

Protecting Pollinators at Home



Towns and cities are home to numerous pollinators, including the gulf fritillary (left) and the endangered rusty patched bumble bee (middle). By creating healthy, diverse, pesticide-free habitat in your yard, not only are you enriching your own life, but you are helping prevent insect declines—and potentially, extinction. (Photos: (l) Dennis Krusac; (m) Xerces Society / Sarina Jepsen; (r) Matthew Shepherd.)

Making Your Yard a Safe Place for Pollinators

Making your home pollinator-friendly is easy and rewarding. Most of North America's native bee species only forage over a distance of a few hundred yards, so with a little planning, your yard can provide a safe space for bees and other pollinators to thrive. All you need to give them are flowering plants throughout the growing season, undisturbed places to nest, and protection from pesticides. This guide will help you with the last item, managing yard pests in a pollinator-friendly way.

Urban Settings Provide Key Habitat for At-Risk Pollinators

Around the world, bee and butterfly populations are experiencing declines. Twenty-eight percent of North American bumble bees and 19 percent of butterfly species in the United States are at risk of extinction. Residential areas provide important food and shelter for many of our threatened and endangered pollinators. By establishing pollinator habitat in your yard, you will be an active part of restoring species on the brink.

Provide for All the Needs of Pollinators

To ensure you can support the entire life cycle of bees and butterflies, consider the following ideas for your yard:

1. Select a range of native and regionally adapted plants with bloom times that overlap throughout the growing season to provide food for pollinators. Be sure to include plants that bloom early and late in the season.
2. Include butterfly larval host species for caterpillars to feed on. Consult Xerces' regional plant lists (available from xerces.org) to find recommendations for your area. For more detailed information, see *Gardening for Butterflies* (Timber Press, 2016).
3. Limit planting cultivated plant varieties, especially those bred for showy blooms. While often selected for

their eye catching beauty, these plants may not produce much pollen or nectar.

4. **Grow pithy-stemmed plants that provide nesting sites for tunnel-nesting bees.** Examples of plants that make good nesting habitat for bees can be found through the web site of the Lady Bird Johnson Wildflower Center.
5. **Leave some downed branches, stems of pithy plants, and patches of bare ground for nesting sites.** It may seem counterintuitive to leave patches of bare ground in the garden, but areas of sunny well-drained soil provide nesting habitat for ground-nesting bees. Leaving leaves and other trimmings in your yard through the winter and into late spring provides shelter for over-wintering pollinators, especially butterflies, moths, and bumble bees.

Pesticides and Their Impacts

Pesticides, which include insecticides, fungicides, and herbicides, are part of the reason our pollinators are struggling. Avoiding their use helps reduce stress on already vulnerable bees, butterflies, and other insects. Below you'll find a brief overview of the risk various pesticide types present for pollinators.

- ⇒ **Insecticides:** Designed to kill insects, these pesticides are the most likely to kill or otherwise harm pollinators. Broad-spectrum insecticides, which lack selectivity for pests, would harm bees if applied on or near where bees are foraging. Neonicotinoids and other systemic insecticides pose the additional risk of delayed exposure since they can persist in plants and the environment for months to years after an application.
- ⇒ **Herbicides:** The greatest risk herbicides pose to pollinators is reducing nectar or pollen sources by killing flowering plants. Large-scale herbicide use can remove already scarce forage plants from the landscape and make it harder for pollinators to find food. There is also research showing that exposure to some herbicides can directly harm bees. For example, the commonly used herbicide glyphosate has been shown to harm navigation in honey bees and can interfere with microbes in their gut, making them more susceptible to harmful pathogens.
- ⇒ **Fungicides:** Once considered low risk for pollinators, new research is showing that products designed to control fungi can weaken pollinators, making them more vulnerable to disease. In some cases, fungicides can also increase the toxicity of other products, especially certain insecticides.

Vegetable Gardens and Pollinators

Vegetable gardens can provide valuable forage sites for pollinators. However, our delectable fruits and vegetables can also draw in pests. With vegetable quality and quantity at stake, most people have a lower tolerance for pests on their fruits and vegetables compared to ornamental plants.

While all the same actions to create resilience in your yard work to combat pests in a vegetable garden, there are a few other steps you can take to protect your crops without using pesticides. Start by choosing plant varieties that are resistant to common pests and diseases. Companion planting, cover cropping, and crop rotation are also strategies that can minimize pest problems.

