

## DELAWARE NATIVE PLANTS FOR NATIVE BEES



The term "native bee" refers to any of a large and diverse group of wild bees that are indigenous to North America. There are some 4,000 species of native bees north of Mexico, around 200 of which have been found in Delaware. Native bees are a vital component of natural ecosystems, providing pollination services to countless species of wild trees, shrubs and flowers.

In addition to wild plants, bees pollinate over 100 crop species in North America. Populations of managed European honey bees have declined in recent years due to mites and diseases. While honey bees are still very important pollinators, native bees can provide "pollination insurance" during times when honey bees are not available. Recent studies in New Jersey



and Pennsylvania have shown that native bees alone provide sufficient pollination for most watermelon farms. Native bees are extremely efficient pollinators of pumpkins, tomatoes, apples, berries, and many other crops.

Bees benefit from patches of native flowering plants on farms, in home gardens, and in public spaces. Adult bees drink nectar and gather pollen to provide food for their young. A supply of pollen- and nectar-rich plants available throughout the growing season will help maintain large, healthy native bee populations. Farmers, gardeners and land managers can help by establishing plantings of native herbaceous or woody vegetation.

In addition to supporting native bee populations, these plantings can also provide food for natural enemies of crop pests (such as predatory bugs and beetles, parasitic wasps, etc.). Many perennial herbaceous and woody plants also provide valuable cover and food for other types of wildlife, including game birds, song birds, and mammals. Permanent native plantings stabilize soil and help prevent erosion. Woody plantings can serve as windbreaks, reducing the effects of high wind on soils and crops, or they may be planted as shelterbelts to protect farmsteads.

## How to Plant for Native Bees

#### **Choosing Plants**



Flowers of different shapes attract bees with different tongue lengths. This sweat bee has a relatively short tongue, and can reach nectar more easily in open flowers than in tubular flowers.

The purpose of this guide is to help you choose plants that are attractive to native bees. There are several important factors to consider when selecting plants.

1. **Timing:** Choose a variety of plants that bloom at different times of the year, so that pollinators have access to a source of food from early in the spring to late in the fall (see the chart on pages 14-15).

2. **Diversity:** Choose plants with a variety of floral shapes and colors to appeal to different species of both short-tongued and long-tongued bees.

3. **Origin:** Select native plants whenever possible, and definitely avoid invasive alien species.

4. **Ecotype:** Whenever possible, buy seed or plants from a nursery that sells local ecotypes (plants propagated from seed or stock originally

collected in the area you plan to plant, rather than in another region of the country). This helps ensure that the plants you use are adapted to the local climate and growing conditions.

**5. Annual vs. Perennial:** Native perennials are less likely than annuals to become weedy, and they are easier to maintain, since they don't need to be reseeded.

6. **Hybrids:** Avoid planting hybrid flower varieties or those that have been bred for showy or "double" blossoms, as these often lack the pollen and nectar rewards of the parent species.

Many native herbaceous plants are available as seed. A commercial seed mix containing desirable species may be used, or better yet, a custom seed mix can be designed to include any number of species. Herbaceous plants can also be grown from rooted plugs, and these will flower more quickly (within 1-2 years versus 3-5 years from seeds). Woody plants grown from containerized seedlings will have much better success than those started from seed or bare root seedlings.

While it is useful to read about native plants, there is no substitute for getting out into the fields and woods to study them in person. As you learn more about each plant, its habitats, and its pollinators and other insect associates, you will be able to apply that knowledge to your own native plantings.

#### **Designing a Planting**

Bee forage plantings should ideally be located near nesting habitat provided by woodlots, thickets, areas of well-drained untilled ground, or fallow fields. If the site is on a farm, locate plantings within flight distance (several hundred feet) of crops requiring insect pollination. While small plantings are beneficial, larger areas of forage habitat will support larger populations of native bees. However, larger plantings require more work to maintain, so plan the size of your planting based on the time and equipment available.

It is important to know your soil characteristics. Have the soil in your planting site tested for organic



Long-horned bee, *Melissodes druriella*, gathering goldenrod pollen.

## How to Plant for Native Bees

content and pH, and be sure you are familiar with the type of soil and degree of soil moisture. Analyze the planting site, taking into account the degree of sun exposure, and any tendency for the site to flood or become excessively dry. Measure your planting area and draw a plan to aid in calculating the right amount of seed. If you will be planting containerized woody seedlings or rooted plugs of herbaceous species, calculate plant spacing and estimate the number of plants needed.

An easy way to establish a native meadow is to plant a mix of native warm-season grasses and bee-friendly wildflowers. Consult references and speak with your seed supplier to determine your desired ratio of wildflower to grass seed in the mix.

#### **Establishing a Planting**

If you are establishing a new wildflower planting on fallow ground, you should begin by eliminating all competing vegetation in the area you wish to plant. This can be done by mowing or burning, followed by one or more applications of glyphosate herbicide prior to planting. Make sure litter and thatch is cleanly removed before spraying so that the herbicide reaches the vegetation. Cultivating is an alternative approach, particularly if a crop has been growing on the site. After cultivating, the soil should be firmed by cultipacking to create good seed to soil contact. Fertilizers are not needed and tend to favor rapid growth of non-native weeds, rather than successful establishment of the native planting.

Seeding should take place either in late fall or in the spring. A no-till drill can be used to plant native grass and wildflower seed, and can often be rented or borrowed from local conservation districts or local chapters of Quail Unlimited or Pheasants Forever. Broadcast seeding may be used, but larger amounts of seed are typically needed to achieve the same results.

If you already have a number of desirable native species present that you don't wish to eliminate, it might be possible to add additional wildflower species into the existing vegetation by either 1) strategically planting rooted plugs or 2) burning or mowing the area, overseeding with the desired species, then mowing periodically during the first season to promote germination of the new seed.

To establish a hedgerow or clump of woody shrubs or trees, complete vegetation control is not necessary, but competing vegetation immediately surrounding the planting site of each tree should be mowed or sprayed prior to planting. Tree tube shelters secured to stakes should be used to protect seedlings from herbicides and mowing, rodent damage, and deer browse. Weed suppression mats may be installed around each plant, or periodic mowing or spraying of competing vegetation may be substituted.

For establishment of native species in wetlands and wetland edges, special care is required. To avoid toxicity to aquatic life and contamination of ground water, be sure to use only those herbicides specifically approved for wetland use. To minimize soil compaction, avoid driving equipment through areas that are too wet. These sites may be better suited for broadcast seeding or hand planting of plugs, bareroot, or containerized stock. Control of invasive species such as Common Reed (*Phragmites australis*) should be completed before planting.

## How to Plant for Native Bees

#### **Maintaining a Planting**

If plantings are properly established in the fall, watering should not be necessary during the subsequent growing season. Spring plantings can be susceptible to drought however, and may need to be watered regularly (every 1-2 weeks) during the first year until the plants are well established. It is necessary to mow herbaceous plantings to a height of 6-8" several times during the first growing season with the blades set high, to remove the tops of the weeds that will inevitably grow faster than the desired perennials. If weeds continue to present problems, they may be controlled by mowing or spot-spraying with herbicides during the first 2 to 3 years of establishment. Long-term maintenance of herbaceous native plant communities can be accomplished by periodic disturbance such as discing, burning, or dormant season mowing.

