Gardening to Please the Birds and the Bees

Gary Fish
Maine State Horticulturist
Maine Department of Agriculture, Conservation and Forestry

gary.fish@maine.gov
207-287-7545

Phish Photography
Pollinator-Friendly Gardens

- Plant diversity of flowering plants
- With overlapping bloom periods throughout the season
- Provide water (small puddles, plants that catch water and dew)
- Provide some shelter
- Replace invasive plants
Bee-Friendly Gardens have Shelter, Plant Diversity, Lots of Blooms, Water, Some Bare Soil
Social Behavior of Bees

- **Social**
  - 10% of species in the U.S.
  - Several generations in a nest at the same time
  - Cooperation in caring for young
  - Division of labor
  - Bumble and honey bees

- **Solitary**
  - 90% of species in the U.S.
  - Each female constructs and provisions her own nest
Foraging Selectivity

- Nectar - sugar and amino acids
- Pollen – protein
- Most gather nectar from several different flower species
  - Depends mostly on tongue length and skill
- Pollen collection is usually more selective
  - Some will use anything, others focus on one species of plant
Floral Resources

- Bee flowers
  - Bilateral symmetry
  - Tube-like or bell-shaped with a nectar reservoir
  - Complex to receive reward
  - Yellow, white, blue or purple with UV markers
Colors attract specific groups

- Bees like blue, purple, white and yellow
- Butterflies like orange, pink and red
- Beetles prefer big fleshy disk shaped smelly white and green flowers
- Wasps and flies like yellow, pink and white
Nesting

- Ground 70%
- Stem 30%
- Cavity
  - Bumble and honey bees
Nesting Resources – Ground Nesters

- Areas of bare or sparsely vegetated soil
  - Loose
  - Well drained
  - Full sun
  - Several yards across
- Flat and/or banked areas
Nesting Resources – Cavity Nesters

- Dead trees, snags, or fallen logs
- Base of bunch grasses
- Old rodent nests often found under grassy tussocks
Nesting Resources – Stem Nesters

• Pithy, soft centered or hollow stems
  • Sumac
  • Box elder
  • Elderberry
  • Raspberry
  • Allium
  • Asparagus
  • Sedum
  • Sunflower
**How to Create Habitat for Stem-nesting Bees**

**WINTER**

Leave dead flower stalks intact over the winter.

**SPRING**

Cut back dead flower stalks leaving stem stubble of varying height, 6 to 24 inches, to provide nest cavities. Female bees find cut or naturally-occurring open stems, start a nest, then lay an egg on the pollen balls. Larvae eat the pollen.

**SUMMER**

New growth of the perennial hides the stem stubble. Bee larvae develop in cut dead stems during the growing season.

**FALL**

Bees hibernate in stems during the winter.

**WINTER**

Adult bees emerge and start nests in newly cut dead stems or in naturally-occurring open stems.

Graphics and content: Coleen Satyshur, Elaine Evans, Heather Holm, Sarah Foltz-Jordan
Nests for Native Bees

www.xerces.org
Eight things you can do to restore the ecosystem in your yard:

- Cut your lawn in half
- Avoid senseless mowing
- Remove invasive species from your property
- Use keystone plants
- Build a landscaped layered with plants
- Put motion sensors on your security lights
- Minimize reliance on pesticide use
- Share these ideas with your neighbors
Minimize lawn areas
Mow or bush hog ½ the meadow each year
Invasive plants

https://www.maine.gov/dacf/php/horticulture/invasiveplants.shtml
### Top Keystone Plant Genera in Northern Forests – Ecoregion 5

A genus is a taxonomic category of plants that contains one or more species of plants with similar characteristics. Species within each genus have adapted to local conditions and are the appropriate native species or varieties suited to a specific ecoregion.

