*), Long-horned bee (*Melissodes dentiventris*), Hostile leaf-cutter bee (*Megachile inimical*)

Fun Fact: **Male long-horned bees can be found sleeping on flowers in the early morning, often several of them together. They will hold onto the flowers with their mandibles or curl up inside.**

Long-horned bees take a nap in a purple coneflower.

GRASSES FOR POLLINATORS

Little bluestem, *Schizachyrium scoparium*

- **Bloom time:** August through October
- **Bloom color:** White, green, brown
- **Soil description:** Well-draining, dry sandy or sandy loam soils, very drought tolerant
- **Light description:** Full sun, part shade
- **Approximate Height:** 24"– 36"
- **Larval host:** Skipper butterfly species, including: Dusted skippers, Leonard's skipper, Crossline skipper, and many more
- Provides overwintering habitat for pollinators, such as the mated bumblebee queen.

Purpletop grass, *Tridens flavus*

- **Bloom time:** August through November
- **Bloom color:** Purple
- **Soil description:** Dry, sandy or sandy loam soils
- **Light requirements:** Part shade
- **Approximate Height:** 36"– 72"
- **Larval host:** Little glassywing skipper, Zabulon skipper, common wood nymph, cross-line skipper, broad-winged skipper

TREES AND SHRUBS FOR POLLINATORS

New Jersey tea, *Ceanothus americanus*

- **Bloom time:** March through April
- **Bloom color:** White
- **Soil description:** Moist to dry soil, well-draining loam soils
- **Light requirements:** Sun, part shade
- **Approximate Height:** 12"– 36"
- **Larval host:** Spring azure (*Celastrina ladon*), summer azure (*Celastrina neglecta*), mottled duskywing, (*Erynnis martialis*)
- The Spring azures are among the first butterflies seen in the spring that have not hibernated over the winter as an adult. It's important that there are food sources available for these early spring visitors.

Eastern redbud, *Cercis canadensis*

- **Bloom time:** March through May
- **Bloom color:** Pink
- **Soil description:** Moist, fertile, well-draining soil
- **Light requirements:** Sun, part shade
- **Approximate Height:** 12 to 36 feet
- The flower clusters of eastern redbuds are rich in both nectar and pollen and provide an excellent food source for early bees at a time when food is scarce. The flowers are often visited by mason bees, carpenter bees, bumblebees, blueberry bees, and many more!
- Leafcutter bees favor Eastern redbud leaves to divide and seal nesting chambers for their offspring. Look for small, perfect circles in leaves.

Fun Fact: **Several species of moth caterpillars eat redbud leaves. The caterpillar of the redbud leaf-folder moth (Fascista cercerisella) only eats redbud leaves. As the moth's name suggests, the caterpillar will fold the redbud leaf in half, then "stitch" the leaf together to create a small hiding place.**

Red Maple, *Acer rubrum*

- **Bloom time:** March through April
- **Bloom color:** Red
- **Soil description:** Prefers moist soil but can handle drier conditions
- **Light requirements:** Full sun, part shade
- **Approximate height:** Can reach up to 100 feet in height
- **Larval Host:** Baltimore bomolocha (*Hypena baltimoralis*), Maple Leaf-Blotch Miner (*Cameraria aceriella*), and many other species
- One of the first sources of food for early spring pollinators, including bumblebees.
- Red maple flowers later in the spring than other maple species and its flowers usually receive more visitation by insects than wind-pollinated maple species. Common bees include mining bees (*Andrena*), small sweat bees (Lasioglossum), mason bees (*Osmia*), and cellophane bees (*Colletes*).

White Oak, *Quercus alba*

- **Bloom time:** March through May
- **Bloom color:** Red, yellow, green, brown (male flowers are yellow-green and female flowers are reddish green)
- **Soil description:** Moist, well-draining loams and sands
- **Light requirements:** Full sun, part sun and shade
- **Approximate height:** Reaches heights over 100 feet
- **Larval host:** Edwards' hairstreak (*Satyrium edwardsii*)
- **Supports over 500 native butterfly and moth species throughout North America!**

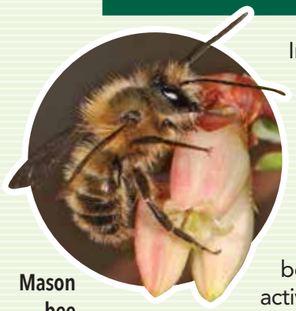
Serviceberry, *Amelanchier arborea*

- **Bloom time:** April through May
- **Bloom color:** White
- **Soil description:** Moist, well-draining, acidic soil
- **Light requirements:** Full sun, part sun, and shade
- **Approximate Height:** 12 to 36 feet
- **Larval Host:** Red-spotted purple (*Limenitis arthemis*) and Viceroys
- Produces edible fruit for humans and wildlife.