In some areas, deer can cause significant problems. Many of the plants listed in this guide are unpalatable to deer, but depending on local conditions, even these species may be browsed. While it is expensive, fencing may be the best control method in areas with high deer populations. Treating newly planted shrubs and trees with deer repellents may help protect them while they are becoming established. For woody plantings, tree tubes should be checked and maintained on a regular basis to prevent deer and rodent damage. Replace broken or loose stakes and ties and check tubes for contact with the soil, since gaps can result from winter frost heave and allow access to rodents.

#### **Financial Assistance**

There are many federal, state, and private programs available that can provide financial assistance to landowners for planting native plant species as part of conservation practices. Most of these practices can be adapted to benefit bees and other pollinators by choosing plant species such as those listed in this booklet. NRCS conservation cost-share programs such as the Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentives Program (WHIP) can help agricultural producers with the establishment of native species plantings. Some of the NRCS cost-share practices that can be adapted for bees include:

Field border planting Filter strip planting Hedgerow planting Shallow-water wetland creation Wetland restoration Critical area planting Riparian herbaceous cover development Early successional habitat development Riparian forest buffer planting Upland wildlife habitat management Wetland wildlife habitat management

Contacts for NRCS are listed at the end of this booklet. Ask about how you can incor-

NRCS cost-share assistance is available to establish plantings for bees.

porate plantings for native bees into NRCS projects. The Delaware DNREC private lands biologist can assist you with finding public and private cost-share assistance for conservation projects. Delaware Department of Agriculture staff members are available to help you design bee habitat enhancements on your farm.

## About the Plant List

The following list includes 39 species of Delaware native plants that provide pollen, nectar, and in some cases, nesting sites, to native bees. The plants included in this list were selected based on the following criteria:

- 1. Native to the state of Delaware
- 2. Known to be visited by a variety of native bees
- 3. Commercially available or, if availability is limited, then a good bee plant that is likely to be present in fallow areas of many farms
- 4. Historical or current occurrence on the Delaware coastal plain, or if limited to the piedmont, then the plant is thought to be an especially good bee plant and is widely available commercially

Many excellent native bee plants are not listed here, because they either do not meet the criteria above, or because they are represented in the list by other members of the same genus. Groups such as Asters, Goldenrods, Joe-pye Weeds, Sunflowers, Willows, and Hawthorns include many more species than can be listed here. While this list is a good starting point, it is worth experimenting with other native species as well, especially those that may already grow on your farm. Keep in mind that the insect visitors to many native plant species are only poorly known, and often what is known is drawn from very old publications and from different parts of the country. The flower preferences of bees and other flower-visiting insects may vary from region to region. Further research is needed to determine what specific combinations of native plants are best suited for augmenting populations of crop pollinating bees and natural enemies of crop pests on farms in our area.

Attractiveness: The relative attractiveness of a plant to **Bees**, and the list of bee **Types Attracted** to each plant are based on a variety of published and unpublished records, and includes only non-parasitic bees (those that collect their own pollen from crops and wild plants). These lists are not exhaustive, but are meant to summarize the available information. In addition, the relative attractiveness of a plant to **Natural Enemies** of crop pests is given when available. This information is based on published records of floral visitation by natural enemies, notably the work of Doug Landis and colleagues in Michigan (see More Information on page 23). Specific natural enemy groups known to use each plant are mentioned in the **Notes** section. For the scientific names of the insect groups listed, see the table on page 22.

Plant **Growth** requirements are compiled from several sources, including the NRCS Plants Database. **Bloom** times are typically those given by Robert Tatnall in his 1946 *Flora of Delaware and the Eastern Shore*. **Natural habitat** descriptions are from the 2001 *Flora of Delaware: an annotated checklist*, by McAvoy and Bennett. The letter codes after the habitat description indicate where the plant is found in the wild ( $\mathbf{P} = \text{Piedmont}$ ,  $\mathbf{C} = \text{Coastal Plain}$ ). **Commercial availability** is based primarily on the plant lists of the regional nurseries listed on page 25.



Swamp Milkweed Asclepias incarnata Perennial Forb Bloom: Pink, Jun - Aug Height: 4 - 6 ft.

#### Attractiveness

Bees: Good Natural Enemies: Good Types attracted: Bumble bees, large carpenter bees, long-horned bees, plasterer bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam Soil pH: 5.0 – 8.0 Propagation: Seed, Plug Availability: Good Natural habitat: Marshes, wet meadows (P, C)

#### Notes

Grows well in low meadows, pond and marsh edges. Like most milkweeds, it is not preferred by deer. Natural enemies attracted include: lacewings; lady and soldier beetles; dance, long-legged, and tachinid flies, parasitic and predatory wasps, and minute pirate bugs.



**Common Milkweed** Asclepias syriaca Perennial Forb Bloom: Pale Purple, Jun - Jul Height: 3.5 - 6 ft.

Attractiveness Bees: Good Natural Enemies: Limited data Types attracted: Bumble bees, leaf-cutter bees, longhorned bees, plasterer bees, sweat bees

Growth Light: Full Sun Moisture: Dry Soil Type: Loam, Sand Soil pH: 5.1 – 7.5 Propagation: Seed, Plug Availability: Good Natural habitat: Old fields, thickets, roadsides (P, C)

#### Notes

While sometimes considered an agricultural weed, this deer-resistant plant is nevertheless a valuable pollinator plant, visited primarily by bumble bees and large wasps. It provides a good mid-summer nectar source, and also hosts hover flies and tachinid flies. Milkweeds are the caterpillar host plants for the Monarch butterfly, *Danaus plexippus*.



Yellow Wild Indigo Baptisia tinctoria Perennial Legume Bloom: Yellow, Jun - Jul Height: 1 - 3 ft.

#### Attractiveness

Bees: Good Natural Enemies: No data Types attracted: Bumble bees, leaf-cutter bees, longhorned bees, sweat bees

Growth

Light: Full Sun to Part Shade Moisture: Dry Soil Type: Loam, Sand Soil pH: 5.8 – 7.0 Propagation: Seed, Plug Availability: Moderate Natural habitat: Dry sandy soils (P, C)

#### Notes

This legume is drought-tolerant and does well even in poor, dry soils. It is visited by a variety of mostly longtongued bees, and is a hostplant for caterpillars of the Wild Indigo Duskywing, the Io Moth, and the rare Frosted Elfin.



Partridge Pea Chamaecrista fasciculata Annual Legume Bloom: Yellow, Jul - Sep Height: 0.5 - 3 ft.

Attractiveness Bees: Moderate Natural Enemies: Good Types attracted:

Bumble bees, large carpenter bees, leaf-cutter bees, longhorned bees, sweat bees

#### Growth

Light: Full Sun Moisture: Dry Soil Type: Sandy Soil pH: 5.5 – 7.5 Propagation: Seed Availability: Moderate Natural habitat: Roadsides, old fields (P, C)

Notes

An excellent soil builder that establishes rapidly and provides erosion control and nitrogen fixation for slowergrowing perennial forbs. The showy flowers are pollinated primarily by bumblebees, while short-tongued bees, predatory wasps, hover flies, and tachinid flies suck nectar from glands on the leaf petioles.