- ⇒ **Companion planting** is the purposeful placement of plants together that help each other, like planting radishes or nasturtiums around your cucumber and squash plants to repel cucumber beetles. There are many great resources on companion planting, including the book *Carrots Love Tomatoes* (Storey Publishing, 1998).
- ⇒ **Cover cropping** is a great way to enrich your soil, suppress weeds, and break pest cycles. After fall harvest and about four weeks before you expect a killing frost, sow seeds such as field peas, fava beans, clover, hairy vetch, or buckwheat. Before they set seed, cut them back and turn them under. Wait about three weeks before planting fruits or vegetables. Sustainable Agriculture Research and Education offers more information on cover cropping.
- ⇒ **Crop rotation**—growing different families of crops in succession on the same land—helps to break the cycles of pests and diseases that affect specific plants. A common rule of thumb is to rotate yearly on a three-year cycle. Crop rotation has proven effective at preventing soil-borne diseases as well as soil pests, including nematodes and wireworms. You can learn more from the University of Wisconsin Extension publication, *Using Crop Rotation in Home Vegetable Garden*.



Leafcutter bees are one example of a solitary bee that you may see signs of in your yard. As their name suggests, these excellent pollinators create the cells in their nests with neatly cut pieces of leaves. They will nest in wooden bee blocks or bundles of hollow stems such as bamboo, sharing them with mason bees and other species. (Photo: Xerces Society / Mace Vaughan.)



Not all wasps are aggressive and many are valuable predators of garden pests. Paper wasps eat a variety of garden insects and spiders. Their nests are frequently found under the eaves of a house. While they can sting if provoked, these wasps are docile and people can live right alongside them without disturbance. (Photo: Xerces Society / Sarah Foltz Jordan.)

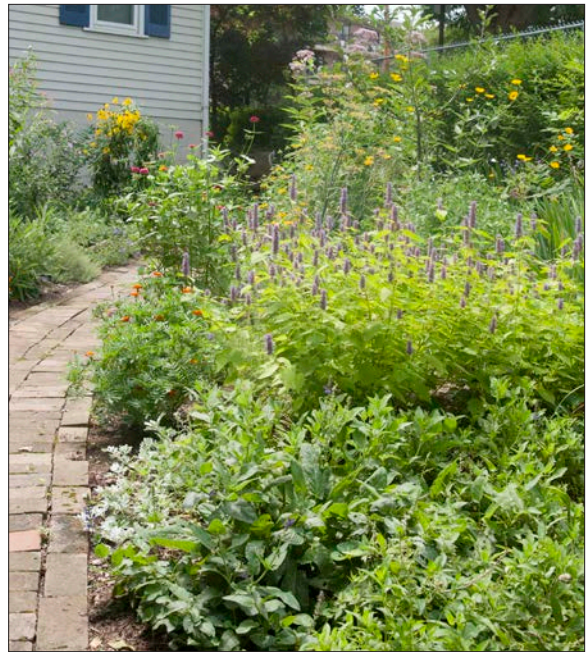
An Ounce of Prevention is Worth a Pound of Cure

The best way to avoid pest issues is to have healthy, resilient plants that don't attract many pests and are able to survive damage caused by feeding by any pests that may arrive. Here are a few things to consider as you work to create or enhance your garden for pollinators:

1. **Go native!** Learn which native and regionally adapted plants are pollinator-attractive. Native plants, when placed in areas that mimic where they come from, are oftentimes less likely to suffer from pests and more attractive to native pollinators. Consult Xerces' regional plant lists (available from xerces.org) to find recommendations for your area. For more detailed information, see *Attracting Native Pollinators* (Storey Publishing, 2011) and *100 Plants to Feed the Bees* (Storey Publishing, 2016).
2. **Get the dirt on your soil.** Learning your soil's characteristics (sandy, clay, or silty) will help you select plants that are best adapted to your soils. Testing your soil will also help you understand the strategies—such as adding organic matter or adapting the pH—that can help your garden plants thrive. You can learn more from Penn State Extension's *Soil Management in Home Gardens and Landscapes*.
3. **Put the right plant in the right place.** If a plant is stressed, it is less able to defend itself from pests. Know what plants prefer—are they shade or sun plants? Do they thrive in dry or wet areas?—and place them in your garden according to their needs.
4. **Source plants carefully or propagate your own.** Pesticide use in ornamental plant production is common. When possible, buy plants grown organically. Although there are organic-approved pesticides, risk from these natural products can be lower relative to conventional products. If you can't find organic plants, at least avoid plants that were treated with neonicotinoids. Unfortunately, many nurseries don't know what their plants were treated with. If you shop at a nursery that grows their own plants, they will be able to answer your pesticide use questions. Another way to ensure your plants are grown with little to no pesticide use is by propagating them yourself. Plus, it can be really fun to trade plants and seed with friends and neighbors.