Black Cherry, *Prunus serotina*

- **Bloom time:** May through mid-June
- **Bloom color:** White
- **Soil description:** Dry to moist, well-draining soils
- **Light requirements:** Full sun, part shade
- **Approximate height:** Height depends on variety, with serotina reaching 110 feet in the east
- **Larval host:** Spring and Summer azure (species name listed above), Eastern tiger swallowtail (*Papilio glaucus*)
- Many other species of bee visit this plant for its nectar, including: mining bees (*Andrena*), small sweat bees (*Lasioglossum*), sweat bees (*Halictus*), bumble bees (*Bombus*), cuckoo bees (*Nomada*), and small carpenter bees (*Ceratina*).

Building a Bee Hotel for Stem-Nesting Bees



Mason bee

Incorporating a bee hotel in your pollinator garden provides crucial habitat for our native pollinators. Stem-nesting bees construct their nests close to their preferred floral resources, so by providing a nesting box within your pollinator garden, you can help native pollinators boost their populations. There are two main kinds of stem-nesting bees, mason bees (*Osmia species*), which are active in the spring, and leafcutter bees (*Megachile species*), which are active in the summer. These two types of bees can be commonly found across the United States, making up about 30% of the 4,000 native bee species found in North America.

Mason and leafcutter bees build their nests above ground in cavities or tunnels, such as inside a pithy plant stem or pre-existing holes in trees. These types of bees are also solitary, meaning that each female uses an individual nest. Unlike honey bees, mason and leafcutter bees do not produce honey. Providing stem-nesting bees with nesting boxes (bee hotels) can help conserve their populations on farms, in home gardens, or in city parks.

Location, Design, and Materials

A bee hotel should be hung in a location that is four to five feet above the ground and facing southeast if possible, so the hotel warms up earlier in the spring and stays warm later in the fall. The bee hotel can be mounted on the side of a building or a solitary tree, ideal locations where it is shielded from the wind, rain, and predators. Make sure the hotel is hung securely so it does not move or shake in the wind, which could disturb the developing larvae. Also, it is crucial that the nesting material does not get wet.

Mason and leafcutter bees can fly hundreds of feet to locate sufficient plants, so be sure to place your bee hotel near floral resources. It is ideal to have a variety of plants that bloom throughout the year. For example, maples, redbuds, or golden alexanders provide pollen for early emerging mason bees. Flowers that bloom later, such as purple coneflower, beebalm, or asters provide foraging resources for leafcutter bees. Please refer to the planting guide (pages 7-14) for more suggestions.

A leafcutter bee feeds on Joe-Pye weed.

How Do Bee Hotels Work?

STEP 1

Stem-nesting bees emerge from nests (tunnels or stems) created the previous year. Mason bees will emerge in the spring and leafcutter bees emerge in the summer.

STEP 2

The bees mate in the spring (mason bees) or in the summer (leafcutter bees). The females will be ready to lay their eggs inside the tunnels of the bee hotel.

STEP 3

The female bee surrounds each egg with pollen or nectar to feed her larvae. Next, she will lay each egg in its own compartment; separating each one from the next with leaves, mud, plant resins, or flower petals. For each successive cell, the female bee will collect more pollen and continue laying eggs until the tunnel is filled. Last, she will cap the end of the tunnel with mud and leaf pieces.

STEP 4

The eggs hatch into small larvae. They will eat the pollen left by their mother throughout the summer. Pictured below are mason bee larvae.

STEP 5

The larvae pupate and overwinter as pre-pupae or as adults. A few species have two generations within one summer, and these species will go through this process twice a year.

A bee hotel secured to the side of a shed where it has protection from the elements.

This is where you can be creative! Build your bee hotel as big as you like and in any shape you want, just be sure it is enclosed in the back. While many may think bigger is better, consider constructing multiple, smaller bee hotels in order to minimize predation and disease. You will also want to use a variety of nest materials and stem diameters to help attract a diversity of bee species to your hotel.

A simple nest can be constructed using bundles of hollow stems, such as bamboo, beebalm stems, or cardboard tubes and paper straws. The inside space of the stems should range from 1/16 to 1/2 inches in diameter. If you decide to use plant stems, each one needs to be cut below the node (see photo). This will leave you with stems that have one open end and one closed end, make sure all the open stems are facing the same direction. The length of the stems can vary depending on nest box design but should range between 5 and 8 inches. Next, tightly bundle the stems together using tape, zip ties, string or wire.

Alternatively, you can pack cut stems or straws into a container with one open end. Be sure to pack your straws or stems into the container with the open ends facing out of the container. This is a great opportunity to recycle old or unused items you have laying around your home. For the container, you can use a plastic tote turned on its side or you could construct a wooden frame to hold your nesting box materials. If you would like to create something a little smaller you can use aluminum cans, cinder blocks, or PVC pipes. Remember to provide an overhang for your nesting box to protect it from the rain and wind.

The materials needed for a bee hotel include:

- Hollow tubes to bundle (plant stems, bamboo, cardboard tubes, and paper straws)
- Tape, zip ties, string, or wire for bundling items together
- Scissors or pruning shears for cutting stems
- Nesting structure or house for rain protection (such as a plastic tote or constructed wooden frame)
- Wire mesh to protect from predators
- Paint to decorate (optional)

A mason bee emerging from a stem.

A node on a stem.

Leafcutter bee.

Plants with hollow or pithy stems:

- **Large Aster Species**
- **Bee Balm**
- **Joe Pye Weed**
- **Sunflowers**
- **Raspberry and Blackberry**
- **Elderberry**

Did You Know?

Decorating your bee hotel with bright paint colors can help attract bees from long distances to the nesting tubes and will protect the nesting box from the elements.

Constructing Wood Nest Blocks

In order to construct a wooden nest block, you will need untreated lumber, tree stumps, or logs that are at least 4 inches thick. On one side of your piece of wood, drill a series of holes that vary in diameter so you can attract a variety of bee species. The holes should measure between 3/32 and 3/8 inches in diameter and should be 3 to 6 inches deep. As the hole diameter increases, the depth of the tunnel should also increase. Most bees favor a closed-end stem so be sure not to drill completely through the back of the wood block. Also, make sure you drill your holes at least 3/4 inches apart to ensure the integrity of the wood block. When drilling make sure that your drill bit is sharp and drill at a high speed. This ensures the drilled holes will be smooth inside and will not cause damage to the wings of bees that visit your bee hotel.

The materials needed:

- Untreated wood
- Drill
- Long drill bits with varying diameters
- Rain protection
- Wire mesh to protect from predators
- Paint (optional)

A wooden nesting block.
Photo by NRCS,USDA.gov.

Maintaining & Monitoring Your Bee Hotel

Maintaining your bee hotel properly is essential not only for the health of the bees that use it, but it also extends the life of the nesting box itself. Since bee hotels have many tunnels close together, fungus and mites can spread more easily than they would in a natural environment. The easiest way to make sure your bee hotel remains clean and safe for our pollinating friends is to have two bee hotels. The first set would be used the first season, while the second set would be held in reserve until the following spring. You will not use the second bee hotel during the first year. The following spring you can place your second bee hotel outdoors. The initial box can be brought in and cleaned after the bees have emerged and left the bee hotel. You will be able to tell when the bees have emerged because the "mud or leaf cap" at the entrance of the tunnel will be opened by the emerging bees. The used bee box can be cleaned over winter so that it is ready to be placed out the following spring.

Depending on the materials you used in the nesting box, the method to clean it will be different. If you used paper or cardboard straws or plant stems, simply dispose of them and replace with a clean set. If you constructed a wooden nesting box use pipe cleaners that have been dipped into a bleach solution. For this method, you will mix half a cup of bleach into a gallon of water. Then cover the surface of the wood block with the solution. Then take your pipe cleaners, dipped in the bleach solution to clean out each of the tunnels. Let the bee hotel dry completely before placing it back out for bees to use. We hope this publication helps you turn your yard into a pollinator paradise!