**Three-nerved Joe-Pye Weed** *Eupatorium dubium* Perennial Forb Bloom: Whitish Purple, Aug - Sep Height: 2 - 5 ft.

Attractiveness Bees: No data Natural Enemies: No data Types attracted: No data

Growth Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Sand Soil pH: 4.5 – 6.5 Propagation: Plug Availability: Moderate Natural habitat: Swamps, stream banks, wet meadows (P, C)

Notes

An attractive species that does well in coastal plain sites, and provides a good source of late summer nectar and pollen. There are few published records of floral visitors to the plant, but other purple *Eupatorium* species are visited by bumble bees, large carpenter bees, leaf-cutter bees, longhorned bees, and small carpenter bees.



**Common Boneset** *Eupatorium perfoliatum* Perennial Forb Bloom: White, Aug - Sep Height: 3 - 5 ft.

Attractiveness Bees: Good Natural Enemies: Excellent Types attracted: Bumble bees, digger bees, leaf-cutter bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 6.5 – 7.0 Propagation: Seed, Plug Availability: Good Natural habitat: Swales, wet meadows, marshes (P, C)

#### Notes

Attracts good numbers of bees and large numbers of natural enemies, including minute pirate bugs, predatory plant bugs, hover flies, tachinid flies, lady and soldier beetles, and predatory and parasitic wasps. This is an excellent choice for ditches, pond edges and other wet areas.



Wild Strawberry Fragaria virginiana Perennial Forb Bloom: White, Apr - May Height: 3 - 8 in.

Attractiveness Bees: Good Natural Enemies: Good **Types attracted:** Mason bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Loam, Sand **Soil pH:** 5.1 – 7.8 **Propagation:** Plug, Containerized Stock **Availability:** Limited Natural habitat: Moist woods, meadows, fields, roadsides (P, C)

#### Notes

A good early season bee plant, especially attractive to mining bees of the genus Andrena, a wide variety of sweat bees, and hover flies. Despite its small, edible berries, which are also consumed by at least 25 species of eastern birds, this plant is not widely available commercially.



**Giant Sunflower** Helianthus giganteus Perennial Forb Bloom: Yellow, Aug - Sep Height: 3 - 10 ft.

Attractiveness **Bees:** Moderate Natural Enemies: No data **Types** attracted: Bumble bees, large carpenter bees, leaf-cutter bees, long-horned bees, mining bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand **Soil pH:** 5.5 – 7.5 Propagation: Seed Availability: Moderate Natural habitat:

Wet meadows, tidal marshes  $(\mathbf{P}, \mathbf{C})$ 

#### Notes

The flowers are visited primarily by long-tongued bees, but the data is sparse. A related Midwestern species attracts parasitic wasps, minute pirate bugs, and other natural enemies. The seeds of sunflowers are one of the most favored wild bird foods and are widely consumed by dozens of species.





**Ox-eve Sunflower** *Heliopsis helianthoides* Perennial Forb Bloom: Yellow, Jul - Sep Height: 3 - 6 ft

Attractiveness Bees: Good Natural Enemies: Limited data Types attracted: Bumble bees, leaf-cutter bees, longhorned bees, mining bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Loam, Sand **Soil pH:** : 6.0 – 7.5 Propagation: Seed, Plug Availability: Good Natural habitat: Thickets and meadows (P. C)

#### Notes

The flowers bloom for a lengthy period during midsummer, attracting a variety of bees, as well as hover flies, soldier beetles, and predatory plant bugs. The species is easy to grow in a wide range of well-drained soils.



**Round-head Bush-clover** Lespedeza capitata Perennial Legume Bloom: White, Aug – Sep Height: 2 - 4 ft.

Attractiveness Bees: Moderate Natural Enemies: No data Types attracted: Bumble bees, leaf-cutter bees, mining bees, sweat bees

#### Growth

Light: Full Sun Moisture: Dry Soil Type: Loam, Sand Soil pH: : 6 .0 – 8.0 Propagation: Seed Availability: Moderate Natural habitat: Dry sandy soils (P, C)

#### Notes

This drought-tolerant legume is relatively easy to grow, though it can be susceptible to damage from mammal browsing. The seeds provide food for upland game birds and songbirds. It is a hostplant for the Eastern Tailed-Blue and Gray Hairstreak butterflies.



**Dense Blazing-star** *Liatris spicata* Perennial Forb Bloom: Purple, Aug - Sep Height: 2 - 5 ft.

Attractiveness Bees: Limited data Natural Enemies: Limited data Types attracted: Bumble bees, leaf-cutter bees, longhorned bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: 5.6 – 7.5 Propagation: Seed, Plug Availability: Moderate Natural habitat: Fields and roadsides (P, C)

#### Notes

The stock sold by many nurseries is of Midwestern, rather than eastern, origin. This plant is visited primarily by long-tongued bees, but species records are few. Natural enemies attracted include hover flies and soldier beetles. *L. graminifolia* is more common in the wild in Delaware but is seldom available commercially.



**Great Blue Lobelia** *Lobelia siphilitica* Perennial Forb Bloom: Blue, Aug - Sep Height: 2 - 3 ft.

#### Attractiveness

Bees: Excellent Natural Enemies: Excellent Types attracted: Bumble bees, digger bees, longhorned bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: : 6.5 – 7.0 Propagation: Seed, Plug Availability: Good Natural habitat: Wet meadows, stream banks,

swamps (P)

#### Notes

This deer-resistant perennial is found naturally along streams in the piedmont, but may be difficult to grow on the coastal plain without soil amendments. It attracts numerous bees, as well as minute pirate bugs, predatory plant bugs, parasitic and predatory wasps, lady beetles, and soldier beetles.



Wild Blue Lupine Lupinus perennis Perennial Legume Bloom: Purple, May - Jun Height: 1 - 2 ft.

#### Attractiveness

Bees: Excellent Natural Enemies: Limited data

**Types attracted:** Bumble bees, digger bees, large carpenter bees, leaf-cutter bees, long-horned bees, mason bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry Soil Type: Sand Soil pH: : 6.1 – 7.5 Propagation: Seed, Plug Availability: Moderate Natural habitat: Dry, sandy soils (C)

#### Notes

While this showy, deer-resistant species is available from native plant suppliers, it is difficult to find stock of a true eastern ecotype. It is a superb bee plant for dry, sandy soils, also visited by hover flies and predatory wasps.



Wild Bergamot Monarda fistulosa Perennial Forb Bloom: Pale Pink, Aug - Sep Height: 2 - 5 ft.

#### Attractiveness Bees: Good Natural Enemies: Limited data

**Types attracted:** Bumble bees, digger bees, large carpenter bees, leaf-cutter bees, long-horned bees, mason bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam Soil pH: 6.0 – 8.0 Propagation: Seed, Plug Availability: Good Natural habitat: Dry open soils (P)

#### Notes

While only long-tongued bees can reach the nectar at the bottom of the flower tubes, some short-tongued bees also drink at holes made in the flower by nectar-stealing wasps. Predatory and parasitic wasps, hover flies, and soldier beetles also visit the flowers. This deerresistant species is rare in Delaware in the piedmont, and may need soil amendments if grown on the coastal plain.



