

Gardening for Pollinators



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Restoring people and places

Gardening for Pollinators

A How-To Guide

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by Jenna Henderson and Bethany Winz

With thanks to:
Master Gardeners of Davidson County
University of Tennessee Extension – Davidson County
Nashville Natives plant nursery
Belmont University Biology Department

Special thanks to:
Cooper Breeden, David Cook, Patty Ghertner, and Caroll Marrero for their support of the Nashville Pollinator Project, and to Patty for her substantial contributions to this guide.

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Introduction: Why Pollinator Gardens?

Pollinators are as important as sunlight, soil, and water to the reproductive success of over 75% of the world's flowering plants. They are crucial to the production of most fruits, nuts, and berries that people and wildlife eat. Humans depend on pollinators for one in three bites of our food.ⁱ



Pale swallowtail

Pollination happens when pollinators (or the wind) move pollen grains between the male and female parts of flowers of the same species, resulting in viable fruit or seeds. Of the roughly 200,000 species of pollinators worldwide, the vast majority are insects.ⁱⁱ

Around the world, native pollinator and domesticated honey bee populations are declining due to disease, pesticide use, habitat loss, and habitat fragmentation.ⁱⁱⁱ Fortunately, each of us can do something to help. We all live somewhere, and we all can be stewards of the earth where we are. Whether you own a home with a two-acre yard or rent an apartment with a small balcony, you can give pollinators the food and shelter they need.

The goal of this guide is to help you make your space a refuge for pollinators by providing the plants they need to survive. The goal is also to help you experience the joy of knowing your place better. Take time to stop and enjoy your garden, and observe the small, essential, and intricate pollinators that show up in your yard. Small acts of stewardship – of caring – really do matter.



Bumblebee on aster

Why Neighborhoods?

Habitat is not something “out there.” It is something we must protect and support right where we are in our neighborhoods and yards. According to Douglas Tallamy, “We have turned 54% of the lower 48 states into cities and suburbs, and 41% more into various forms of agriculture. That’s right: we humans have taken 95% of nature and made it unnatural.”^{iv}

According to Dr. Joseph Wilson, a professor at Utah State University, “while some of the 4,000 species of native bees in North America can fly for miles, others are less than a quarter of the size of a honeybee, and can only fly a couple of hundred feet at a time.”^v

Concentrating pollinator-friendly plants in urban and suburban neighborhoods and along streets creates important habitat pathways for these pollinators.

A Rocha is developing resources to help inspire and organize neighbors, friends, or church communities to create pollinator habitats together. To get ideas and ask questions about throwing a Pollinator Garden Party, hosting an educational event, or organizing a planting day, visit the A Rocha community at community.arocha.us.



Clouded sulphur on aster

What Do Pollinators Need?

Pollinators need plants with high quality pollen, nectar, and plant parts they can eat. **Native plants are best at meeting this need because they are edible by native insects.**^{vi} Research has shown that alien (non-native) ornamental plants support 29 times less biodiversity than native ornamentals.^{vii} A yard with a diverse mix of native trees, shrubs, and flowering plants is a rich habitat full of life. It is a landscape with a key element of a healthy ecosystem – insects.

The idea that we want a landscape attractive to insects can go against common landscaping practice, but insects are an essential part of the web of life. Without them, most higher life forms would not exist.^{viii}

Our choices about what to plant are more important than ever. When we choose life-supporting native plants, we help strengthen the web of life. We not only give pollinators a home, we contribute to the biodiverse ecosystem we all rely on for life.

Dr. Doug Tallamy's research confirms the domino effect that planting native plants for pollinators can have for higher life forms:

"Our studies have shown that even modest increases in the native plant cover on suburban properties significantly increases the number and species of breeding birds, including birds of conservation concern." –bringingnaturehome.net^{ix}



Bumblebee on zinnia

If you build it, they will come! Here are some of the key components of a pollinator garden:

Food – Pollinators need pollen and nectar, preferably from nutrient dense native plants. Some pollinators also need resins and oils secreted by native plants. Butterflies also need the leaves of host plants to eat while in the caterpillar stage.

Shelter – Pollinators also need secure places for nesting and breeding such as grasses, bare patches of ground, dead stalks, or a bee nesting block.

Water – Provide a saucer of water or patch of bare, moist soil in your garden.