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Plant Genus</th>
<th>Sample of Common Species (not all encompassing)</th>
<th># Caterpillar Species that Use this as a Host Plant</th>
<th># of Pollen Specialist Bee species that Rely on this Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees</td>
<td>Quercus</td>
<td>White oak (Quercus alba), Black oak (Quercus alba)</td>
<td>995</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prunus</td>
<td>American plum (Prunus americana), Black cherry (Prunus serotina), Chokecherry (Prunus virginiana)</td>
<td>909</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Betula</td>
<td>Yellow birch (Betula alleghaniensis), Paper birch (Betula papyrifera)</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Populus</td>
<td>American aspen (Populus tremuloides), Balsam poplar (Populus balsamifera)</td>
<td>557</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Morus</td>
<td>Sweet crabapple (Malus coronaria)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acer</td>
<td>Silver maple (Acer saccharinum), Sugar maple (Acer saccharum)</td>
<td>276</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alnus</td>
<td>Gray alder (Alnus incana)</td>
<td>205</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pinus</td>
<td>Red pine (Pinus resinosa), Eastern white pine (Pinus strobus)</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>Shrubs</td>
<td>Vaccinium</td>
<td>Lowbush blueberry (Vaccinium angustifolium), Cranberry (Vaccinium macrocarpon)</td>
<td>276</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Salix</td>
<td>Pussy willow (Salix discolor), Prairie willow (Salix humilis), Black willow (Salix nigra)</td>
<td>597</td>
<td>12</td>
</tr>
<tr>
<td>Flowering Perennials</td>
<td>Solidago</td>
<td>Canada goldenrod (Solidago canadensis), Gray goldenrod (Solidago nemoralis), Giant goldenrod (Solidago gigantea)</td>
<td>120</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Symphyotrichum</td>
<td>Caltco aster (Symphyotrichum latifolium), Swamp aster (Symphyotrichum puniceum), New England aster (Symphyotrichum novae-angliae)</td>
<td>8</td>
<td>16</td>
</tr>
</tbody>
</table>

https://www.nwf.org/Garden-for-Wildlife/About/Native-Plants/keystone-plants-by-ecoregion
Plant in layers

Overhead canopy of deciduous and evergreen trees provide wildlife with food sources, nesting cover and shelter from the elements.

Minimal use of lawn area, in relation to surrounding landscape.

Wide plant buffer next to water’s edge will intercept sediments and filter out nutrients that run off the land.

Layers of vegetation provide good habitat structure.

Diversity of native plants supports a diverse food web.

Soil is protected with native groundcovers and shrubs.
Turn off the lights
Spare the Sprays. Even Organic Ones

Soaps and Oils, only when directly sprayed upon the pollinator

Toxicity of Common Organic Pesticides to Pollinators

<table>
<thead>
<tr>
<th>PESTICIDE</th>
<th>Non-Toxic</th>
<th>Low Toxicity</th>
<th>Highly Toxic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insecticides/Repellants/Pest Barriers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacillus thuringiensis (Bt)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beauveria bassiana</td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Carya pomonella granulosis</td>
<td>✔️</td>
<td></td>
<td>✔️</td>
</tr>
<tr>
<td>Diatomaceous Earth</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Garlic</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Insecticidal Soap</strong></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Kaolin Clay</strong></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Neem</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Horticultural Oil</strong></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrethrians</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Rotenone</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Sabadilla</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Spinosad</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Herbicides/Plant Growth Regulators/Adjuvants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjuvants</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Corn Gluten</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Gibberellic Acid</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Horticultural Vinegar</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Fungicides</strong></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Copper</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Copper Sulfate</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Lime Sulfur</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Sulfur</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

Eric Mader – The Xerces Society for Invertebrate Conservation
Many great plant choice sources today

https://www.audubon.org/native-plants
Many great plant choice sources today
Many great plant choice sources today

https://www.nwf.org/NativePlantFinder/

Bring your garden to life.
Many great plant choice sources today

https://plantfinder.nativeplanttrust.org/Plant-Search
Check any box below to find only plants having the specific characteristic(s). Otherwise, leave all boxes unchecked to maximize your search results based on the criteria above.

https://plantfinder.nativeplanttrust.org/Plant-Search
<table>
<thead>
<tr>
<th>Cultivation Status</th>
<th>Exposure</th>
<th>Soil Moisture</th>
<th>Ecoregion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivar</td>
<td>Sun</td>
<td>Dry</td>
<td>(58) Northeastern Highlands</td>
</tr>
<tr>
<td>Selection</td>
<td>Part Shade</td>
<td>Average</td>
<td>(59) Northeastern Coastal Zone</td>
</tr>
<tr>
<td>Species</td>
<td>Shade</td>
<td>Wet</td>
<td>(82) Acadian Plains and Hills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ornamental Interest</th>
<th>Attracts Wildlife</th>
<th>Tolerance</th>
<th>Additional Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Bloom</td>
<td>Attracts Bees</td>
<td>Deer/Rabbit Resistant</td>
<td>Edible</td>
</tr>
<tr>
<td>Summer Bloom</td>
<td>Pollinator Powerhouse Plant</td>
<td>Drought Tolerant</td>
<td>Low Maintenance</td>
</tr>
<tr>
<td>Fall Bloom</td>
<td>Attracts Butterflies</td>
<td>Salt Tolerant</td>
<td>Spring Ephemeral</td>
</tr>
<tr>
<td>Summer Fruit</td>
<td>Host Plant</td>
<td>Urban Environment</td>
<td>Dioecious (fruits only on female plants)</td>
</tr>
<tr>
<td>Fall/Winter Fruit</td>
<td>Attracts Songbirds</td>
<td>Compaction Tolerant</td>
<td>Fragrant</td>
</tr>
<tr>
<td>Fall Foliage</td>
<td>Attracts Hummingbirds</td>
<td>Landscape Use</td>
<td>Erosion Control/Soil Stabilization</td>
</tr>
<tr>
<td>Winter Interest</td>
<td>Other Pollinators/Wildlife</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and/or Evergreen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landscape Use</th>
<th>Attractive Fall Foliage and/or Ornamental Fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundcover</td>
<td>Red Fruit</td>
</tr>
<tr>
<td>Hedge/screening</td>
<td>Red to Purple Fall Foliage</td>
</tr>
<tr>
<td>Massing</td>
<td>Orange to Brown Fall Foliage</td>
</tr>
<tr>
<td>Specimen</td>
<td>Bright Yellow to Bronze Fall Foliage</td>
</tr>
<tr>
<td>Rain Garden</td>
<td>Blue Fruit</td>
</tr>
<tr>
<td>Meadow garden</td>
<td>Multi Color Fall Foliage</td>
</tr>
<tr>
<td>Naturalize</td>
<td>Purple to Black Fruit</td>
</tr>
<tr>
<td>Rock garden</td>
<td>White Fruit</td>
</tr>
<tr>
<td></td>
<td>Orange to Yellow Fruit</td>
</tr>
</tbody>
</table>
https://plantfinder.nativeplanttrust.org/Plant-Search

**Growth Habit**

- Compact/Clumping
- Spreading/Suckerling

- Show only plants having **ALL** checked characteristics above
- Show plants having **ANY** checked characteristics above

[BEGIN SEARCH]
"Pollinator Powerhouse Plant" is a designation for native plant species that support a proportionally large number of caterpillar species: woody plants qualify as pollinator powerhouses if they support 75 or more species of lepidopterans; herbaceous plant species qualify if they support 15 or more species of lepidopterans.

https://plantfinder.nativeplanttrust.org/Plant-Search
Aquilegia canadensis
red columbine

Asclepias exaltata
poke milkweed

Asclepias incarnata
swamp milkweed

Asclepias purpurasecens
purple milkweed

Asclepias syriaca
common milkweed

Asclepias tuberosa
butterfly milkweed

Baptisia tinctoria
yellow wild indigo

Caltha palustris
marsh marigold

https://plantfinder.nativeplanttrust.org/Plant-Search
Echinacea purpurea – Purple Coneflower

Speyeria cybele - Great Spangled Fritillary and Vanessa cardui - Painted Lady

Homoeosoma electellum – Sunflower Moth

Halictidae – Sweat Bee
Eupatorium maculatum – Spotted Joe Pye Weed

Arctia caja – Great Tiger Moth

Bombus insularis – Indiscriminate Cuckoo Bumble Bee
Asclepias incarnata – Swamp Milkweed

Sphex ichneumoneus – Great Golden Digger Wasp
Asclepias syriaca – Common Milkweed

Epistrophe grossulariae - Hover fly
Lobelia cardinalis – Cardinal Flower

Archilochus colubris – Ruby-throated Hummingbird
*Symphyotrichum nova angliae* – New England Aster

*Bombus impatiens* – Impatient Bumble Bee

*Syrphus ribesii* - Hoverfly
**Rudbeckia hirta** – Blackeyeded Susan

*Phidippus clarus* – Jumping Spider

*Chlorochlamys chloroleucaria* – Blackberry Looper

*Agapostemon virescens* – Green Metallic Bee

*Misumena vatia* – Goldenrod Crab Spider
Carex pensylvanica – Pennsylvania Sedge

Euphyes vestris - Dun Skipper
Geranium maculatum – Spotted Geranium

Apis mellifera – Honey Bee

Heliothis virescens - Tobacco Budworm
Heliopsis helianthoides – False Sunflower

*Chlosyne nycteis* - Silvery Checkerspot
Monarda fistulosa – Wild Bergamot

Unknow Microlep

Pyrausta signatalis – Monarda caterpillar
Penstemon digitalis - Beardtongue

Osmia bucephala
Bufflehead Mason Bee

Elaphria chalcedonia
Chalcedony Midget
Phlox subulata – Creeping Phlox

Hemaris diffinis – Snowberry Clearwing Moth
Schizachryium scoparium – Little Bluestem

Polites origenes – Crossline Skipper
Solidago canadensis - Canada Goldenrod
Veronicastrum virginicum – Culver’s Root

Agapostemon splendens - Brown-winged Striped-Sweat bee

Bombus affinis – Rusty Patched Bumble Bee

SUSAN DAY/UW-MADISON ARBORETUM
www.illinoiswildflowers.info
Vaccinium corymbosum – Highbush Blueberry

Bombus impatiens – Impatient Bumble Bee

Monoleuca semifascia – Pin-striped Slug Moth
Vaccinium angustifolium – Lowbush Blueberry

Bombus ternarius
- Red-Tailed Bumble Bee

Itame argillacearia – Blueberry Spanworm
Gaylussacia baccata – Black Huckleberry

Andrenid bee

Sphinx Gordius – Apple Sphinx

Pangrapta decoralis – Decorated Owlet
Lindera benzoin - Northern Spicebush

Celastrina ladon
- Spring Azure

Papilio Troilus – Spicebush Swallowtail

Hermit Thrush
Quercus spp. - Oaks

- Quercus alba – White Oak
- Quercus rubra – Red Oak
- Anisota senatoria - Orangestriped Oakworm
- Peridea angulosa – Angulose Prominent
**Acer Spp. - Maples**

- **Acer rubrum** – Red Maple
- **Acer pensylvanicum** – Striped Maple
- **Speranza pustularia** – Lesser Maple Spanworm
- **Malacosoma disstria** – Forest Tent Caterpillar
Where to Buy Native Plants

The native plant movement is gaining traction in much of the U.S. — and that is fantastic! It can still be difficult, though, to source local native plants and seeds; so to help, we’ve carefully curated the following directory of where to buy northeastern native plants by state, including:

- Wholesale and retail nurseries that specialize in or include a wide selection of native plants
- Native plant sales hosted by nonprofits and co-ops annually or seasonally

While we include the highest quality plant nurseries in this directory, it is still important that you do your own research to find out what native plants are in stock, if the plants are grown from seed, and if the nurseries use...
Pest management resources

Maine Dept Agriculture: Gotpests.org

UMaine Extension: http://pmo.umext.maine.edu/homeowner/
Resources

https://homegrownnationalpark.org/tallamys-hub-1
Resources
Resources

- https://www.half-earthproject.org/
Apiary (Honey Bee) Program

Maine Beekeeper Survey 2021/2022

Data collected will be used to summarize beekeeping practices and losses in the State of Maine for the 2021/2022 beekeeping season. All responses are confidential. This survey should take about 15-minutes and we ask that you please provide information about honey bee colonies that you owned from April 2021 - April 2022.

A summary of the survey can be found on the Maine Department of Agriculture, Conservation and Forestry Apiary website mid-July 2022 and will be presented at the 2022 Maine State Beekeepers Annual Meeting.

Take the Survey

The purpose of the Apiary Program is to prevent the introduction and/or spread of regulated honey bee diseases, parasites, and undesirable genetic material in resident and migratory honey bee colonies, as well as encourage and maintain interstate movement of honey bees for crop pollination and honey production.

On this page:
- Literature: Invasive and Non-native
- Education: Training and Events
- Publications: Resources
- Bees & Pollinators
- Exotic Fungus

Resources

Questions?
gary.fish@maine.gov
207-287-7545