**Spotted Horsemint** *Monarda punctata* Perennial Forb Bloom: Yellow/Pink, Jul - Aug Height: 2 - 3.5 ft.

#### Attractiveness Bees: Good

Natural Enemies: Excellent Types attracted: Bumble bees, digger bees, large carpenter bees, leaf-cutter bees, long-horned bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun Moisture: Dry Soil Type: Sand Soil pH: : 5.0 – 7.5 Propagation: Seed, Plug Availability: Good Natural habitat: Sandy soils, old fields,

roadsides (C)

#### Notes

Highly attractive to bees as well as to natural enemies, such as minute pirate bugs, predatory plant bugs, soldier beetles, and parasitic wasps. Adapted to dry, sandy habitats, the species is extremely drought tolerant.



**Tall White Beard-tongue** *Penstemon digitalis* Perennial Forb Bloom: White, Jun Height: 2 - 4 ft.

#### Attractiveness Bees: Good Natural Enemies: Limited data

**Types attracted:** Bumble bees, digger bees, large carpenter bees, leaf-cutter bees, long-horned bees, mason bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: 5.5 – 7.0 Propagation: Seed, Plug Availability: Good Natural habitat: Meadows, roadsides (P, C)

#### Notes

A relatively easy-to-grow, deer-resistant plant. Penstemons are especially important pollen sources for some species of mason bees. Hover flies are also known to visit this species.



Black-eyed Susan Rudbeckia hirta Perennial Forb Bloom: Yellow, Jun - Jul Height: 1 - 3 ft.

#### Attractiveness

**Bees:** Excellent **Natural Enemies:** Good **Types attracted:** Bumble bees, leaf-cutter bees, longhorned bees, mining bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam Soil pH: : 5.0 – 7.5 Propagation: Seed, Plug Availability: Good Natural habitat:

Old fields, roadsides, edges (P, C)

#### Notes

A widely available, deerresistant wildflower with showy yellow blossoms, it is easy to grow from seed in a wide range of soils. Attracts natural enemies, including predatory plant bugs, lady beetles, hover flies, tachinid flies, and predatory and parasitic wasps.



**Canada Goldenrod** Solidago canadensis Perennial Forb Bloom: Yellow, Sep - Oct Height: 3 - 6 ft.

#### Attractiveness

**Bees:** Excellent **Natural Enemies:** Excellent **Types attracted:** Bumble bees, large carpenter bees, leaf-cutter bees, long-horned bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: 4.8 – 7.5 Propagation: Seed Availability: Moderate Natural habitat: Old fields, roadsides,

edges (P, C)

#### Notes

A deer-resistant, widely distributed goldenrod that attracts a tremendous diversity of bees. Natural enemies attracted include predatory plant bugs, hover flies, tachinid flies, lady and soldier beetles, and predatory and parasitic wasps.



**Early Goldenrod** *Solidago juncea* Perennial Forb Bloom: Yellow, Jul - Sep Height: 3 - 4 ft.

#### Attractiveness

Bees: Excellent Natural Enemies: Good Types attracted: Bumblebees, leaf-cutter bees, longhorned bees, mason bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Sand Soil pH: 5.0 – 7.5 Propagation: Seed Availability: Moderate Natural habitat: Thin woods and edges, old

fields (P, C)

#### Notes

The first goldenrod to bloom in late summer, this deerresistant species is highly attractive to bees. Also attracted are hover flies, tachinid flies, lady beetles, and predatory and parasitic wasps.



**New England Aster** Symphyotrichum novae-angliae Perennial Forb Bloom: Purple, Aug - Sep Height: 2 - 6 ft.

#### Attractiveness

Bees: Good Natural Enemies: Excellent

**Types attracted:** Bumble bees, large carpenter bees, leaf-cutter bees, long-horned bees, mining bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist Soil Type: Loam Soil pH: 5.5 – 7.0 Propagation: Seed, Plug Availability: Good Natural habitat: Marshes, wet meadows (P, C)

Marshes, wet meadows (P, C

#### Notes

Like many other asters, attracts good numbers of bees and high numbers of natural enemies, including minute pirate bugs, dance flies, hover flies, lady beetles and parasitic wasps. It grows well in areas that are moist, but not too wet, and is resistant to deer browse.



Hairy Heath Aster Symphyotrichum pilosum Perennial Forb Bloom: White, Sep - Oct Height: 2 - 5 ft.

#### Attractiveness

**Bees:** Excellent **Natural Enemies:** Excellent **Types attracted:** Bumblebees, leaf-cutter bees, longhorned bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: 5.4 – 7.0 Propagation: Seed Availability: Limited Natural habitat:

Fields, open woods, roadsides (P, C)

#### Notes

Establishes rapidly on disturbed sites and fallow fields. The numerous small white flowers are visited by a multitude of bee and hover fly species. This species is not widely available commercially (seed is sometimes available), but two varieties (var. pilosum and var. demotus) are common in Delaware. Also attracts tachinid flies, soldier beetles, and predatory and parasitic wasps.



**Blue Vervain** Verbena hastata Perennial Forb Bloom: Purple, Jun - Aug Height: 2 - 5 ft.

#### Attractiveness Bees: Good Natural Enemies: Limited data

**Types attracted:** Bumble bees, leaf-cutter bees, long-horned bees, mining bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 6.0 – 7.0 Propagation: Seed, Plug Availability: Good Natural habitat:

Wet meadows, ditches (P, C)

#### Notes

This deer-resistant plant grows best in moist soils that are not too acidic. Natural enemies attracted include tachinid flies. The small seeds are eaten by songbirds, including cardinals and several species of sparrow.



**New York Ironweed** *Vernonia noveboracensis* Perennial Forb Bloom: Purple, Aug – Sep Height: 3 - 7 ft.

Attractiveness Bees: Good Natural Enemies: No data Types attracted: Bumble bees, long-horned bees, and others

Growth Light: Full Sun Moisture: Wet to Moist Soil Type: Loam Soil pH: 4.5 – 8.0 Propagation: Seed, Plug Availability: Good Natural habitat: Wet meadows, marshes, swales (P, C)

#### Notes

While there is limited information available on the bees that visit this species, related species of *Vernonia* in the Midwest are visited by a variety of long-tongued bees, including bumble bees, leafcutter bees, long-horned bees, and small carpenter bees.



**Golden Alexanders** *Zizia aurea* Perennial Forb Bloom: Yellow, Apr - Jun Height: 1 - 3 ft.

Attractiveness Bees: Excellent Natural Enemies: Excellent Types attracted: Bumble bees, long-horned bees, mason bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: 4.0 – 6.5 Propagation: Seed, Plug Availability: Good Natural habitat: Moist rich woods and floodplains (P)

#### Notes

One of the best early season herbaceous bee plants. It occurs naturally in Delaware in moist, rich soils on the piedmont, but may be difficult to grow on the coastal plain without soil amendments. Also attracts minute pirate bugs, predatory plant bugs; dance, tachinid and hover flies; lady and soldier beetles; and predatory and parasitic wasps.