When and How to Respond to Garden Pests

- ⇒ **Reconsider your tolerance for pest damage.** A few holes in the leaves of garden plants can indicate a thriving ecosystem and generally, are not cause for concern. Sometimes insects feeding on plants can cause leaves to turn yellow or brown, but infestations rarely kill the plants. For example, lace bugs feeding on asters can have this effect, but the asters typically survive. Small populations of some pests can be a good thing, as they provide food for beneficial species. Also, many beneficial insects eat or otherwise use plants; holes in the leaves of your plants might be a sign of butterfly caterpillar activity or native bee presence.
- ⇒ **Identify the pest and manage it accordingly.** It is important to know which pest you are dealing with to determine how best to manage it. A pest's food and shelter requirements and life cycle often dictate your response. A call to your local extension service can help you identify potential pests, and provide good management suggestions. Make sure to tell your extension service that you are most interested in management options that do not require pesticides. An online search can also provide good management suggestions. You may need to start by searching for the plant species and damage or injury symptoms to figure out the likely pest or disease. Once you know the name of the pest, search by the pest name plus "IPM" (which stands for *integrated pest management*).
- ⇒ **Address the underlying cause of the pest problem.** Your plants might be succumbing to pests because they are unhealthy. Plants become stressed for a number of reasons including whether they get too much or too little water or sunlight, are planted too densely inhibiting proper airflow or if the soil pH doesn't match their needs. While applying a pesticide might kill a pest, it will not address underlying issues that allow pests to thrive. Pests can re-establish on vulnerable plants despite pesticide application(s).
- ⇒ **Physically remove the pest.** If you find diseased or infested plant parts, prune away the damaged areas and dispose of them off-site. With small insect infestations, picking off the pests or spraying them off with a hose can be effective.
- ⇒ **Replace unhealthy plants.** When a plant is perennially prone to pests, and efforts to improve its health have failed, sometimes the right course of action is to remove the plant and replace it with something better suited to the landscape.



Adding pollinator habitat to your garden can also attract other "beneficial insects" that are natural enemies of common pests and can help keep pest populations in check. (Photo: Justin Wheeler.)

Mitigating Risks of Pesticides

While we urge home gardeners to forgo pesticide use, if you do choose to use pesticides, please use them judiciously and carefully, to limit harm to pollinators and other beneficial insects such as lady beetles that eat garden pests. Take all precautions to avoid exposing bees and other beneficial insects to pesticides. You can limit exposure by making targeted applications directly to the pest or affected plant and never making applications immediately before or during bloom. Before you use a pesticide, take the time to read the label and follow any advisory language to limit harm.

If you are considering use of a pesticide, please consider the following guidelines:

1. **Try to go pesticide free.** A home garden can thrive without pesticides. If you do decide to use pesticides, use them only when you have found a pest that can compromise the health of your plants, rather than nuisance pests. Never use pesticides for cosmetic reasons.

2. If you do decide to use a pesticide, **choose the most targeted, reduced-risk product available**. Start with organic options, but keep in mind that some organic pesticides are toxic to pollinators and other beneficial insects. Avoid multi-use products for disease, insects, and/or weeds. These combination products can be very toxic to beneficial insects. They are also contrary to the concept of using a pesticide for a specific target pest. Some lower-toxicity options for home gardens include insecticidal soap, horticultural oils, and kaolin clay. You can learn more about organic pesticides in the Xerces report, *Organic Pesticides: Minimizing Risks to Bees and Other Agriculturally Beneficial Insects*. You can also compare the toxicity of different pesticides to bees using the online Bee Precaution tool developed by University of California Agriculture and Natural Resources (available at www2.ipm.ucanr.edu). Before you treat for a suspected pest, be sure that you have identified it properly, and determined if it is likely to cause harm.
3. **Avoid applications where bees are present**. In an effort to avoid direct exposure of bees, pesticides should never be applied when bees are foraging. Since pesticide residues can stay active on plants causing harm hours to days after an application, it is best to avoid any applications during bloom. Some plants, such as apple trees, attract pollinators even before they bloom. If you notice pollinators visiting a plant, even one that is not in bloom, forego any pesticide application.
4. **If you use a landscaping company, learn about their practices**. Do they use any products to manage weeds, disease, or insects? If so, ask them to discuss options with you before making any applications.