Range of Bloom Time – The longer plants flower in your garden, the longer you'll support pollinators. Plan for maximum range of bloom time with flowers emerging in early spring and continuing through summer into late fall.

Colors and Shapes – Go for diversity of flower colors and shapes to attract a variety of pollinators. Planting clusters of the same plant will increase the visibility of blooms to pollinators and improve their foraging efficiency.

Avoid Cultivars and Hybrids – Plant breeding and selection can reduce the amount of pollen and nectar available to pollinators. Changes to the flower color and the shape, such as double blooms, can also be detrimental to pollinators.^x



Hunt's bumblebee on salvia

A New Garden Aesthetic – Abundant Life

When you create habitat for pollinators, you are creating polyculture (multiple species of one plant or animal in one place). Polyculture mimics the natural diversity of healthy ecosystems. While there is freedom to express your personality through your garden design and maintenance, in general you are not striving for what is commonly considered a “perfect” yard or lawn. You are creating a living landscape.

You might need to adapt the way you think of “caring” for your yard. Don’t be surprised if insects feed on some of your plants. In fact, that’s the point! Many caterpillars need to feed on host plants to survive, so it’s important to allow for some superficial plant damage.

Chemical-Free Pest Management

While agricultural pesticide use is a well-documented threat to pollinators, research is increasingly showing that pesticide use at home is also harming pollinator populations.^{xi} As you experience the beauty of a diverse array of plants and insects, you might notice that beneficial insects (like ladybugs, which feed on aphids), birds, and bats serve as natural pest management.

Avoid using pesticides since they are counterproductive to creating a healthy and safe habitat for pollinators. If you do need to manage mosquitos, first remove all standing water you can (buckets, gutters, etc.) The best and most pollinator-friendly way to control mosquito populations is to kill them at the larval stage. To do this, add Bti (Mosquito Bits & Dunks) to water in your yard. Mosquitos will breed here, and then the larva will eat the Bti, which will eliminate them before they can mature. These products can be used in standing water already on your property or in a bucket you fill with water (plus straw) for this purpose.



Silver-spotted skipper

Planting Your Garden

Preparing a new bed – We recommend using organic methods such as cardboard, vinegar, sun solarization, and hand digging to rid the ground of weeds.

Adding plants to an existing bed – Pay attention to the light (sun or shade) and soil (dry or moist), and chose your plants accordingly.* Make sure there's enough room to plant your plants in clusters (rather than alone or in rows) to increase visibility and foraging efficiency.

How to Plant Potted Plants and Plugs – Instructions provided by Andy Sudbrock of Nashville Natives plant nursery.

1. Clear weeds and undesired vegetation from the planting area. A clean, weed free site will result in a clean, weed free garden.
2. Remove plants from their tray and gently break up the root ball if root bound. You may want to dip the roots in water prior to planting.

3. Dig planting holes to the same depth as the soil volume of the plug or root ball.
4. Plant the plug and return the soil to the planting hole around the roots. Gently push the soil down to have firm soil to root contact.
5. Water thoroughly and deeply after planting.
6. Add 1-2 inches of mulch around the plants. It is best to use natural mulches such as shredded leaves, compost, pine fines, or pine mulch. Avoid any mulches that have been treated with any chemicals or dyes. If desired, you can lay down newspaper (2 or 3 sheets thick) between plants before you put down the mulch.
7. The newspaper will prevent weed seeds from germinating while the native perennials take root and grow.
8. To prevent rot, keep all soil and mulch from piling up around plant stems.
9. Sit back and enjoy your native pollinator garden.

Spacing – Be sure to look at the dimensions for your specific plants when planting. Space according to mature size. Overcrowding can cause future problems. *

Starting from Seed – You can start your pollinator garden from seed. Some seeds will do best if planted in the fall, while others prefer spring planting. For a list of regional pollinator garden seed mixes and to learn where to buy seeds, visit xerces.org/pollinator-seed.



Honey bee on cosmos

**Missouri Botanical Garden is an excellent online resource for plant spacing, sun, and soil requirements (search online for "Missouri botanical garden plant finder")*



Painted lady on zinnia

Garden Maintenance

Mulch – Seasonal application of mulch between plants will help control weed growth. We recommend natural mulches such as shredded leaves, compost, pine chips, pine straw, or rocks. If your soil quality is poor, you may add compost or other organic amendment prior to planting or top dress once a year. Most native perennials will grow quite well in average to poor soil, however, so amending the soil is usually not necessary.

Water – Water the plants during spells of hot, dry weather. Deep, infrequent watering is recommended over light, frequent watering. Once plants are established (1-2 years), watering should not be needed often or at all.

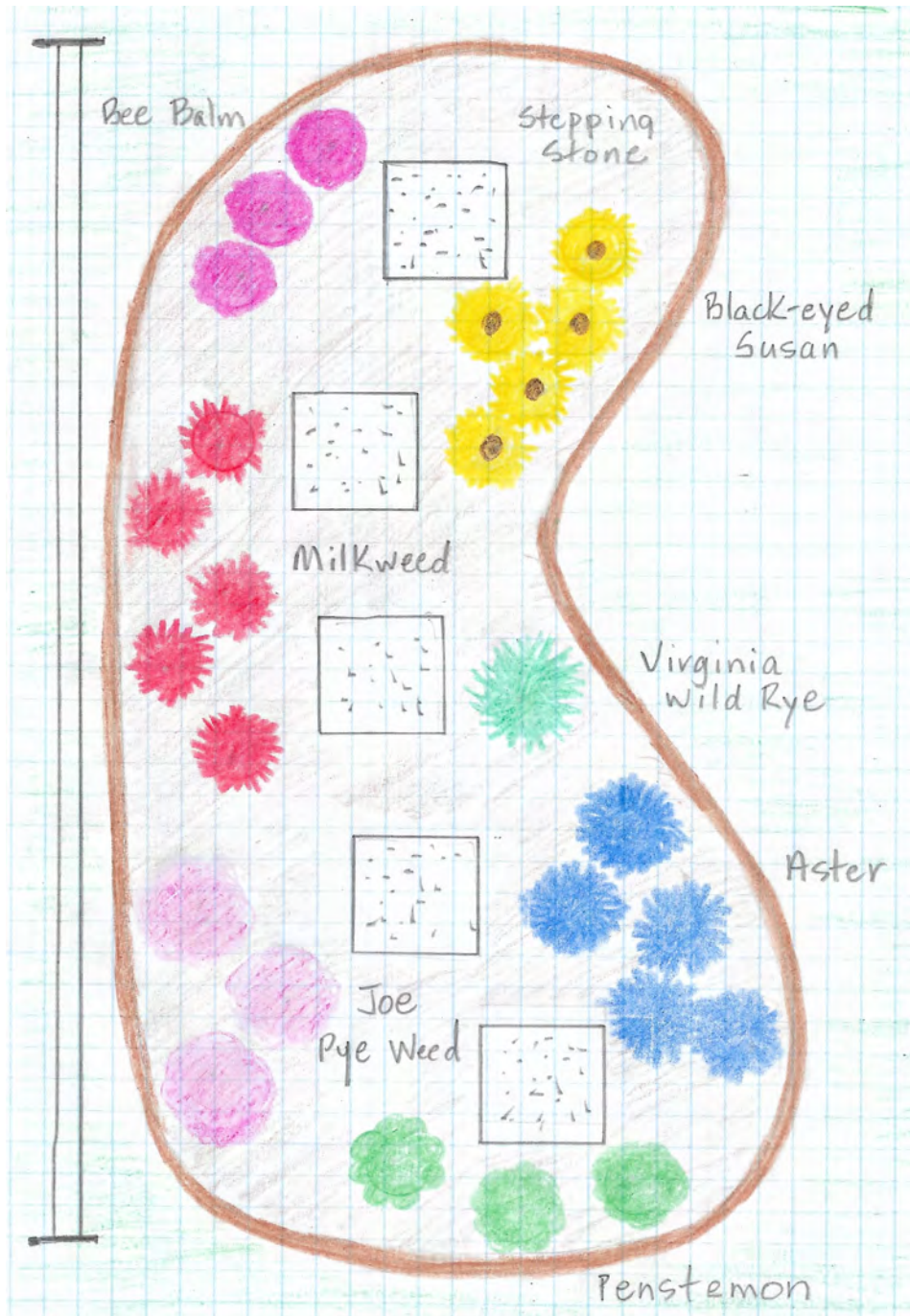
Fertilizers, Pesticides, and Other Chemicals – Do not fertilize or apply chemicals to your native pollinator garden. Native plants are tough and should not need fertilizer when they are planted in the right place for their sun and soil requirements. We recommend no pesticides since pesticides are not targeted and are detrimental to all organisms (including pollinators). The motto to “first do no harm” is imperative when considering the maintenance and care of your pollinator garden. Especially avoid neonicotinoids, which are systemically absorbed by the plant and attack the nervous system of insects. These insecticides can remain active in treated plants for years.

Winter – Leave stems standing through the winter and, if desired, cut down in the spring, leaving cut stems where they fall. This will allow the plants to seed themselves into any bare areas. Dead stalks and stems are where some pollinators lay eggs and overwinter. Letting the stems be will allow new life to emerge in the spring.

Troubleshooting – If your plants are not thriving, they could be getting too much sun or shade, they could be planted too closely, or your soil could be too wet or too dry. Post pictures of what you're seeing in the Conservation forum on the A Rocha Community (community.arocha.us) for suggestions and input.

Sample Garden Design

This design template is for your inspiration and guidance. The plants featured are native to the southeast.





Bumblebee on Zinnia

Sourcing Plants

Pollinators will be best supported by a garden full of plants native to your area (see list below for some suggestions). When purchasing plants, look for plants grown without neonicotinoids or other pesticides.

For a list of native plant nurseries in your area, visit xerces.org/pollinator-resource-center and select your region.

To have native plants shipped to you, visit www.izelplants.com.

Note: When planting milkweed, **do not plant *Asclepias curassiva***. This variety of Milkweed can be harmful to Monarch butterflies.^{xii}



Black-eyed Susan (Rudbeckia hirta)



Bumblebee on aster

Top Native Plants for Pollinator Gardens

These plants, which are listed in the order in which they bloom throughout the year, includes some of the most pollinator-friendly plants for different US regions.^{xiii} The suggestions below come from the Xerces Society. Visit xerces.org/pollinator-conservation/plant-lists and check out the recommended books and websites on page 20 for more information about these and other pollinator-friendly plans for your area.

Great Lakes Region

Beardtongue (*Penstemon digitalis*)
 Butterfly milkweed (*Asclepias tuberosa*)
 Wild bergamot (*Monarda fistulosa*)
 Prairie blazing star (*Liatris pycnostachya*)
 New England aster (*Symphyotrichum novae-angliae*)

Maritime Northwest Region

Bigleaf lupine (*Lupinus polyphyllus*)
 Slender clarkia (*Clarkia gracilis*)
 Large-flowered collomia (*Collomia grandiflora*)
 Showy milkweed (*Asclepias speciosa*)
 Canada goldenrod (*Solidago canadensis*)

Southeast Region

White wild indigo (*Baptisa alba*)
 Butterfly milkweed (*Asclepias tuberosa*)
 Bee balm (alt. wild bergamot) (*Monarda fistulosa*)
 Joe pye weed (*Eutrochium fistulosum*)
 New England aster (*Symphyotrichum novae-angliae*)

Southern Plains Region

Dew Flower (*Penstemon cobaea*)
 Blanketflower (*Gaillardia pulchella*)
 Narrowleaf coneflower (*Echinacea angustifolia*)
 Dotted blazing star (*Liatris punctata*)
 Giant goldenrod (*Solidago gigantea*)

Mid-Atlantic Region

Beardtongue (*Penstemon digitalis*)
Butterfly milkweed (*Asclepias tuberosa*)
Mountain mint (*Pycnanthemum* spp.)
Blazing star (*Liatis spicata*)
Rough goldenrod (*Solidago rugosa*)

Midwest Region

Wild geranium (*Geranium maculatum*)
Pale purple coneflower (*Echinacea pallida*)
Culver's root (*Veronicastrum virginicum*)
Yellow giant hyssop (*Agastache nepetoides*)
Gray goldenrod (*Solidago nemoralis*)

Northeast Region

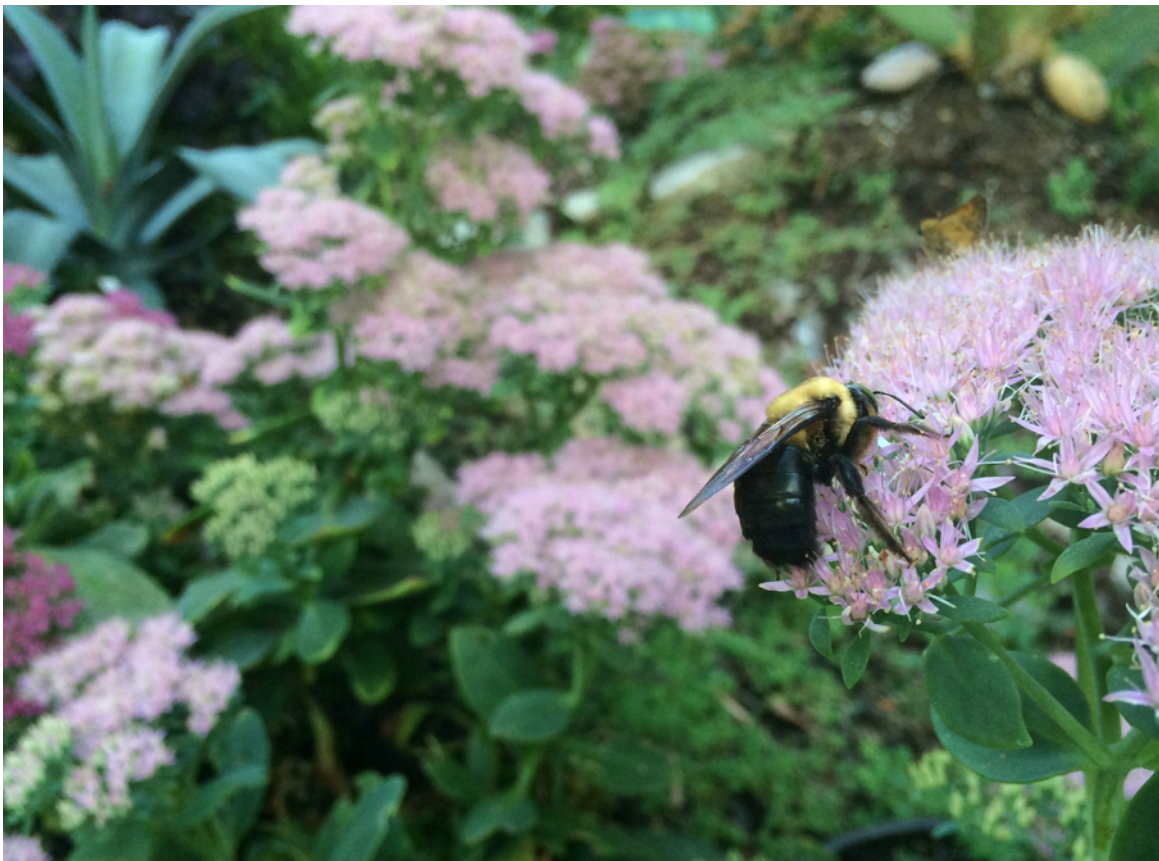
Golden alexanders (*Zinia aurea*)
Swamp milkweed (*Asclepias incarnata*)
Wild bergamot (*Monarda fistulosa*)
Cardinal flower (*Lobelia cardinalis*)
Calico aster (*Symphotrichum lateriflorum*)

California

Baby blue eyes (*Nemophila menziesii*)
Elegant clarkia (*Clarkia unguiculata*)
Narrowleaf milkweed (*Asclepias fascicularis*)
Common sunflower (*Helianthus annuus*)
California goldenrod (*Solidago californica*)

Florida

Manyflower beardtongue (*Penstemon multiflorus*)
Butterfly milkweed (*Asclepias tuberosa*)
Scarlet Sage (*Salvia coccinea*)
Leavenworth's coreopsis (*Coreopsis leavenworthii*)
Seaside goldenrod (*Solidago sempervens*)



Carpenter bee on sedum

Annual Plants

While we fully endorse the use of perennial native plants for pollinator gardens, there are some annual, noninvasive, non-native plants that also feed pollinators. In Tennessee, zinnias, marigolds, borage, lantana, dill, and some varieties of sedum support pollinators. These plants and other noninvasive annuals can be selectively added to your garden or yard and will sometimes resow themselves and appear for years to come.

Shrubs and Trees

Native shrubs and trees are also important sources of food and shelter for pollinators. To learn what trees and shrubs to include in your landscaping, visit:

<https://www.xerces.org/pollinator-conservation/plant-lists/>.

Citizen Science

Citizen science is a way for ordinary people to report the plants, animals, and insects they see around them. [iNaturalist.org](https://www.inaturalist.org) makes it easy for you to become a citizen scientist. We invite you to join iNaturalist and link to “A Rocha Pollinators” under the Projects tab. You can also upload photos of any non-cultivated insects, plants, or animals you see, and they will become part of nation-wide efforts to track biodiversity. The site also connects you to a global community of scientists and naturalists who will help identify what you see in your garden and beyond.

Photography

One of the easiest ways to document what visits your pollinator garden is to take photos. When photographing, get as much of the insect (or animal) in focus as possible. Amazon and other retailers have inexpensive smartphone macro lens attachments available for purchase to help with this, but most smartphones now take high quality photos which can easily be cropped and uploaded to iNaturalist for identification (use the smartphone iNaturalist app).



Honey bee

Native Pollinators

Once you have planted your pollinator garden, we encourage you to enjoy it by spending time in it! You'll be amazed at the diversity of creatures that find their way to your yard. This pollinator list will help you begin to name and recognize what you see.^{xiv} Don't forget to add your observations to iNaturalist to learn more about what species are coming to your garden.

Bees

There are 4,000 documented species of native bees in the United States.^{xv} These are some broad categories of bees:



Bumblebee

Colony nests underground

49 species in the United States

Vary in size and color patterns^{xvi}

Large, usually stout and hairy



Carpenter bee^{xvii}

Nests in trees or frame buildings

Same size or bigger than a bumble bee

Has a black, shiny abdomen



Sweat bee^{xviii}

Behavior – varies, solitary to social

Coloration varies, often dull to metallic black or green

Typically slender



Mason bee^{xix}

Solitary

Nests in wood holes

Smaller than a honey bee

Often a shiny dark blue



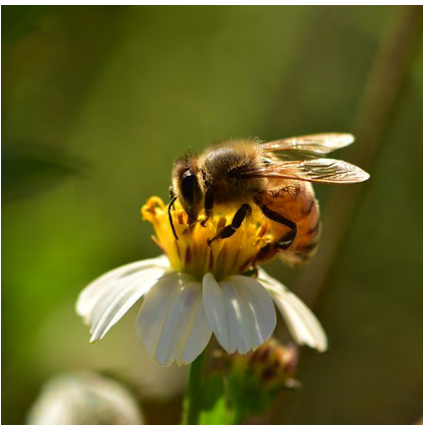
Digger bee^{xx}

Solitary

Nest in the ground

Brown to black

Bands of white/gray abdominal hairs



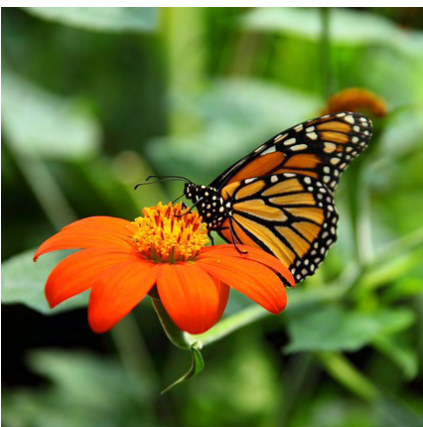
Honey bee (not native)^{xxi}

Colony (thousands) nests in hive

Smaller than bumble bees

Black and yellow bands

Hairy



Butterflies

The United States is home to 750 species of butterflies. For more information about butterflies as pollinators, visit www.fs.fed.us/wildflowers/pollinators/animals/butterflies.shtml



Birds

In the United States, birds (particularly hummingbirds), provide vital pollination. Keep an eye out for birds

Beetles

Beetles are essential pollinators for many flowers, including magnolias. When pollinating, they often eat petals. So, when you see “damaged” flowers, you can celebrate the presence of these beneficial insect pollinators. Ladybugs are a type of beetle that are beneficial in gardens because they help control pests like aphids – a single ladybug can eat 5,000 aphids in its lifetime!

Wasps

Like bees, many wasps feed on pollen and nectar and are important pollinators. Wasps are typically narrower than bees with a smooth, shiny body.^{xxii}

Flies

Although they aren’t as hairy as bees and therefore don’t carry pollen as effectively, some species of flies are excellent pollinators. There are even species that masquerade as bees. You can distinguish a fly from a bee by noticing if the insect has one set of wings (fly) or two (bee).

Bats

After dark, bats and moths take over the work of pollination. Bats are important pollinators, especially in desert and tropical climates. More than 300 species of fruit are pollinated by bats, including bananas and mangoes. They feed on insects in the flower and on nectar and flower parts.^{xxiii}

Moths

Many moth pollinators are nocturnal, although some are active during the day. Two of the easiest ways to tell the difference between a moth and a butterfly are by the wings and the antennae. Moths rest with their wings at their sides, while butterflies rest with their wings upright. Butterflies have knobbed antennae, and moths do not.^{xxiv}

About A Rocha

A Rocha (uh-RAW-sha) is an international family of Christian conservation organizations at work in twenty countries around the world. Each project grows from local needs and is shaped to fit its particular place.

In the United States, we are Christians restoring people and place through collaborative, community-based conservation. We partner with churches, schools, community groups, and organizations to provide resources and support to help people practice conservation where they are.

Learn more about what we do and get involved at arochoa.us.

Reach us by email: support@arochoa.us

Recommended Reading

- *Bringing Nature Home* by Douglas W. Tallamy
- *Attracting Native Pollinators* by The Xerces Society
- *Gardening for Butterflies* by The Xerces Society
- *Pollinators of Native Plants* by Heather Holm
- *Native Alternatives to Invasive Plants* by the Brooklyn Botanic Garden All-Region Guides
- *Noah's Garden* by Sara Stein

Online Resources

- www.community.arochoa.us
- www.xerces.org
- www.bringingnaturehome.net
- www.Fs.fed.us/wildflowers/pollinators
- For native plants specific to your place, visit
 - www.pollinator.org/guides
 - www.xerces.org/pollinator-resource-center
 - www.bringingnaturehome.net/what-to-plant.html (for the mid-Atlantic region)

Notes

- ⁱ USDA <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/pollinate/>
- ⁱⁱ https://www.fs.fed.us/wildflowers/pollinators/documents/factsheet_pollinator.pdf
- ⁱⁱⁱ <https://www.nap.edu/read/11761/chapter/5#93>
- ^{iv} <http://www.bringingnaturehome.net/gardening-for-life.html>
- ^v <https://www.theatlantic.com/science/archive/2017/01/pollinator-pathway/513395/>
- ^{vi} Douglass Tallamy, *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants* (Portland: Timber Press, 2009)
- ^{vii} <http://www.bringingnaturehome.net/gardening-for-life.html>
- ^{viii} Edward O Wilson (Tallamy, *Bringing Nature Home*, 2009, p15)
- ^{ix} <http://www.bringingnaturehome.net/gardening-for-life.html>
- ^x Heather Holm, *Bees: An Identification and Native Plant Forage Guide* (Pollination Press LLC, 2017)
- ^{xi} <https://www.csmonitor.com/Science/2016/0601/To-save-the-bees-mind-the-household-bug-spray-study-says>
- ^{xii} <http://www.sciencemag.org/news/2015/01/plan-save-monarch-butterflies-backfires>
- ^{xiii} Plant selection and information sourced from Xerces Society (xerces.org/pollinator-conservation/plant-lists/).
- ^{xiv} Unless otherwise noted, all pollinator information is from the USDA Forest Service (fs.fed.us/wildflowers/pollinators)
- ^{xv} https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5306468.pdf
- ^{xvi} <http://xerces.org/learn-about-bumble-bees/>
- ^{xvii} <http://www.clemson.edu/extension/publications/entomology/household-structural/carpenter-bees-hs08.html>
- ^{xviii} http://entnemdept.ufl.edu/creatures/misc/bees/halictid_bees.htm
- ^{xix} <http://www.masonbeecentral.com/resources-mason-bees-central-supplies-cocoons>
- ^{xx} http://www.clemson.edu/extension/hgic/hot_topics/2013/05digger_bees.html
- ^{xxi} <http://www.insectidentification.org/external-anatomy-of-honey-bees.asp>
- ^{xxii} <http://sciencing.com/difference-between-wasps-bees-4578394.html>
- ^{xxiii} <https://www.fs.fed.us/wildflowers/pollinators/animals/bats.shtml>
- ^{xxiv} <http://easyscienceforkids.com/all-about-butterflies-and-moths/>