## Flowering Periods of Delaware Native Bee Plants

Common Name	Scientifc Name	Mar	Apr
Black Willow	Salix nigra		
Red Maple	Acer rubrum		
Canadian Serviceberry	Amelanchier canadensis		
Highbush Blueberry	Vaccinium corymbosum		
Wild Strawberry	Fragaria virginiana		
American Wild Plum	Prunus americana		
Golden Alexanders	Zizia aurea		
Black Raspberry	Rubus occidentalis		
Blackhaw	Viburnum prunifolium		
Wild Blue Lupine	Lupinus perennis		
Cockspur Hawthorn	Crataegus crus-galli		
Blackgum	Nyssa sylvatica		
Black Cherry	Prunus serotina		
Northern Dewberry	Rubus flagellaris		
Tall White Beard-tongue	Penstemon digitalis		
Silky Dogwood	Cornus amomum		
Common Milkweed	Asclepias syriaca		
Yellow Wild Indigo	Baptisia tinctoria		
Swamp Milkweed	Asclepias incarnata		
Black-eyed Susan	Rudbeckia hirta		
Blue Vervain	Verbena hastata		
Buttonbush	Cephalanthus occidentalis		
Wild Bergamot	Monarda fistulosa		
Winged Sumac	Rhus copallinum		
Ox-eye Sunflower	Heliopsis helianthoides		
Partridge Pea	Chamaecrista fasciculata		
Sweet Pepperbush	Clethra alnifolia		
Early Goldenrod	Solidago juncea		
New York Ironweed	Vernonia noveboracensis		
Spotted Horsemint	Monarda punctata		
Great Blue Lobelia	Lobelia siphilitica		
Three-nerved Joe-pye Weed	Eupatorium dubium		
Giant Sunflower	Helianthus giganteus		
Dense Blazing-star	Liatris spicata		
Common Boneset	Eupatorium perfoliatum		
Round-head Bush-clover	Lespedeza capitata		
Canada Goldenrod	Solidago canadensis		
New England Aster	Symphyotrichum novae-angliae		
Hairy Heath Aster	Symphyotrichum pilosum		

Мау	Jun	Jul	Aug	Sep	Oct
			_		
			Note:		_
			Tre	e and shrub flo	owering
			<i>tim</i>	es are shown ii	n green.
			Wa	dflower flower	-
			tim	es are shown i	n –
			- vel	low.	-
				1	



Red Maple Acer rubrum Tree Bloom: Red, Mar - Apr Height: 60 - 100 ft.

#### Attractiveness

Bees: Good Natural Enemies: Limited data Types attracted: Mason bees, mining bees, plasterer bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 5.4 – 7.1 Propagation: Containerized Seedling Availability: Good Natural habitat: Forests and low ground (P, C)

#### Notes

This fast-growing tree is known for its brilliant red fall foliage. Although it is windpollinated, the profuse early season flowers present nectar for bees at a time when few other plants are blooming. Hover flies are also known to visit the flowers.



**Canadian Serviceberry** *Amelanchier canadensis* Shrub Bloom: White, Apr - May Height: 15 - 25 ft.

Attractiveness Bees: Excellent Natural Enemies: Limited data Types attracted: Mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 5.6 – 7.5 Propagation: Containerized Seedling Availability: Good Natural habitat: Moist woods, fields, edges (C)

#### Notes

Also called shadbush, this deer-resistant shrub is a highly attractive pollen source for early spring mining bees and sweat bees. Natural enemies attracted include hover flies and tachinid flies. The fruits of *Amelanchier* species provide food for at least 25 species of eastern birds and numerous mammals.



**Buttonbush** *Cephalanthus occidentalis* Shrub Bloom: White, Jul - Aug Height: 6 - 12 ft.

Attractiveness Bees: Moderate Natural Enemies: Good Types attracted: Bumble bees, digger bees, leaf-cutter bees, long-horned bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 6.1 – 8.5 Propagation: Containerized Seedling Availability: Good

#### Natural habitat:

Coastal plain ponds, marshes, wet meadows (P, C)

#### Notes

The unusual spherical flower heads are visited most frequently by bumble bees and leaf-cutter bees that can reach the abundant nectar deep inside the tubular flower. Minute pirate bugs, dance flies, hover flies and parasitic wasps are also attracted. The plant needs plenty of moisture to thrive, and can tolerate complete flooding, often forming thickets at the edge of ponds and wetlands.



Sweet Pepperbush Clethra alnifolia Shrub Bloom: White, Jul - Sep Height: 6 - 10 ft.

#### Attractiveness

**Bees:** Excellent **Natural Enemies:** No data **Types attracted:** Bumble bees, large carpenter bees, leaf-cutter bees, sweat bees

#### Growth

Light: Part Shade to Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 4.5 – 7.0 Propagation: Containerized Seedling Availability: Good Natural habitat:

Swamps (C)

#### Notes

This deer-resistant shrub attracts large numbers of insects. Published records of bee species are few, but the plant produces ample nectar. Grows well in wet places and has attractive yellow fall foliage. The fruits are attractive to birds.



Silky Dogwood Cornus amomum Shrub Bloom: White, Jun – Jul Height: 6 - 10 ft.

#### Attractiveness Bees: Excellent Natural Enemies: Limited data

**Types attracted:** Bumble bees, large carpenter bees, leaf-cutter bees, mining bees, plasterer bees, small carpenter bees, sweat bees

Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 5.0 – 7.0 Propagation: Containerized Seedling Availability: Good Natural habitat: Swamps, wet meadows, marshes (P, C)

#### Notes

The best available bee records for this species are from *Cornus obliqua*, formerly considered a subspecies of C. *amomum*. As many as 20 species of bees have been collected on C. *obliqua* in a single day, and it is probable that C. *amomum* is similarly attractive. Hover flies, tachinid flies, and predatory wasps are also visitors.



**Cockspur Hawthorn** *Crataegus crus-galli* Shrub Bloom: White, May - Jun Height: 20 - 30 ft.

Attractiveness Bees: Good Natural Enemies: Limited data Types attracted: Bumble bees, mining bees, plasterer bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: : 4.5 – 7.2 Propagation: Containerized Seedling Availability: Moderate Natural habitat: Thickets, old fields, low ground, floodplains (P, C)

#### Notes

Hawthorns attract a number of spring-flying mining bees and sweat bees, as well as dance flies, hover flies, and predatory wasps. The thorny tree is not preferred by deer, and will grow in a wide range of soil types. Hawthorn thickets provide excellent nesting cover for a variety of songbirds.



Blackgum Nyssa sylvatica Tree Bloom: Green, May - Jun Height: 60 - 80 ft.

#### Attractiveness

**Bees:** Moderate **Natural Enemies:** No data **Types attracted:** Bumble bees, leaf-cutter bees, mining bees, plasterer bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Wet Soil Type: Clay, Loam, Sand Soil pH: 4.5 – 6.0 Propagation: Containerized Seedling Availability: Good Natural habitat: Woods (P. C)

#### Notes

A survey of the insects visiting blackgum blossoms in Maryland found 46 bee species. The tree is moderately palatable to deer and is favored as an ornamental for its brilliant orange-red autumn color.