Managing Weeds in Your Yard and Garden

While many “weedy” species can actually provide pollinator resources, you will want to have a strategy to address unwanted and problematic plants. We suggest the following.

1. **Accept some weeds in your yard**. If you have an unwanted, native weed, you may want to allow some of it to persist in confined areas since native plants tend to provide native pollinators with nectar and pollen and serve as larval host plants for moths and butterflies. If you have invasive weeds, it is best to remove them. Check the web site of the USDA National Invasive Species Information Center or give a call to your local extension service to determine whether a species is invasive. If you appreciate a more manicured aesthetic, consider strategically setting aside areas of your yard to be more wild. You might spend more time managing weeds next to your front door or patio while leaving areas such as a side yard untamed. The less-managed areas can provide nesting habitat for pollinators.
2. **Weed by hand or with hand tools**. Advancements in weeding tools have made hand weeding efficient, easy, and comfortable. Many stores now carry effective tools that can be used without bending over.
3. **Time your weeding for early in the plant’s growth cycle**. It is best to remove weeds before they go to seed. Weed removal is also most



Above: Signs can go a long way toward acceptance of an “untidy” yard. (Photo: Elizabeth Henkel.)

Below: Weeding can be a relaxing activity, giving you time to de-stress from daily life and the chance to carefully observe and appreciate the diversity of wildlife your garden supports. (Photo: Debbie Roos.)



effective when root systems are less developed.

4. **Use mulches wisely.** Mulching, including leaf mulch, can be an effective way to control weeds and retain moisture in topsoil during dry spells. Still, heavy mulch can block access to the ground for soil nesting bees and certain mulches (e.g., cedar mulch) can be toxic to bees and ants. We recommend mulching sparingly, and choosing organic untreated mulches rather than colored or rubber mulch.
5. **Solarization, heavily seeded cover cropping, and sheet mulching are effective weed management techniques** if you are preparing larger areas for planting. The Xerces Society guidelines *Organic Site Preparation for Wildflower Establishment* (available from xerces.org) provide more information about these and other techniques.
6. **After weeding, replant with desirable species** so weeds don't re-establish.

Managing Mosquitoes and Ticks in and Around the Home

Mosquitoes and ticks are not garden pests but because of their potential health concerns, many people seek to manage them in their yards. Managing these public health pests is most effective at the community level but there are actions you can take at home to limit their presence without harming the pollinators you have welcomed into your yard.

The most effective way to limit mosquitoes in your yard is to first prevent them from breeding and second to take steps to avoid being bitten by mosquitoes. Dumping standing water at least once a week eliminates mosquito

Bee-Friendly Lawns

Lawns are the single largest irrigated crop in America; we have well over 40 million acres of lawn. "Bee lawns" incorporate low-growing flowering plants into traditional grass, providing valuable forage and the benefits of a home lawn.

If your lawn is already established, you can re-seed with pollinator-friendly lawn mixes that include plants such as clover or creeping thyme. You also can simply accept some flowering weeds. Beyond increasing the number of flowering plants in your lawn, also limit the number of times you mow or only mow a section of your lawn at a time. Xerces' blog "Bee Friendlier With Your Lawn Care" (access via xerces.org) has many tips for lawn management. The University of Minnesota's Bee Lab also provides tips on how to create and manage bee lawns in a fact sheet, *Flowering Bee Lawns for Pollinators*.



Although white Dutch clover is most obvious, the bee-friendly lawn on left has eight flowers that bloom through the spring and summer. In contrast, the lawn on the right offers little to support pollinators. (Photos: (l) Matthew Shepherd; (r) heipei, Flickr.)

breeding grounds. Common places where you'll find mosquitoes breeding are in bird baths, backyard pools, flower pots, and gutters. These efforts are most effective if you can also convince your neighbors to remove breeding habitat. Placing screens in your windows and wearing long pants and shirts at times when mosquitoes are most active are valuable ways to avoid mosquito bites. Also, for those evenings when you are sitting outside, set up a box fan to keep mosquitoes away. **Do not use backyard products such as mosquito misters or vaporizers which emit insecticides. These products may also kill pollinators and other beneficial insects and they only kill the mosquitoes that come in contact with the poisons rather than eliminating the source of the mosquitoes.**

It is important to keep in mind that most mosquitoes don't carry disease. Your county health department, as well as online tracking by the Centers for Disease Control and Prevention, can keep you informed as to whether the mosquitoes in your area pose a health risk or are simply a nuisance. More information can be found in the Xerces Society publication *How to Help Your Community Create an Effective Mosquito Management Plan*.

Some ticks also transmit disease. Ticks are most often found in grassy, brushy, or wooded areas. To avoid ticks latching on to you, walk in the middle of trails, wear light-colored clothing, and check your clothing and body for ticks once you come indoors. While we recommend mowing grass less often to sustain pollinators, keeping the grass in frequently used areas (such as where children or pets play) shorter can help reduce contact with ticks. Creating a wood chip or gravel strip between your yard and wooded areas limits tick presence in your yard. Removing leaf litter in frequently used areas also reduces tick habitat. You can learn more in the *Tick Management Handbook* prepared by the Connecticut Agricultural Experiment Station.

Conclusion

As pollinators move through the landscape they encounter many hazards, including disease, pesticides, and lack of forage and nesting sites. By creating a pollinator garden, you are providing them a safe oasis. Pollinator-friendly yards also inspire curiosity and foster awareness. Once your neighbors see yours, they might decide to add a few pollinator plants in their yard. In some communities, neighbors have combined their efforts to purposefully expand habitats to create corridors that help expand the range of these beneficial species. In this digital age, you can even inspire people far away by sharing your garden through the Xerces Society's Bring Back the Pollinators campaign, a forum celebrating pollinator gardens across the country. And, of course, be sure to take a few moments every day to marvel at the diversity of insects right under your nose.



The most effective way to reduce the number of mosquitoes is to remove potential breeding places. Any object in which water can puddle, including old tires, buckets, and flower pots, may be used by mosquitoes. Dump water from these places at least once a week. (Photo: Pan American Health Organization.)

Websites Referenced

Xerces Society Resources

Bring Back the Pollinators campaign: bringbackthepollinators.org

How to Help Your Community Create an Effective Mosquito Management Plan: xerces.org/how-to-help-your-community-create-an-effective-mosquito-management-plan-a-xerces-society-guide/

Organic Pesticides: Minimizing Risks to Bees and Other Agriculturally Beneficial Insects: xerces.org/pollinator-conservation/organic-farms/organic-approved-pesticides/

Organic Site Preparation for Wildflower Establishment: xerces.org/guidelines-organic-site-preparation/

Regional pollinator plant lists: xerces.org/pollinator-conservation/plant-lists/

Xerces Society blog, “Bee Friendlier With Your Lawn Care”: xerces.org/2018/05/06/bee-friendlier-with-your-lawncare/

Resources from Other Organizations

Connecticut Agricultural Experiment Station, *Tick Management Handbook:* portal.ct.gov/-/media/CAES/DOCUMENTS/Publications/Bulletins/b1010pdf.pdf?la=en

Lady Bird Johnson Wildflower Center, pollinator nesting plants: wildflower.org/collections/collection.php?collection=xerces_nesting

Penn State University Extension, *Soil Management in Home Gardens and Landscapes:* extension.psu.edu/soil-management-in-home-gardens-and-landscapes

Sustainable Agriculture Research and Education, cover crops guide: sare.org/Learning-Center/Topic-Rooms/Cover-Crops

University of California Agriculture and Natural Resources, Bee Precaution tool: www2.ipm.ucanr.edu/bee precaution/

University of Minnesota Bee Lab, *Flowering Bee Lawns for Pollinators:* beelab.umn.edu/sites/beelab.umn.edu/files/floweringlawninfoenrtflogo.pdf

University of Wisconsin Extension, *Using Crop Rotation in Home Vegetable Garden:* hort.extension.wisc.edu/articles/using-crop-rotation-home-vegetable-garden-0/

USDA National Invasive Species Information Center: invasivespeciesinfo.gov

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