American Wild Plum Prunus americana Shrub Bloom: White, Apr - May Height: 10 - 30 ft.

Attractiveness Bees: Excellent Natural Enemies: Limited data Types attracted: Bumble bees, long-horned bees, min-

ing bees, plasterer bees, small carpenter bees, sweat bees

Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Loam, Sand Soil pH: 5.0 – 7.0 Propagation: Containerized Seedling Availability: Moderate Natural habitat: Thickets, meadows, open

woods (P, C)

#### Notes

Attractive to spring mining bees and sweat bees, as well as dance flies, hover flies, tachinid flies, and predatory and parasitic wasps. The fruits are eaten by many birds, including quail, pheasant, robins, and woodpeckers.



**Black Cherry** *Prunus serotina* Tree Bloom: White, May – Jun Height: 50 - 80 ft.

Attractiveness Bees: Good Natural Enemies: Limited data Types attracted: Bumble bees, long-horned bees, mining bees, plasterer bees, small carpenter bees, sweat bees

Growth Light: Full Sun Moisture: Dry to Moist Soil Type: Loam Soil pH: 5.0 – 7.5 Propagation: Containerized Seedling Availability: Good Natural habitat: Woods, edges, old fields (P, C)

#### Notes

A valuable timber tree, and one of the foremost wildlife trees in the eastern U.S. It attracts a number of bee species, as well as dance flies, hover flies, and predatory wasps. The fruits are eaten by numerous birds and mammals; and while the palatability of the foliage to deer is low to moderate, some 200 species of butterflies and moths feed on the tree.



Winged Sumac Rhus copallinum Shrub Bloom: Yellow, Jul – Aug Height: 10 - 25 ft.

#### Attractiveness

Bees: Moderate Natural Enemies: Limited data Types attracted: Leaf-cutter

bees, long-horned bees, plasterer bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry Soil Type: Clay, Loam, Sand Soil pH: 5.3 – 7.5 Propagation: Containerized Seedling Availability: Good Natural habitat: Thickets, old fields, edges

(P, C)

#### Notes

One of the most common shrubs along field margins on the coastal plain, this species is often abundant enough to provide significant bee forage for sweat bees, the primary visitors. All sumacs are extremely good nesting sites for stem-nesting bees. Also attracts hover flies, tachinid flies, and predatory wasps.



**Northern Dewberry** *Rubus flagellaris* Woody vine Bloom: White, May - Jun Height: 2 - 3 ft.

#### Attractiveness Bees: Good

Natural Enemies: No data Types attracted: Bumble bees, leaf-cutter bees, longhorned bees, mason bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Dry to Moist Soil Type: Clay, Loam, Sand Soil pH: 5.0 – 7.0 Propagation: Bareroot, Containerized Seedling, Root Cuttings Availability: Limited Natural habitat: Dry open soils (P, C)

#### Notes

The berries, though small, are edible, and are also eaten by a wide variety of game birds, song birds, and mammals. The species is difficult to find commercially, but is common in the wild. All wild blackberries, dewberries, and raspberries (genus *Rubus*) are valuable bee plants and should be encouraged on the farm.



**Black Raspberry** *Rubus occidentalis* Shrub Bloom: White, May Height: 5 - 6 ft

#### Attractiveness Bees: Moderate

Natural Enemies: No data

**Types attracted:** Bumble bees, leaf-cutter bees, long-horned bees, mason bees, mining bees, small carpenter bees, sweat bees

## Growth

Light: Full Sun to Part Shade Moisture: Moist Soil Type: Loam Soil pH: 5.2 – 7.5 Propagation: Containerized Seedling, Bareroot Availability: Moderate Natural habitat: Thickets, old fields, edges (P, C)

#### Notes

Many stem-nesting bee species build nests in the canes of this and other *Rubus* species. They hollow out the soft pith and build chambers in which to lay their eggs. Black Raspberry is one of many eastern brambles that are excellent insect and wildlife plants.



Black Willow Salix nigra Tree Bloom: Yellow-green, Mar - Apr Height: 40 - 60 ft.

#### Attractiveness

**Bees:** Excellent **Natural Enemies:** No data **Types attracted:** Bumble bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 4.8 – 8.0 Propagation: Containerized Seedling Availability: Good Natural habitat: Marshes, wet meadows, ditches (P, C)

#### Notes

Early season mining bees and sweat bees depend on willow pollen as a major food source. The tree is also very attractive to dance, hover, and tachinid flies, and hosts a surprising diversity of butterfly and moth caterpillars. Other species of willows are also valuable, but Black Willow is readily available and does well in most any wet site. Deer palatability is low to moderate.



**Highbush Blueberry** Vaccinum corymbosum Shrub Bloom: White, Apr - May Height: 6 - 12 ft.

#### Attractiveness Bees: Excellent Natural Enemies: Limited data

**Types attracted:** Bumble bees, mason bees, mining bees, plasterer bees, small carpenter bees

#### Growth

Light: Full Sun to Part Shade Moisture: Moist to Wet Soil Type: Clay, Loam, Sand Soil pH: 4.7 – 7.5 Propagation: Containerized Seedling Availability: Good Natural habitat: Swamps and wet woods (P, C)

#### Notes

Blueberries are pollinated primarily by buzz-pollinating bumble bees. This species is a good choice for plantings in Delaware, but all *Vaccinum* species are valuable for early season bees. Hover flies also visit the flowers, and the fruits are eaten by at least 30 species of birds.



**Blackhaw** Viburnum prunifolium Shrub Bloom: White, Apr - May Height: 12 - 20 ft.

#### Attractiveness

Bees: Excellent Natural Enemies:

#### Limited data

**Types attracted:** Longhorned bees, mason bees, mining bees, plasterer bees, small carpenter bees, sweat bees

#### Growth

Light: Full Sun to Shade Moisture: Dry to Wet Soil Type: Clay, Loam Soil pH: 4.8 – 7.5 Propagation: Containerized Seedling Availability: Good Natural habitat: Rich woods, thickets, edges (P, C)

#### Notes

This species is highly attractive to short-tongued bees, especially mining bees, and also attracts good numbers of predatory hover flies, dance flies and tachinid flies. It grows well in a broad range of soils, and like other *Viburnum* species, is at least moderately deer resistant.

## Plants for Wet and Dry Sites

Bee Plants for Wet Areas (Ditches, swamp edges, wet meadows)		
Swamp Milkweed	Asclepias incarnata	
Three-nerved Joe-pye Weed	Eupatorium dubium	
Common Boneset	Eupatorium perfoliatum	
Giant Sunflower	Helianthus giganteus	
Great Blue Lobelia (piedmont)	Lobelia siphilitica	
New England Aster	Symphyotrichum novae-angliae	
Blue Vervain	Verbena hastata	
New York Ironweed	Vernonia noveboracensis	
Red Maple	Acer rubrum	
Canada Serviceberry	Amelanchier canadensis	
Buttonbush	Cephalanthus occidentalis	
Sweet Pepperbush (coastal plain)	Clethra alnifolia	
Silky Dogwood	Cornus amomum	
Black Willow	Salix nigra	

Bee Plants for Dry Areas (Sandy soils and drought prone areas)		
Common Milkweed	Asclepias syriaca	
Yellow Wild Indigo	Baptisia tinctoria	
Partridge Pea	Chamaecrista fasciculata	
Round-head Bush Clover	Lespedeza capitata	
Wild Blue Lupine (coastal plain)	Lupinus perennis	
Wild Bergamot	Monarda fistulosa	
Spotted Horsemint (coastal plain)	Monarda punctata	
Winged Sumac	Rhus copallinum	
Northern Dewberry	Rubus flagellaris	

## **Scientific Names**

Scientific Names of the Bees and Other Insects Listed in this Booklet				
Common Name	Family	Tribe	Genera	
Bees:				
Bumble bees	Apidae	Bombini	Bombus	
Digger bees	Apidae	Anthophorini	Anthophora, Habropoda, Svastra	
Large carpenter bees	Apidae		Xylocopa	
Leaf-cutter bees	Megachilidae		Megachile, Anthidium, Anthidiellum, and others	
Long-horned bees	Apidae	Eucerini	Melissodes, Synhalonia, Eucera	
Mason bees	Megachilidae	Osmiini	Osmia, Hoplitis	
Mining bees	Andrenidae		Andrena, Calliopsis, Perdita and others	
Plasterer bees	Colletidae		Colletes, Hylaeus	
Small carpenter bees	Apidae		Ceratina	
Sweat bees	Halictidae	All	Halictus, Agapostemon, Lasioglossum, and others	
Natural Enemies:				
Lacewings	Chrysopidae			
Parasitic wasps	Braconidae, Chalcididae, Cynipidae, Ichneumonidae, and many others			
Predatory wasps	Vespidae, Sphecidae			
Dance flies	Empididae			
Hover flies	Syrphidae			
Long-legged flies	Dolichopodidae			
Tachinid flies	Tachinidae			
Minute pirate bugs	Anthocoridae		Orius and others	

## **More Information**

A companion booklet, *Farm Management for Native Bees: a Guide for Delaware*, is available from the Delaware Department of Agriculture. Contact them at the address listed on page 26 to obtain a copy, or visit the website: http://dda.delaware.gov/plantind/pollinator.shtml

#### **Bee Use of Native Plants:**

Brooklyn Botanic Garden's New York Metropolitan Flora Project, Metropolitan Plant Encyclopedia www.bbg.org/sci/nymf/encyclopedia/index.html

Enhancing Beneficial Insects with Native Plants (MI). http://nativeplants.msu.edu

Insect Visitors of Illinois Wildflowers www.shout.net/~jhilty/

Loose, J.L., F.A. Drummond, C. Stubbs, S. Woods and S. Hoffman. 2005. *Conservation and management of native bees in cranberry*. Maine Agricultural and Forest Experiment Station Technical Bulletin 191. Orono, ME: University of Maine. www.umaine.edu/mafes/elec\_pubs/techbulletins/tb191.pdf

NAPPC Pollinator Conservation Digital Library http://libraryportals.com/PCDL

#### **Choosing Native Plants:**

Lady Bird Johnson Wildflower Center Native Plant Database www.wildflower.org/plants/

Missouri Botanical Garden's Kemper Center For Home Gardening Plantfinder www.mobot.org/gardeninghelp/plantfinder/

NRCS Plants Database: http://plants.usda.gov/

#### **Regional Resources:**

Delaware Native Plant Society (DNPS) www.delawarenativeplants.org

Delaware Native Plant Society. 2005. *Delaware native plants for landscaping and restoration: recommended species for the property owner and land steward. 2nd ed.* DNPS. 21 pp.

- McAvoy, W.A. and K.A. Bennett. 2001. *The flora of Delaware: an annotated checklist*. Dover, DE: Delaware Dept. of Natural Resources and Environmental Control, Division of Fish and Wildlife. 265 pp. Available for purchase at: www.dnrec.state.de.us/fw/floraform.pdf
- University of Delaware Cooperative Extension Native Plant Publications http://ag.udel.edu/extension/horticulture/index.htm

Maryland Native Plant Society (MNPS) www.mdflora.org

Adkins Arboretum: www.adkinsarboretum.org

## **More Information**

#### **Regional Resources:**

US Fish and Wildlife Service Bayscapes Program www.fws.gov/chesapeakebay/Bayscapes.htm

Native Plant Society of New Jersey: www.npsnj.org

Pennsylvania Native Plant Society (PNPS) www.pawildflower.org

Bowman's Hill Wildflower Preserve: www.bhwp.org

Virginia Native Plant Society (VNPS): http://vnps.org

Virginia Natural Heritage Program Native Plant Lists www.dcr.virginia.gov/natural\_heritage/nativeplants.shtml

#### **Planting for Pollinators:**

- The Xerces Society provides a wealth of information on pollinator conservation at their website: www.xerces.org
- MacCulloch, Bonnie. 2007. *Farming for Native Bees in Delaware*. Dover, DE: Delaware Department of Agriculture. Available from: http://dda.delaware.gov/plantind/pollinator.shtml
- Vaughan, M., M. Shepherd, C. Kremen and S.H. Black. 2007. *Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms*. 2nd ed. www.xerces.org/pubs\_merch/Farming\_for\_Bees.htm

Vaughan, M. and S.H. Black. 2006. Agroforestry Note 33: *Improving Forage For Native Bee Crop Pollinators*. USDA National Agroforestry Center. www.unl.edu/nac/agroforestrynotes/an33g07.pdf

#### **Establishment and Maintenance of Native Plantings:**

Michigan State University's Enhancing Beneficial Insects with Native Plants program http://nativeplants.msu.edu/getstarted.htm

Michigan DNR Wildflower Planting Guide www.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/landowners\_guide/ Habitat\_Mgmt/Backyard/Wildflower\_Planting.htm

Planting the Seed: A guide to establishing prairie and meadow communities in southern Ontario www.on.ec.gc.ca/wildlife/docs/doc-planting-prairie-e.html

Wildlife Habitat Fact sheets from Illinois DNR www.in.gov/dnr/fishwild/hunt/facts.htm

## Some Regional Native Plant Suppliers for Conservation Projects

**Note:** this list includes primarily wholesale suppliers that can provide large quantities of plants and seed to individuals enrolled in cost-share programs. Many additional retail native plant nurseries and garden centers sell native plants in smaller quantities to homeowners and gardeners. Consult your local native plant society or search the internet to locate additional suppliers.

#### **American Native Plants**

4812 E. Joppa Road Perry Hall, MD 21128 (410) 529-0552, wholesale (443) 552-7022, retail (410) 529-3883 fax retailnativeplants@comcast.net www.americannativeplants.net

#### **Chesapeake Natives**

annwing@ chesapeakenatives.org www.chesapeakenatives.org/

#### **Environmental Concern, Inc.**

P.O. Box P 201 Boundary Lane St. Michael's, MD 21663 (410) 745-9620 (410) 745-4066 fax horticulture@wetland.org www.wetland.org

#### **Ernst Conservation Seeds**

9006 Mercer Pike Meadville, PA 16335 (800) 873-3321 (814) 336-5191 fax ernst@ernstseed.com www.ernstseed.com

#### Go Native Tree Farm

2310 Chestnut View Drive Lancaster PA 17603 (717) 399-0195 (717) 380-1489 mobile www.gonativetrees.com

#### John S. Ayton State Tree Nursery

3424 Gallagher Road Preston, MD 21655 800/TREESMD (410) 673-2467 (410) 673-7285 fax anursery@dnr.state.md.us www.dnr.state.md.us/forests/ nursery/

#### North Creek Nurseries

388 North Creek Rd. Landenberg, PA 19350 (877) ECO-PLUG (610) 255-4762 fax order@northcreeknurseries.com www.northcreeknurseries.com

#### New Moon Nursery

13 Ways Lane Kennett Square, PA 19348 (888) 998-1951 (888) 998-1952 fax info@newmoonnursery.com www.newmoonnursery.com

#### Octoraro Native Plant Nursery

6126 Street Rd. Kirkwood, PA 17536 (717) 529-3160 (717) 529-4099 fax mail@octoraro.com www.OCTORARO.com

#### Pinelands Nursery, Inc.

323 Island Road Columbus, NJ 08022 (609) 291-9486 (609) 298-8939 fax sales@pinelandsnursery.com www.pinelandsnursery.com

#### Redbud Native Plant Nursery

1214 Middletown Road Glen Mills, PA 19342 (610) 358-4300 (610) 358-3330 fax catheris@mindspring.com www.redbudnativeplantnursery.com

## Sylva Native Nursery & Seed Co.

3815 Roser Road Glen Rock, PA 17327 (717) 227-0486 (717) 227-0484 fax sylvanat@aol.com www.sylvanative.com

#### Temple University Propagation Center

580 Meetinghouse Road Ambler, PA 19002 (215) 283-1330

# Contacts for Information on Cost-share and Technical Assistance Programs:

#### **DNREC:**

Shelley Tovell Private Lands Biologist DNREC Division of Fish and Wildlife 6180 Hay Point Landing Road Smyrna, DE 19977 Phone: 302-735-3600 Email: Shelley.Tovell@state.de.us

#### **USDA NRCS:**

Kent County Agriculture Center 800 Bay Road, Suite #2 Dover, Delaware 19901-4667 Phone: 302-741-2600 Fax: 302-741-0347

#### Sussex County Agriculture Center

21315 Berlin Road, Unit #3 Georgetown, Delaware 19947 Phone: 302-856-3990 Fax: 302-856-4381

#### New Castle County Agriculture Center

2430 Old County Road Newark, DE 19702 Phone: 302-832-3100 Fax: 302-834-0783

#### **DE Department of Agriculture:**

Faith Kuehn Plant Industries Administrator Delaware Department of Agriculture 2320 S. DuPont Highway Dover, DE 19901 Phone: 302-698-4500 Email: Faith.Kuehn@state.de.us



**CITATION:** Sarver, Matthew J., ed. 2007. *Delaware Native Plants for Native Bees*. Dover, DE: USDA NRCS and Delaware Department of Agriculture.

This booklet was prepared by Matthew Sarver, in collaboration with the DDA Pollinator Project Team: Dewey Caron, Faith Kuehn, Heather Harmon, Bonnie MacCulloch, and Robert Mitchell.

## **Photo Credits**

All images that appear in this brochure, except those in the public domain, are the property of the original photographer and are used here by direct permission or under the terms of the specified license.

David G. Smith's photos of Delaware native plants, used throughout much of this booklet, can be found on his website: www.delawarewildflowers.org

#### Front Cover:

Top row (l-r): New England Aster, *Symphyotrichum novae-angliae*, PA DCNR Forestry Archive, Bugwood.org (Licensed under: http://creativecommons.org/licenses/by/3.0/us/); Bumble bee (*Bombus* sp.) on Sweet Pepperbush, *Clethra alnifolia*, David G. Smith.

Middle row: Digger bee, *Svastra obliqua* on Aster, *Symphyotrichum* sp., Dan Tenaglia. Bottom row (l-r): Polyester bee, *Colletes eulophi* on Goldenrod, *Solidago* sp., Edward Trammel; Northern Dewberry, *Rubus flagellaris*, David G. Smith; Blue Vervain, *Verbena hastata*, David G. Smith.

#### **Back Cover:**

Soldier beetle *Chauliognathus* sp. and Skipper, Hesperiidae, on native Field Thistle, *Cirsium discolor*, David G. Smith.

#### Page:

- 1: Large carpenter bee, Xylocopa virginica on False Foxglove, Agalinis sp., Dan Tenaglia.
- **2:** Sweat bee, Halictidae on Spring Beauty, *Claytonia* sp., Edward Trammel; Long-horned bee, Melissodes druriella on Golenrod, *Solidago* sp., Edward Trammel.
- 4: Bee forage planting in Delaware, Randolph Ciurlino.

#### 6-20: All photos by David G. Smith except as noted below.

- 9: Dense Blazing-star, Frank Wouters, Wikimedia Commons. Licensed under: http://creativecommons.org/licenses/by/2.0/
- 10: Wild Blue Lupine, Steven Katovich, USDA Forest Service, Bugwood.org; Wild Bergamot, Dan Tenaglia.
- 12: New England Aster, Dan Tenaglia.
- 16: Red Maple, Dan Tenaglia.
- 17: Cockspur Hawthorn, Robert H. Mohlenbrock @ USDA-NRCS PLANTS Database / USDA SCS. 1991. Southern wetland flora: Field office guide to plant species. South National Technical Center, Fort Worth.
- 18: Black Gum, Jean-Pol Grandmont; American Wild Plum, Quentin Cronk.
- 20: High Bush Blueberry, Quentin Cronk.

#### **ACKNOWLEDGEMENTS:**

The following people assisted by providing information or data, reviewing the manuscript, or providing technical support: Sam Droege, USGS; Sally Griffith-Kepfer, NRCS; John Hilty; Rob Jean and Peter E. Scott, Indiana State University; Doug Landis, Michigan State University; Lauren Morgens; T'ai Roulston, University of Virginia; John Timmons, NRCS; Mace Vaughan, The Xerces Society. Layout: Jennie Hess, State of Delaware Printing and Publishing Office.

#### This booklet was made possible by funding from the USDA Natural Resources Conservation Service and the Delaware Department of Agriculture.

The data and information in this booklet, Delaware Native Plants for Native Bees, are provided "as is." Delaware Department of Agriculture (DDA) and the Natural Resources Conservation Service (NRCS) make no warranty, express or implied, to any user including without limitation the implied warranties of merchantability or fitness for a particular purpose of the information in this publication. DDA and NRCS will not be liable for special, incidental, consequential, indirect or other similar damages. Reference to commercial products, trade names, organizations, or businesses does not imply endorsement by DDA or NRCS or bias against those not mentioned.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

## Notes:



