Trumpet Vine

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Loudoun County Extension Master Gardener

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Knowledge for the Community from
Loudoun County Extension Master Gardeners

TABLE OF CONTENTS

Message From the Editor
Cultivating Love for Your Native Garden

Carol Ivory, Loudoun County Extension Master Gardener

If you've been planting native plants, you know that they have a mind of their own. A few of them stay just where you plant them, bloom beautifully and attract insects just as you want. Others sit and think for a few years and then proceed to take over. They move around, reproduce abundantly and pop up everywhere. You can plant a beautifully laid out garden and within a few years your design is morphing into something quite different. You love your garden and marvel at how each plant does its own thing. But others may not feel the same about your native garden. To some it looks weedy and unkempt. How do you avoid clashing with the expectations of your neighbors and your community?

There are some key things to do with the garden. Prioritize the areas that are most visible. Tend the edges along sidewalks and paths by weeding and cutting back any plants that are growing over the walkway. Eliminate or cut back tall plants that have moved to the front blocking the view. Remove obnoxious weeds. Scan the garden for any plant that stands out negatively and either remove it or give it a Chelsea chop.

Virginia Conservation Assistance Program (VCAP) sign

Now the next steps are a bit more difficult: Communicate and Educate. You have subtly communicated that the garden is intentional. Now you need to communicate that in a more official way—with signage. If your native garden is the consequence of a Virginia Conservation Assistance Program (VCAP) grant you may have a sign like this to display. This will let your community know that these plants are part of a county program. The Xerces Society offers the Pollinator Protection Pledge to grow pollinator friendly plants, to provide habitat for all pollinator life stages, to avoid pesticides and to spread the word, plus a sign. The Loudoun Wildlife Conservancy offers a certification that involves at least one site visit by an LWC volunteer and consultation and a sign once you have achieved certification. In addition, you can find lots of unofficial native plant garden signs online that range from informative to whimsical.

Xerces Society sign

Unofficial native plant garden sign
Photos: Carol Ivory

Finally, educate. Plan some simple fact-based statements that avoid judgements about other properties. Talk about your goals and how natives benefit the environment. For example "to raise a nest of about five chickadees, parent birds must collect between 6,000 and 9,000 caterpillars from native plants, 350 to 570 every single day." Having a good book like Doug Tallamy's Bringing Nature Home can help conversations go deeper.

Good luck with your garden and your neighbors.

Soft Landings in Your Landscape

Barbara De Rosa-Joynt, Loudoun County Extension Master Gardener

Invasives under a Birch. Photo: Barbara De Rosa-Joynt

Underplanting, that is planting beneath trees or shrubs, often with shade-tolerant plants, has been a tried-and-true gardening technique for a long time. Such plantings, like the one pictured here, are easy to find in our neighborhoods, and many are quite attractive, though unfortunately some may include invasive species. So-called soft landings provide an opportunity to take that traditional underplanting technique to the next level by selecting plants that support biodiversity in your landscape to intentionally support pollinators and other wildlife.

What is a soft landing? Heather Holm, noted biologist, pollinator conservationist, and author, describes soft landings as "…diverse native plantings under keystone trees (or any other regionally appropriate native tree). These plantings provide critical shelter and habitat for one or more life cycle stages of moths, butterflies, and beneficial insects such as bumble bees, fireflies, lacewings, and beetles. In addition to plants, soft landings also include leaf litter, duff, and plant debris."

Lacy Phacelia and ferns.
Photo: Barbara De Rosa-Joynt

What are "keystone trees" referenced in the quote from Ms. Holm above? Keystone plants are native plants that support considerably more native insect species than other native plants. They do so in two ways: as the 14 percent of native host plants that collectively feed the caterpillars of 90 percent of butterflies and moths (Lepidoptera), and as a source of pollen that feeds specialist bees whose larvae can only eat pollen from specific plants while also feeding generalist bees whose larvae can eat pollen from a variety of species. The top five keystone native tree genera in our region support an astonishing number of Lepidoptera species: oak (*Quercus*) 436, plum/cherry (*Prunus*) 340, birch (*Betula*) 284, cottonwood (*Populus*) 249, and maple (*Acer*) 238. Native shrubs also provide opportunities for creating soft landings. The top two keystone shrub genera, willow (*Salix*) and blueberry (*Vaccinium*), rival some tree genera and support 289 and 217 species respectively with each also supporting 14 specialist bee species. Planting shade-tolerant native perennials under a native tree or shrub has the potential to add even more host plants into the mix. Some of the top native perennial keystone genera include: goldenrod (*Solidago*) (104 Lepidoptera/42 bees), aster (Symphyotrichum) (100 Lepidoptera/33 bees), sunflower (Helianthus) (66 Lepidoptera/50 bees), and black-eyed Susan (*Rudbeckia*) (20 Lepidoptera/29 bees). There are shade-tolerant plants in each of these genera.

Underplanted river birch.
Photo: Barbara De Rosa-Joynt

In a traditional underplanting like the one shown here, the main goal is often aesthetics, maximizing available space, and/or weed suppression. In a soft-landing planting, the primary objective is to help insects complete their lifecycles and promote biodiversity. Traditional underplanting practices include trees and shade-tolerant plants of any origin, whereas soft landings focus on keystone tree species and native plants, though you can create soft landings under any tree, or any native or non-native shrub for that matter. Care for a traditional underplanting includes removing fallen leaves and other debris, but in a soft-landing planting fallen leaves are left in place—and more may be added—and the ground layer often also includes twigs and other natural debris, much of which is ultimately hidden by the plants.

Underplanted crepe myrtle.
Photo: Barbara De Rosa-Joynt

How does a soft landing make a difference? An oasis like this will create a safe space for pollinators and other wildlife to shelter over the winter—either burrowed underground or nestled in the plants and leaf litter—and to provide cover to help them hide more easily from predators during the growing season. Many moth and butterfly (Lepidoptera) larvae drop to the ground beneath their host plants to complete their life cycles in the duff under or near the host plant, or in some cases underground. Duff is the organic matter you would typically find on a forest floor—think decomposing leaves, twigs, bark, and/or pine needles. If a caterpillar drops onto pavement below a tree, it is likely to be eaten by a predator or smooshed. If it drops onto plant-free mulch beneath trees like these pictured here, it doesn't have much protection from predators. If that caterpillar drops onto turf under a tree, it will likely encounter compacted soil resulting from mowing and foot traffic, which is difficult to burrow into, not to mention it can be stepped on or mowed over there. Lots of other wildlife will make good use of soft-landing spaces too—in my yard our resident chipmunks, toads, frogs, skinks, salamanders, and box turtles take cover in these plantings, and the birds and foxes forage in them.

Mulched trees.
Photo: Barbara De Rosa-Joynt

As indicated, while you can create a soft landing under any tree, it will have the greatest wildlife impact with a native tree or shrub underplanted with herbaceous native plants. Why? This way you get the most bang for your buck. An oak tree can serve as the host plant for the caterpillars of 436 species of Lepidoptera in our region, the most out of all our native tree species, whereas a non-native ginkgo tree is believed to host no more than five species, if that. Creating a soft landing with native plants under an oak or other native tree can support the Lepidoptera the tree is hosting *plus* other wildlife that will also benefit from the shelter, including the beneficial insects and spiders that we welcome in our gardens. There is still a wildlife benefit to creating a soft landing with native plants under a non-native tree: a non-native tree would host few if any caterpillars so there would be few or none dropping from the tree, but a soft landing planting would still provide shelter for insects, spiders, and other wildlife as mentioned above—and since many natives are host plants, if you use natives in the underplanting, some of them would likely be host plants for pollinators. That said, if you can only create one soft landing area under one tree on your property, you will have the greatest impact by planting native plants under an oak or other native tree. The more diverse the planting under the tree or shrub, the more species you are likely to support, but a planting of a single species or two of natives is still beneficial as with these sea oats and coralberry.

Sea oats and coralberry under edge of forest trees.
Photo: Carol Ivory

Birch underplanting with mix of natives. Photo: Barbara De Rosa-Joynt

While soft landings are most effective when the area is planted from the trunk all the way out to the tree's dripline, that is not always possible or practical, particularly in smaller yards. Any size soft landing will be better for your local wildlife than a tree with pavement or turf all the way up to the trunk or encircled by plant-free mulch. I have a quarter acre lot and while most of my trees have some kind of soft landing under them, none extend to the dripline—the dripline of several of my trees extends over the property line anyway, so even if I could make that work with my HOA and my husband, it would be complicated to execute. Of course, the larger the planting and the more natives you plant, the greater the benefits, but don't let the perfect be the enemy of the good: a smaller planting of native plants or a mixed planting of natives and noninvasive non-natives will still provide benefits to wildlife. I encourage you to give it a try and see what opportunities you can find in your yard to underplant your trees—native or not—with native perennials.

Important considerations when creating soft landings.

Do:

- First and foremost, protect the health of the tree.
- Remove any invasive species and any pre-existing non-native species you no longer wish to keep, and add natives to the existing planting.
- Dig gently and with great care, as trees often have shallow roots and you will want to avoid damaging them.
- Use a hand trowel, not a full-size shovel.
- Let the leaves fall naturally into your soft landing and rake other fallen leaves into that area in the fall. At the beginning you may need to weigh leaves down with branches to keep them in place long enough to decompose. This can be challenging, but retaining leaves in your soft-landing area gets easier once your plants are sizeable enough to hold the leaves in place.
- Use plant plugs or other small size plants. You can even plant seeds, though I find it hard to tell the difference between seedlings from desirable plants and volunteer weeds.
- The smaller and/or shallower the plant's root system, the easier it will be to tuck it in between the tree's roots without inadvertently causing harm.
- Leave all healthy plants standing in the fall to help hold the leaves in place and to allow birds and other wildlife to eat the seeds.

Do not:

- Dig large holes for plants or use a full-size shovel to dig your holes.
- Dig out turf or use a sod cutter if you have grass running right up to the trunk—the safest option is to smother the grass in the fall. By the following spring you should be ready to plant.
- Create a raised bed under your tree—adding soil or compost on top of the tree's root system can affect the health of the tree.
- Plant right up against the tree trunk since you can accidentally damage large tree roots—plant up to about 3 feet from the trunk and let the plants naturally fill in on their own over time.
- Use landscape fabric, which will prevent healthy root growth of the tree and the perennials and will also prevent insects from burrowing into the soil to overwinter.
- What plants are candidates? Lots! Many plants that like part-shade and tolerate dry locations can work for soft landings. Note that like any planting, they will benefit from supplemental watering until they are settled into their new location. Just a few ideas include:

Sensitive fern.
Photo: Barbara De Rosa-Joynt

Zigzag goldenrod.
Photo: Barbara De Rosa-Joynt

Ferns: Christmas fern (*Polystichum acrostichoides*), sensitive fern (*Onoclea sensibilis*), lady fern (*Athyrium filix-femina*)

Sedges: Seersucker sedge (*Carex plantaginea*), eastern woodland sedge (*Carex blanda*), Pennsylvania sedge (*Carex pensylvanica*)

Asters: Big leafed aster (*Eurybia macrophylla*), white wood aster (*Eurybia divaricata*), calico aster (*Symphyotrichum lateriflorum*)

Goldenrods: Zigzag goldenrod (*Solidago flexicaulis*), blue-stemmed goldenrod (*Solidago caesia*), sweet goldenrod (*Solidago odora*)

Golden Alaxander. Photo: Barbara De Rosa-Joynt

Bloodroot. Photo: Barbara De Rosa-Joynt

Celandine poppy under buttonbush. Photo: Barbara De Rosa-Joynt

Black-eyed Susans: Brown-eyed Susan (*Rudbeckia triloba*), Black-eyed Susan (*Rudbeckia fulgida*), black-eyed Susan (*Rudbeckia hirta*)

Medium height groundcovers (2 to 3 feet): Golden Alexander (*Zizia aurea*), mistflower (*Conoclinium coelestinum*), woodland poppy (*Stylophorum diphyllum*)

Low groundcovers (less than 1 foot): Green and gold (*Chrysogonum virginianum*), wild ginger (*Asarum canadense*), heartleaf foamflower (*Tiarella cordifolia*), woodland stonecrop (*Sedum ternatum*)

A note about ephemerals: Spring ephemerals like bluebells (*Mertensia virginica*), mayapple (*Podophyllum peltatum*), and bloodroot (*Sanguinaria canadensis*) are gorgeous and can be used, but since ephemerals' foliage will eventually disappear, you will want to ensure you also include plants that will maintain their foliage throughout the rest of the year.

Some examples from my garden:

Thirty years ago, the builders installed most of the trees in my neighborhood with the root balls partly aboveground, so in addition to its wildlife benefits, this planting of green and gold (*Chrysogonum virginianum*) under a red maple (*Acer rubrum*) helps visually connect the tree to the lawn and mask the height difference between the trunk flare and the turf. This planting under a mature maple is three years old and has filled in really nicely, fanning out to reach up to the trunk and down into the lawn, which is actually helpful because there are a number of surface roots that are hard to mow around anyway. I have been steadily removing turf around the outer edges to give the green-and-gold more and more room to run and it has accepted the challenge.

Green and gold under red maple. Photo: Barbara De Rosa-Joynt

If I am being honest, my resident chipmunks planted these woodland poppies (*Stylophorum diphyllum*) under my buttonbushes (*Cephalanthus occidentalis*) by relocating the seeds from , but I love them there and they help cover the fading foliage of daffodils and other bulbs so I pretend that I designed it that way. The buttonbushes are about 10 years old and the poppies have been there for four years and have filled in beautifully.

Birch with golden alexander and other natives. Photo: Barbara De Rosa-Joynt

I have a river birch (*Betula nigra*) underplanted with golden Alexander (*Zizia aurea*), sensitive fern (*Onoclea sensibilis*), Jack in the pulpit (*Arisaema triphyllum*), shooting star (*Primula meadia*), and seersucker sedge (*Carex plantaginea*) among other plants. These plants have been mixing together for about 15 years, and few are where I originally planted them, but they have generally sorted themselves out and decided who goes where.

Other river birches in a shadier part of the same bed are underplanted with Christmas fern (*Polystichum acrostichoides*), sensitive fern (*Onoclea sensibilis*), NY fern (*Amauropelta noveboracensis*), royal fern (*Osmunda regalis*), heart-leafed foamflower (*Tiarella cordifolia*), Jack in the pulpit (*Arisaema triphyllum*), woodland stonecrop (*Sedum ternatum*), violets (*viola sororia*), seersucker sedge (*Carex plantaginea*), and several volunteer aster and goldenrod species. They are a similar age as above and likewise have rearranged themselves over time with the foamflower and stonecrop weaving among the rest to knit them together.

Yet another birch has a ring of eastern woodland sedge (*Carex blanda*) and blue wood sedge (*Carex flaccosperma*) encircling the tree, and violets (*viola sororia*) and multiple aster and goldenrod species grow inside the circle. Other than the sedges and violets, which the deer typically ignore, this planting has been a struggle as the plants never get very tall and rarely flower thanks to heavy grazing by our local herd of deer. Both sedges are also reseeding freely within the circle so hopefully, in time, they will give cover to the plants the deer like and maybe they will be able to grow taller than an inch or two. Regardless, the sedge edge makes it clear where to stop mowing, so I still consider this experiment to be a win.

Ferns under birch . Photo: Barbara De Rosa-Joynt

This is a more recent effort planting big leaf aster and zigzag goldenrod in a place where I already had some non-native plumbago (*Ceratostigma plumbaginoides*) under a non-native Japanese cherry tree located between my driveway and a paved community walking path. The natives have been there for two years and have been making steady advances from my driveway toward the trunk of the tree, slowly crowding out the plumbago, which I am essentially using as a placeholder until the other plants fill in the space.

Left to right: Sedges under river birch. Bigleaf aster and others under cherry. Photos: Barbara De Rosa-Joynt

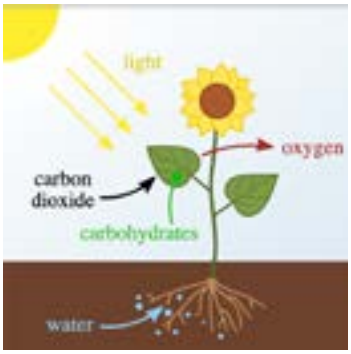
Healing the Earth With Our Gardens

(Third article in a series on Landscaping for Climate Change)

Gaye Mara, Loudoun County Extension Master Gardener

"The best time to plant a tree was 30 years ago. The second-best time is now."
(Anonymous)[1]

Photosynthesis is a miracle. Green plants—trees most of all—breathe in carbon dioxide, incorporate the carbon into their tissues, and breathe out oxygen. They give us the clean air we breathe. After plants appeared on the planet, oxygen levels rose to 35 percent of Earth's atmosphere.



Basics of photosynthesis.
Image by: CC BY-SA 4.0

Humans have been felling and burning trees for heat and cooking for thousands of years. Then we discovered the rich sources of carbon-based fuel under the ground—first coal, then oil and natural gas. Plants gave us those as well—they are the buried remains of ancient plants subjected to eons of heat and pressure. Now we burn them, too.

Burning is the opposite of photosynthesis: It consumes oxygen and puts carbon back into the air. All that burning is gradually diminishing our supply of oxygen, which now stands at just under 21 percent of the atmosphere. And the rising amount of carbon dioxide is overheating and destabilizing the Earth.

What Nature Gives Us

In the early 1990s, environmentalists started talking about "ecosystem services"—all the good things nature does for humans—to bring more attention to the importance of preserving the natural world. Ecosystem services include food and medicine, clean air and water, fertile soil, flood and erosion control, recreational opportunities, aesthetic beauty, and stress reduction. They add up to providing us with a livable—indeed, a comfortable and enjoyable—home.

A huge variety of local ecosystems exist around the world—coastal swamps, deserts, prairies, and mountain forests. Each has its own unique, interdependent populations of living things. Among U.S. states, Virginia has an exceptional diversity of ecosystems because of its transitional location between ocean and mountains and between the cold North and the semitropical South. The U.S. Environmental Protection Agency has mapped the ecosystems of the continental United States; you can see the diversity of our region in the map below, clipped from EPA's map. Loudoun County has its own transitional location, in the Piedmont between the Atlantic coastal plain and the mountains of the Blue Ridge.


Ecoregions of Virginia.
Credit: U.S. Environmental Protection Agency

Our Wounded World

Ecosystems are fragile. They are being destroyed all over the world, and the destruction is accelerating. We can see it happening here at home.

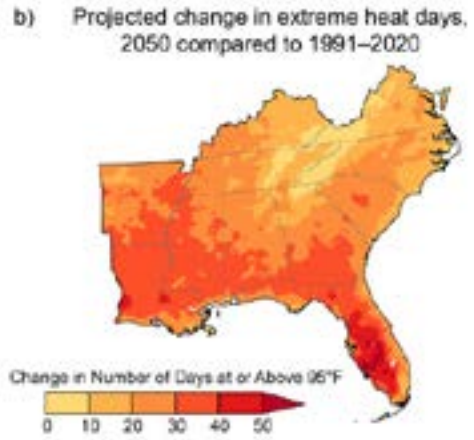
Before the arrival of Europeans, Virginia and the southeastern United States in general were covered with grasslands, pine savannas , and oak-hickory forests , all with an extraordinary variety of native plants. Those native plants, and the animals that coevolved with and depend on them, are gravely threatened by climate change and the resulting weather extremes: hotter summers and warmer winters, extreme temperature spikes and plunges, longer droughts alternating with heavier rains, more and hotter wildfires. Adding to the threats are invasive plants, deer browsing, pesticide overuse, and habitat destruction for farming and development. The combination is a "perfect storm" that is driving many natives to extinction or near-extinction and shutting down nature's ecosystem services along with them.

To sum up the present state of things, according to the Fifth National Climate Assessment in 2023 (2023 NCA), the Southeast is "one of the most biodiverse areas in the continental United States. [Its] ecosystem…are now in a precarious state." The NCA continues, "The Southeast has lost more forested area to development and other land uses…han any other National Climate Assessment region since 1985…. Many of the region's most biodiverse landscapes remain unprotected, threatening unique species of birds, fish, and amphibians. Future sprawl may threaten these landscapes." (pp. 22-23)

Longleaf Pine Savanna.
Credit: Chuck Bargeron, University of Georgia, Bugwood.org

Of particular concern is the combination of hotter summers, more extreme droughts, and dwindling water supply.

As to heat, the 2023 NCA projects a significant increase by 2050 in the annual number of days over 95° F across the Southeast. Loudoun County is better off than most, with an increase of only up to 20 days at 95° F or higher. But temperatures that are merely over 86° F severely stress most plants. Sustained temperatures higher than that will kill them.



Projected 2050 heat levels in the Southeast.
Credit: Fifth National Climate Assessment, 2023

Regarding drought, the National Integrated Drought Information System reports three straight years of drought in Loudoun County and projects another in 2026. https://www.drought.gov/states/virginia/county/Loudoun.

As to our water supply, a study of Loudoun County groundwater in 2025, using government data, says that "Groundwater as a water supply is no longer sustainable, as the water table is slowly declining and several droughts have caused some wells, springs, and ponds to dry up." (p. 6) The study further notes that the water level in a Leesburg well monitored by the U.S. Geological Survey has dropped 3 feet per decade (p. 23). And at least "235 replacement wells ... have been drilled in Loudoun since 2000." (p. 12)

We can expect further groundwater decline as rising heat and drought force more intensive irrigation of farms and gardens and as the data centers proliferating here, and the expansion of power facilities to meet data center energy demands, consume ever more water for cooling.

Let Us Start in Our Own Landscapes

Our task now is not just to conserve what remains. If we want to heal the Earth, we have to do more to start restoring what has been destroyed. We can begin on our own properties.

For starters, we need to regard our landscapes as living ecosystems that sustain the health of the planet rather than as collections of plants that are pleasing or useful to us. That requires us to think and act differently than we have in the past. Here are some of the things we need to do:

1. Emphasize native plants and remove invasives. Most of our pollinators—butterflies, moths, native bees—have specialized, sometimes exclusive, relationships with native plants; and almost all our birds feed their young mostly with moth and butterfly caterpillars. Doug Tallamy, entomology professor at the University of Delaware, has extensively studied and reported on those relationships. His research has also identified "keystone plants," the plants that are essential to the life cycles of the most species, with oaks at the top of the list. They are the plants to emphasize in our gardens.

For a list of keystone plants native to your ZIP Code, see the National Wildlife Federation's Native Plant Finder at https://nativeplantfinder.nwf.org/Plants.

Regarding caterpillars and native plants, a 2018 study by Desiree Narango, a Tallamy PhD student, found that at least 70 percent of the plants on a property must be native for chickadees to find enough caterpillars there to feed their nestlings. That has led to the "70/30 rule" of landscape design: at least 70 percent native, no more than 30 percent non-native. The good news is we can still feel good about keeping a grassy play area and our beloved hydrangeas. And at page 73 of Barbara Sullivan's book (see list of references at the end of this article) there's a list of popular nonnative trees and shrubs, well adapted to the Southeast and not invasive, to choose from for that 30 percent.

It's no sacrifice to replace most of the plants in our gardens with natives. They require less maintenance, less fertilizer, and less water. If you have the chance to visit the extensive native plant gardens at Mt. Cuba in Delaware, you will see how beautiful they are. Mt. Cuba trials cultivars (a/k/a "nativars") and straight species of native plants for their vigor and pollinator support; you can see the reports and rankings at https://mtcubacenter.org/research/trial-garden/. They have found that some but not all nativars support pollinators and perform well in the garden, so their findings are worth checking out in considering your choices.

Baptisia australis, a beautiful native perennial whose deep tap root keeps it lush-looking and healthy in heat and drought.
Credit: Gaye Mara

To find native plants for your location, check out:

- "Native Plants for Conservation, Restoration, and Landscaping," a comprehensive list published by Virginia's Department of Conservation and Recreation for each region of the state. Loudoun County Master Gardeners distribute the list for the Piedmont region at our weekly garden clinics during the growing season; we provide other gardening advice as well. See our clinic schedule at https://loudouncountymastergardeners.org/events/gardening-clinics/ .
- The Native Plant Finder on the National Wildlife Foundation website (https://nativeplantfinder.nwf.org/Plants); enter your ZIP Code to retrieve a list of native plants appropriate to your location.
- The Homegrown National Park website (https://homegrownnationalpark.org/buy-native-plants/), offering seed and plant collections by region and emphasizing the "keystone plants" that support the most native wildlife.
- Local native plant nurseries, including Earth Sangha in Springfield, Ecoplantia in Frederick, Watermark Woods in Hamilton, and Yellow House Natives in Berryville. Ecoplantia offers unique "roll-out gardens" complete with native plants and a to-scale printed garden design that you can lay on a garden bed, with planting holes marked for each plant. The traditional nursery Abernethy and Spencer in Purcellville has recently added several native plant greenhouses.

For those who are removing invasive plants from their property and replacing them with natives, Loudoun County offers financial support through its Invasive Species Management Program (https://www.loudoun.gov/6186/Invasive-Plant-Species-Management-Program).

For advice on the proper use of pesticides, contact the Master Gardener Help Desk at LoudounMG@vt.edu or 703-771-5150.

Regarding invasive plants, I've heard it said that we should just "leave nature alone" and let it rebalance natives and invasives on its own. One problem with that approach is that many creatures, insects in particular, are dependent on native plants and will be extinguished if we lose them. And so will the creatures higher up the food chain that feed on those insects. As biologist E. O. Wilson famously said, insects are "the little things that run the world."

A second problem with the laissez-faire approach is that native plants are not competing on a level playing field. Most invasives arrived here without the diseases and predators that kept them in check at home as our natives are kept in check here. And our overpopulation of deer eats native plants in preference to invasives; they have eliminated

the native understory in our forests and are also eliminating the replacements for aging native trees by eating the tender seedling trees as soon as they come up.

2. Replace mulch under trees with groundcovers and other plants. Groundcovers are living mulch that insulates and protects the soil and doesn't have to be replaced every year. More importantly, they and other plants provide cover and a "soft landing" for the caterpillars and other insect larvae that drop from trees to pupate and/or overwinter on or under the ground.

3. "Leave the leaves" and other natural clutter.

- Over the winter, fallen leaves and hollow plant stems host butterflies, native bees, and other small creatures; acorns, walnuts, and seed heads of flowers and grasses and the berries of poison ivy and Virginia creeper feed much other wildlife.
- In spring, the silk from spider webs is used by hummingbirds and other small birds to build their nests; the strands are strong and stretch to accommodate the growing chicks (see Audubon Society, https://www.audubon.org/magazine/what-do-birds-use-to-duct-tape-their-nests-together).
- Fallen logs host native bees; standing dead trees, or "snags," provide homes for cavity-nesting birds.
- Conserve water. As noted above, our rainfall and groundwater are dwindling. Some things we can do to manage with less water:
- Irrigate with driplines or soaker hoses instead of sprinklers; more water will get to plant roots instead of evaporating into the air.
- Further reduce evaporation loss by watering in the early morning when it is cooler.
- Hook downspouts up to rain barrels to store rainwater for later use; this will also reduce flooding and erosion.
- Convert lawns to gardens; garden plants, and natives in particular, require much less water than turfgrass. Sheet mulching is a chemical-free way to kill the grass; see this article by California master gardeners for guidance: https://ucanr.edu/blog/under-solano-sun/article/sheet-mulching-cardboard-dos-and-donts.

Hummingbird nest made with spider silk.
Credit: Mike's Birds

- For the lawn that remains, set mowers at 3.5" or higher and leave clippings on the lawn. Taller grass survives high heat better and uses less water, and the clippings are natural fertilizer.
- Important note: Newly planted landscapes still require an inch of water per week until they are established. So that will require the same amount of water as a lawn for about three years. The payoff is not immediate, but it is substantial after the plants are established.

5. Eliminate chemical fertilizers and broad-spectrum insecticides and limit other chemicals. Native plants in healthy soil don't need fertilizer. And our ongoing war on insects and other creatures we find annoying is wrecking the balance of nature and the base of the food chain.

- Chemical fertilizers are petroleum products. To the extent any fertilizer is needed (a soil test can tell you), use organic fertilizers. Make your own compost or buy local.
- For your own safety and that of other living things, use herbicides, insecticides, and other pesticides exactly according to the explicit directions that come with every product. Make sure you have correctly identified the pest you are trying to eliminate and confirm that the product is effective against it. Then target the application to that pest only.

6. Eliminate or reduce impermeable surfaces, which retain and radiate heat and block water absorption into the soil:

- All green plants, even turfgrass and non-natives, store carbon and produce oxygen. That makes them much superior to pavement.
- The manufacture of cement, the major component in concrete, "accounts for around 8 percent of all CO2 emissions worldwide," and the subsequent concrete manufacturing process produces additional greenhouse gases.
- Paths of grass, mulch, or gravel let water percolate into the soil instead of pooling or running off.
- If you have a sturdy flat roof, consider making it a green roof. (Britain's Royal Horticultural Society has a helpful guide at https://www.rhs.org.uk/garden-design/build-green-roof.)
- On a sturdy sloped roof, you can add solar panels to reduce fossil fuel consumption. (Energy Sage, https://www.energysage.com, can steer you to a good local contractor.)
- If the roof is not flat enough or sturdy enough, paint it white to reduce heat buildup and the energy demand from air conditioning.

7. Reconsider what you buy and use for the garden.

- Stop buying peat moss, a nonrenewable resource that is rapidly disappearing from Canada's peat bogs. Use coconut coir, a fine bark mulch, or compost instead.
- Buy local whenever you can and avoid the environmental impact of long-distance shipping: flowers, plants, and produce that are locally grown (or grown in your own garden); locally produced mulch and compost (or make your own).
- Replace gas-powered equipment with electric or hand-powered.
- Another "R" has been added to the 3R mantra: Refuse, Reduce, Reuse, Recyle. That is, refuse to buy products that are manufactured, packaged, and/or shipped using fossil fuels. And there's a reason "Recycle" is last on the list; recycling is a manufacturing process that consumes energy and produces pollution. And many allegedly recyclable products, particularly plastics, are not in fact recycled but end up in landfills and waterways.

8. Turn off outside lighting at night, use motion sensors, or change the bulbs from white to yellow to avoid attracting night flyers. We are losing huge numbers of migrating birds, moths, lightning bugs, and other night-flying creatures because of confusion from night lighting.

Then Let Us Do More

As has been said, what each of us does is just a drop in the bucket. But enough drops can fill the bucket. And it is all those drops in the bucket of our past actions that have brought us to the place we are now. Let's empty and refill that bucket with better drops.

Sixty percent of land in the United States is privately owned. If we work with other gardeners and landowners, together we can have a huge impact.

We know it can be done. My own community in Lovettsville has an ongoing project to clear invasives and replant with natives in our common land, and individual homeowners here are planting native gardens and groves. Many other such projects are going on in Loudoun County with the help of grants from Loudoun County's Invasive Plant Species Management Program.

And if we all become Earth's lobbyists, press federal officials and major corporations to do the right thing, and vote out or stop buying from those who don't, we can accomplish even more.

The cloud forest at Canto del Rio (https://www.cantodelriocr.com/en), a 60-acre private preserve in Costa Rica whose owner has been restoring the forest for 28 years. Credit: Gaye Mara

Again, it can be done. On a national level, Costa Rica is an inspiring example of environmental restoration, with 25 percent of its land in government conservation and strict environmental laws. In January, I visited a unique restored ecosystem there–cloud forests on the upper slopes of mountains, so called because they are constantly bathed in clouds. Their dense stands of tropical plants act like a sponge, soaking up the moisture from the clouds and releasing it in springs that provide most of the country's fresh drinking water—a critical ecosystem service. Many of those forests had been cleared for pastureland, but government, nonprofits, and private landowners have been buying the land back and restoring the cloud forests.

We are guests on this planet. It has been a generous host. Now Earth is ailing and needs our help, all of us, to start healing. Let's join hands and get going.

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[1] Variations of this quote are often cited as a Chinese proverb. But there is no record of it in Chinese literature; its first known appearance was in a Cleveland newspaper in 1967.

[2] Since 1991, the Scripps Institution of Oceanography at La Jolla, California, has been tracking oxygen levels from air samples collected at stations around the world. https://scrippso2.ucsd.edu.

[3] See U.S. Forest Service page on pine savannas as a threatened ecosystem at https://research.fs.usda.gov/treesearch/43573.

[4] Sullivan at 15-17. See also the Virginia Department of Forestry website at https://dof.virginia.gov/forest-utilization-sustainability/learn-about-forest-utilization-sustainability/ for more on Virginia's forests and forest history.

Garden for Bugs: Why Better Messaging Is the Key to Backyard Conservation

Sharon Murphy, Loudoun County Extension Master Gardener

When I was starting out as a gardener, I thought I was being a good steward of my land. My garden was full of butterfly bush, lantana, and zinnias, all purchased at a nursery that had helpfully labeled them as "pollinator magnets" or "butterfly favorites." I was so happy to see all the butterflies perched on the flowers of those butterfly bushes drinking nectar. Not only did I enjoy watching the insect action on those flowers, but I also felt proud that I was doing something good for the natural world. I didn't know what I didn't know about how to support biodiversity on my property, and I wasn't unusual in that respect. I had gotten the message to plant for pollinators, but I didn't execute the message in a sustainable way, not out of apathy but because the message itself is a vague directive.

Bluebird with a caterpillar. Credit: kansasphoto

What I had created was the ecological equivalent of a fast food restaurant. There wasn't much in my garden that could sustain the pollinators and butterflies through a full life cycle, and I simply didn't know any better. My garden was alive with pollinators, but I was feeding adults while starving the next generation. I had confused the appearance of ecological health with truly functional ecological health.

"Plant a pollinator garden." "Choose native species." "Support biodiversity." These are the popular slogans of the backyard conservation movement. The message is well-intentioned and the public, by and large, has been receptive. People are willing to make different choices in their gardens as evidenced by the fact that most plant nurseries now have a dedicated native plant section or have special signage boasting that certain plants are native. This is a demand-driven change. And yet insect and bird populations continue to decline, so there is clearly a disconnect between messaging and execution.

Public disinterest is not the primary issue. I believe the problem is that the current conservation messaging tells people what to do without explaining how to do it or why to do it in concise, easy to digest soundbites, and that gap leads to exactly the kind of mistakes I made. The movement needs a catch phrase.

Consider what happened in Texas in the 1980s. The state was spending roughly $20 million a year cleaning litter from highways. Officials had tried appeals to civic duty and environmental responsibility. Nothing moved the needle. Then, in 1986, the state reframed the campaign entirely. The new slogan "Don't Mess with Texas" said nothing about the environment but instead spoke to Texas identity and pride. Between 1986 and 1990, littering declined by 72 percent (Texas Department of Transportation, 1999). Facts alone don't normally elicit behavioral change because they lack context and may not be personally meaningful. "Don't Mess with Texas" worked because it gave people a clear reason to act that resonated with who they already were. Backyard conservation has not yet found its equivalent call to action that moves the needle in a meaningful way.

Currently, messaging fails to convey that herbivorous insects—especially caterpillars—are the foundation of the backyard food web and that that foundation is vital to the health and well-being of the birds we prize. Plants capture solar energy, and caterpillars and other herbivorous insects convert that plant energy into insect biomass. Birds and other wildlife feed on the insects. If we remove the insects from the food chain, then the whole system collapses. No bugs, no birds (this could be a great slogan!). For instance, a pair of Carolina chickadees raising a single clutch must deliver somewhere between 6,000 and 9,000 caterpillars to the nest before those chicks fledge (Tallamy, 2019). Caterpillars are protein-rich food for the young, and they are critically dependent on the right host plants. We need caterpillars if we want a healthy and diverse bird population.

This is where the nectar plant versus host plant distinction becomes essential and where most pollinator garden advice generally gets muddy. Simply because a plant is a butterfly magnet does not mean that it can allow the butterfly to complete its lifecycle. The emerging caterpillars simply cannot feed on the plant, so they starve. However, a native oak tree can host (feed) more than 500 species of caterpillars, and a native cherry tree can host more than 400. A non-native ornamental like my beloved Ginko tree, planted in the same spot may host none. This singular point moves the call for backyard biodiversity from an abstract notion to an actionable one that is attainable for most homeowners. There is a direct line between the call to action and the outcome: plant an oak, increase caterpillar population, increase bird population.

Most suburban yards, however well-intentioned, are ecological dead zones. The average suburban lawn hosts almost nothing (Tallamy, 2007). Many of our prized ornamental shrubs are non-native, and our insects are not adapted to them. Trees, if there are any, are often ornamental varieties selected for aesthetics rather than ecological function. Using myself as an example again, I have several lilac trees that I love very much but their ecological value is limited to shelter for birds and a brief period of nectar for pollinators. I'm not getting rid of them, or of any of my non-native plants, but I am supplementing my landscape with native species to help fortify the area food web. As Doug Tallamy put it: if you have one or more oaks in your yard, you can have your peonies (Tallamy, 2026). You can keep what you love. Add what matters and know that even one well-chosen plant is the beginning of a food web.

I don't necessarily see the result of my eco-efforts because much of it is invisible unless I purposefully turn over leaves in search of caterpillars or see partially eaten leaves. It's certainly not as fulfilling as seeing a butterfly bush teeming with butterflies, but I do notice an uptick in the variety of birds to my yard and have even noticed bluebirds (my favorite) are visiting the yard now. Attracting bluebirds was a goal of mine and something I've been working toward, so I do get excited when I see them in my yard. The presence of a variety of birds is one of the most reliable indicators that a backyard ecosystem is functioning.

Conservation messaging needs to walk a fine line between getting people to take action while also not shaming those who don't or who are just dipping their toes in the eco-water. Most people are not master gardeners or forestry professionals, nor do they possess a degree in environmental sciences and cannot be expected to have the time to digest the literature and connect the dots between caterpillar host plants versus nectar plants and bird populations. It is our responsibility as people working within this space to convey the information concisely and without judgment.

Conservation scientists at Virginia Tech have reached a similar conclusion. Sorice and Donlan (2015) found that well-intentioned conservation programs often fail not because people are unwilling to participate, but because the programs are designed without regard for what participants value. When messaging is built around the needs and values of the audience rather than the priorities of the messenger, participation increases and so does the kind of internal motivation that produces lasting behavior change. Just like the Don't Mess with Texas example, reframing the message to reflect the values of the population is going to be the most effective way to get people to support their bugs.

Understanding the foundational concepts of backyard ecology changed the way I approach my landscape. I stopped planting butterfly magnets and started asking "can anything reproduce on this?" I planted native milkweed and saw my first monarch caterpillars within a season. I stopped cutting down plants in the fall after learning that native bees may overwinter inside them. I started leaving fallen leaves on the ground because firefly larvae live in the leaf litter.

My garden looks very messy by springtime, but it is more alive than it has ever been. It has been a long journey to get to this point where my eco-mental paradigm has shifted, and I have spent a lot of time reflecting on why it took me so long to come around to the idea that while I was well intentioned, my landscape execution was flawed. I believe the answer is that I got the message, but the message was flawed.

The phrase "support biodiversity" is admirable but abstract. "Plant an oak because it hosts hundreds of caterpillar species that feed your chickadees" is concrete and specific but is quite a mouthful. I don't have a background in public relations or marketing, but I am also not afraid to propose a solution. The "Don't Mess with Texas" of backyard conservation could be:

Garden for Bugs. Everything Else Depends on Them.

There are many sound bites based on this that I can think of and I am sure a creative person could do much better. But I will leave you with these: "Leave the Leaves!" "Don't Clean 'til Spring!" and, of course, "No Bugs, No Birds!"

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Planting and Dividing Tall Bearded Irises

Lina Burton, Loudoun County Extension Master Gardener

Midsummer is coming and it's time to think about planting new irises and dividing those which have become crowded in your garden. Ideally, this should be done at least six weeks after they have bloomed but at least six weeks before the first hard frost. That puts the window of opportunity for planting and dividing irises squarely in the mid-July through September timeframe.

Buying Iris Rhizomes

Iris rhizomes are widely available at discount or "big box" stores and garden centers. Plants purchased from these sources may or may not be correctly labeled and may or may not have been dug and handled properly prior to your purchasing them. You may be lucky and buy a great plant; or maybe not. It's better to buy plants from a local grower — they will be raising plants suitable for our climate — or from the catalog of a breeder in a USDA zone similar to our own. If you're ordering rhizomes from catalogs, now is the time to do it. Irises ordered now will be delivered at the correct planting time.

Once you have your new rhizomes, remove them at once from the box or shipping container. If you can't plant them immediately, place the unpacked rhizomes in a dry, airy but shady spot. They can be held for about a week.

Planting New Iris Rhizomes

If you're planting a new iris bed or incorporating irises into beds of existing perennials, the most important thing to remember is drainage: bearded irises simply must have excellent drainage, such as is available on a slope or in a raised bed. Planting irises in soil which is poorly drained invites diseases. Other than this one imperative, irises will grow well in average garden soil to which some compost has been added, i.e., any soil suitable for growing vegetables. The ideal pH for irises is 6.8-7.0, but they are tolerant of soils which are either more acidic or more alkaline than this ideal.

Planting in a grid. Note "toes" of plants facing inward.
Photo by William Shear, courtesy of Dr. Shear and The American Iris Society, www.irises.org

In addition to excellent drainage and good garden soil, bearded irises need at least six hours of direct sun a day and good air circulation. Given these prerequisites, irises should do well in your garden.

You can plant your irises in one of two patterns:

- If you have only one rhizome of a cultivar, you can plant that rhizome 12-24 inches away from its closest neighbor in the garden. The closer you plant it to its neighbor, the sooner it will need to be divided. (I plant mine 24 inches apart so I don't have to divide as often.)
- If you have several rhizomes of a specific cultivar available, you can plant them as above or in a grid pattern, about eight inches apart, with the "toes" of each rhizome pointing toward the center of the grid as shown in the photograph. You'll have to divide much sooner if you use this planting pattern.

Plant the rhizome on a mound.
Photo by William Shear, courtesy of Dr. Shear and The American Iris Society www.irises.org

Actually planting and caring for iris is easy.

- Dig a hole 8-to-10 inches deep and wide in the garden bed.
- Mound up soil in the center of the hole.
- Place the rhizome on top of the mound and drape the roots down the sides of the mound.

- Fill in the hole with soil, leaving the top of the rhizome exposed; do not cover with soil unless you have extremely light, sandy soil, in which case cover with no more than 1 inch of soil. Planting too deeply is a common mistake. The plants won't die, but they may not bloom.
- Firm the soil around the rhizome and its roots.
- Water to settle the soil.
- For the first summer and fall, water whenever there is less than one inch of rainfall a week, but don't overwater.
- Because irises are drought tolerant, after the first year they usually don't need watering.
- For the first winter, lightly mulch after the ground is frozen. Clean wheat or oat straw or branches cut in January from your old Christmas tree are best, but if necessary you can use pine bark, compost, or chopped leaves. Just be sure to remove the mulch in early spring as the plants begin to show new leaves.
- Don't be surprised if a particular iris doesn't bloom the first year after planting. About 60-75% will bloom, but the rest require a second year to settle in.
- After blooming has finished, break or cut the bloom stalks off at the base of the plant and remove any diseased leaves which appear throughout the summer. Don't cut the leaves back into the traditional "fan", which once was a common practice. They need those leaves for photosynthesis to take place! Instead, wait and cut them off after the first hard frost.
- After the first year you can lightly fertilize your irises with superphosphate, bone meal, or any other high phosphate fertilizer, such as 6-10-10, depending on the results of a soil test. Avoid high nitrogen fertilizers — they encourage root rot and discourage blooming! Apply fertilizer lightly in early spring (February/March) and again about a month after bloom. Sprinkle the fertilizer on the ground around the clump, not on top of the rhizomes. (Some years I fertilize; other years I don't. Bloom may be a little smaller the next year, but disaster won't ensue!)
- Watch for diseases and pests. The American Iris Society has information about these problems at http://www.irises.org/About_Irises/Cultural%20Information/Pests_Diseases.html. Suffice it to say here that proper drainage, good air circulation, good soil with the proper pH, timely dividing, and good garden sanitation will go a long way to preventing these diseases and pest issues, and they are not insurmountable, especially if caught early.

Dividing Old Clumps

Bearded irises need to be divided every three to five years. For some cultivars it will be sooner — perhaps every other year. For others, you may be able to wait four or even five years. And, of course, if you originally planted them 12 inches instead of 24 inches apart, they will require dividing sooner. Nevertheless, for your irises to continue to prosper, eventually you must divide them. If not divided, bloom eventually will decline, any disease and insect problems present can worsen, more vigorously growing irises can crowd out less robust neighbors, and two or more cultivars can become intermingled so you won't know what you have when you finally do divide them.

Iris clump in need of dividing. Photo courtesy of Dana Brown, American Iris Society, Region 17, www.aisregion17.org

Any time from mid-July through mid-September (but definitely at least six weeks before the first hard frost) you can either dig and divide the entire clump or thin out the center of the old clump, leaving the daughter rhizomes in place.

If you decide to dig and divide the clump, proceed as follows:

- Trim the foliage back to about 12 inches. The plants will be easier to handle if you don't have lots of long foliage flopping about as you work.
- Dig each clump, one at a time. Don't try to work with more than one clump at a time — it's too easy to mix the cultivars up.

- Clean the clump, brushing or washing off excess dirt and removing dead leaves and debris.
- Break off the individual rhizomes at the joints — they should snap off — or cut them off with a sharp knife. Carefully tease out the roots that belong to each rhizome. Discard withered, or old, spent rhizomes and any which are soft or rotten. You'll probably have a lot of rhizomes from each clump. Replant the largest ones; as to the others? Your friends, neighbors, and fellow gardeners may be delighted to have them!
- To keep cultivars straight, write the name of each cultivar on the leaves of the rhizomes as you divide them, using a permanent marker. When you're finished, each division will be clearly marked with its cultivar name.
- Trim off about 2/3 of the roots emerging from each rhizome so they're easier to handle.
- Trim the leaves again, this time at an angle, leaving six-to-eight inches of foliage above the rhizome.
- Wash the rhizome with water and place in a dry, airy shady spot for a few days to allow the broken or cut ends to callus over. (I elevate mine on old window screens on a shady porch.)
- After processing, rhizomes can be stored for a few days or weeks before replanting by placing in a dry, shaded but airy spot, such as a sheltered porch.

The previously shown clump after digging and washing, ready to be divided. Photo courtesy of Dana Brown, American Iris Society, Region 17, www.aisregion17.org

- While the rhizomes are curing, renew the soil in the bed by adding compost and any amendments which a soil test suggests are required.
- Replant the rhizomes as you would a newly purchased iris.
- And you're finished!

If you decide to thin instead of divide the clump, proceed as follows:

- Cut out the withered, soft, rotten, or old spent rhizomes at the center of the clump.
- Leave the new, healthy rhizomes around the edge of the clump undisturbed. It's as simple as that! But be aware that eventually you will have to dig and divide those clumps — they'll just keep expanding outward and eventually encroach on their neighbors.

If you're really captivated by irises, the American Iris Society (www.irises.org) and its local affiliate, the Chesapeake & Potomac Iris Society (http://www.irisregion4.com/CPIS.htm), headquartered in Winchester, would be happy to have you join them.

Slugs in the Environment

Heather Keith, Loudoun County Extension Master Gardener

Slugs are shell-less gastropods that play important ecological roles. Thousands of land slug species are found worldwide, and even more sea slug species exist. Land slugs are found in moist environments such as gardens, forests, and other damp areas where they seek moderate temperatures as well as moisture. Slugs are not just snails without shells. The names slug and land slug are interchangeable. The names suggest any gastropod Mollusca that has no shell, or a very reduced shell. Snails, in contrast, have a coiled shell large enough that they can fully retract their soft parts. Slugs and snails are not insects; they both belong to the same soft-bodied Mollusk family. "Gastropod" means stomach foot--the single, large, muscular foot used to glide across surfaces.

Banana Slug https://news.ucsc.edu/2025/02/banana-slug-complete-genome/

Slugs have a terrible reputation. They are generally reviled and thought to be totally disgusting. Have you ever said, "Oh look at that cute slug?" Is "charismatic slug" an oxymoron? Actually, one slug and a whole classification of slugs are considered charismatic. The California banana slug native to the forests of Northern California is bright yellow and the largest land slug in North America measuring up to almost 8 inches. Sammy the Slug is famously the mascot of the University of California, Santa Cruz.

Nudibranch. Credit: Bernard Picton - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=22742547

The other charismatic slugs are sea slugs. The name "sea slug" is often applied to all slug-like creatures found in the sea—from nudibranchs to a paraphyletic set of other marine gastropods—that live without apparent shells. They are considered charismatic due to their very diverse shapes and colors.

Grey field slug, *Deroceras reticulatum* Credit: Carol Ivory

Two common garden slugs are found in Loudoun County; both are non-native. Most common is the grey field slug, Deroceras reticulatum, found in gardens, which can grow 13/4 to 23/8 inches and can travel up to 40 feet in a single night. This slug has creamy or light coffee cream-colored skin, which can sometimes appear dull orange, pale grey, or light brown in color. They can live 1 to 2 years. They are the most common crop and garden pest within the county. This slug originated in the European lowlands, Great Britain, and Ireland. Insert photo 3

Another less-common, non-native garden pest is the leopard slug, *Limax maximus*, which can grow 4 to 8 inches and can live 2 to 3 years. They get their name from the dark spots on their lighter-colored bodies. The leopard slug is from Europe and was first discovered outside its native range in the United States in Philadelphia in 1867.

These two non-native species are serious pests of both horticultural and agricultural crops. They can destroy foliage faster than plants can grow. They also feed on fruits and vegetables prior to harvest, making holes in the crops that make the products unsellable. These slugs can also make crops vulnerable to rot and disease.

Garden slugs are the ones in your garden and the ones you hate. We have native slugs, but you will never see them in your garden or in any cultivated area. Northern Virginia is home to many members of the Virginia Mantleslug family, Philomycus virginicus. You will find them in undisturbed upland forests and hiding under rotting logs. They are 2 to 4 inches long and have a different appearance because they are covered with a thick, fleshy protective mantle that makes them appear to be long and slender. Native slugs have received little research because they are not a garden pest.

Elements common to all land slugs

All land slugs produce a large amount of slime. Slime reduces friction, keeps the skin moist, deters predators, and cushions them to glide over sharp surfaces. This slimy secretion is thick and sticky and may taste very bad, making them unpleasant to eat for many predators. Some raccoons and some birds have learned to roll the slug in dirt to lessen the effect of the slime. Slugs move using the muscular organ on the underside of their body called a "foot." They glide forward through wave-like rhythmic muscle contractions and the slime that they secrete. The mucus of slugs has been studied for antimicrobial properties, wound-healing properties, and adhesive properties.

Slugs' soft bodies are highly susceptible to drying out. For this reason, they often can be found under stones, boards, mulch, leaf litter, and untrimmed plants, and in soil crevices. They emerge mostly at night when the temperatures drop and humidity rises. They will hide in dark, damp places during the day. Slugs are often hard to spot. Look for slime both on plants and on the surrounding surfaces. It is easiest to see the trails of slime first thing in the morning. Slugs' hiding places are important to remember when trying to make your yard less attractive to them.

Slugs play an important part in the food chain. They are widely eaten by birds. They are preyed upon by both vertebrates and invertebrates. They are the main diet of lightning bug larvae. Fish that feed on slugs include the brown trout; frogs and toads are both important predators of slugs. In Northern Virginia, the most prominent reptiles that naturally feed on slugs are small, non-venomous, secretive snakes. Dekay's Brownsnake is often called the ultimate "slug assassin". Birds that prey on slugs are common blackbirds, starlings, owls, vultures, and ducks. Mammals that eat slugs include foxes, opossums, skunks, moles, shrews, mice, and squirrels. Ants are a common predator of slugs, and beetles also will feed on slugs.

Nutrient recycling: Slugs are the clean-up crew. They are detritivores and omnivores; they consume rotting vegetation, dead insects, and animal waste, accelerating decomposition. Their excrement returns essential elements like nitrogen, phosphorus, and potassium back to the soil. They use radula, a ribbon-like structure with microscopic teeth, to scrape and grind food before swallowing it. Sometimes they eat other slugs and slug eggs.

Soil Aeration and Structure: As slugs burrow underground, they create tunnels that allow water, oxygen, and nutrients to easily reach plant roots. Their mucus also acts as a natural glue, helping soil particles bind together to improve drainage and prevent erosion.

Fungal Spore Dispersal: Many slug species consume fungi, helping to spread spores across the ecosystem, which supports plant and fungi biodiversity.

Slugs are not bad to have around; we just don't want them around our susceptible plants.

Warning! Eating live slugs is highly dangerous and can be fatal. They act as hosts for the rat lungworm parasite, *Angiostrongylus cantonensis*. Ingesting a slug can transfer this parasite to the human brain, leading to a severe form of meningitis and long-term complications. While most of us would never intentionally ingest a live slug, they might be found hidden in leafy green vegetables. To safely remove live slugs from leafy greens, submerge the vegetables in a sink or large bowl filled with cold, heavily salted water or a mixture of water and distilled white vinegar for 10 to 15 minutes.

Clearing your garden of slugs: Baits can be used in both agriculture and gardening to control slug populations. Iron phosphate bait is currently preferred over the more toxic metaldehydes. The chemical properties of metaldehyde make it incredibly dangerous to humans, pets, and wildlife if ingested or improperly handled. It is the most frequent cause of poisoning in dogs and cats. Iron phosphate has been found to be effective and a safer bait to use. The iron disrupts the snail's digestive tissue and calcium metabolism; it stops eating and dies in a couple of days. Parasitic nematodes have also been used to control the population of slugs. They are applied in water and actively seek out the slugs and infect them, causing their death. This is the control method often used in organic growing systems. Small gardens can also use crushed eggshells and coffee grounds to prevent the spread of slugs in the garden. Both the crushed eggshells and the coffee grounds must be applied as a thick, continuous barrier around vulnerable plants. They need to be monitored and possibly replenished after rain.

Gardeners can take steps to reduce slug populations by understanding slugs' egg-laying habits, preferred hiding spots, and nocturnal behavior. Reduce the moist hiding spots and egg-laying spots of snails. The grass should be cut short around vegetable gardens. Regular mowing will reduce opportunities for the slugs to hide. It would be helpful to remove any debris lying around the garden such as overturned pots, pieces of wood, old mulch and soil bags, and stones. Any dead or dying leaves should also be removed. This will improve airflow and discourage damp, shaded conditions the slugs love.

Slugs lay eggs in moist, sheltered environments. Eggs are laid in areas such as moist leaf litter, compost piles, or near water sources. Two to twenty eggs are laid at a time; they are small, white, and oval-shaped. They will incubate for 2 to 4 weeks, depending on temperature and humidity. A single slug can produce more than 100 eggs per year.

Calibrate your efforts against slugs to fit your garden and remember the benefits of slugs in the environment,—their role in the food chain, their nutrient recycling, and their benefits to the soil.

Mosquitoes!

Barbara De Rosa-Joynt, Loudoun County Extension Master Gardener

"Mosquitoes are my favorite insect!" Said no one ever. I think we can all agree that mosquitoes are incredibly annoying, and, unfortunately, they can also carry diseases. They are an inevitable part of our lives, but how can we keep them from ruining our time outdoors?

Mosquito cartoon. https://publicdomainvectors.org/en/free-clipart/Cute-mosquito/38602.html public domain image - photo credit publicdomainvectors.org

As in any battle, you need to know your opponent to fight that opponent successfully. It is also important to understand what works and what does not work. A lot of misinformation exists. People try to sell you products and services that can waste your money and harm pollinators, other beneficial insects, fish and other organisms in your local streams, and potentially even you and your pets.

In Virginia we have around 40 species of mosquitoes, two of which are common:

1. Asian tiger mosquito (*Aedes albopictus*) is the top nuisance mosquito in Northern Virginia and is an aggressive day-flying mosquito that can carry West Nile virus.
2. Culex mosquitoes (*Culex restuans* and *Culex pipiens*) are small, less aggressive mosquitoes that bite at dusk and dawn. They prefer birds but will bite humans and can transmit West Nile virus.

***Aedes albopictus* – Asian tiger mosquito.** https://commons.wikimedia.org/wiki/File:CDC-Gathany-Aedes-albopictus-1.jpg photo credit James Gathany, CDC public domain photo

Prevention is the most effective and safest approach to mosquito control, so focus your efforts on removing breeding sites.

The best way to control mosquitoes is to kill them as larvae, not to treat them when they are adults. Why? Mosquitoes lay up to 150 eggs at a time over up to four cycles. Those eggs and the larvae they turn into are concentrated together, whereas adult mosquitoes are dispersed widely. Which is an easier target? Breaking the mosquitoes' life cycle is key to reducing populations.

Everywhere we look people are trying to sell us products or services to kill adult mosquitoes.

Bug zapper. https://commons.wikimedia.org/wiki/File:Bug_zapper.jpg photo credit Mk2010

Why doesn't killing adult mosquitoes work to reduce mosquito populations?

Fogging and/or spraying: Adult mosquitoes disperse widely, so fogging and spraying only kills the small number of individual mosquitoes present when the chemicals are applied. The National Wildlife Federation advises that despite marketing claims that they only kill mosquitoes, the most widely used residential mosquito sprays are also highly toxic to native pollinators like bees and butterflies, as well as fish and other aquatic organisms, and they can even pose a risk to pets and people.

Bug zappers: Numerous studies have found that these devices kill few mosquitoes and instead kill many non-targeted species.

Ultrasonic devices: Scientific trials have found these devices have not worked as claimed.

Plants: Living plants do not repel mosquitoes. While concentrations of certain plant extracts,

e.g., citronella, can repel mosquitoes, living plants that contain those chemicals like citronella grass, lemon balm, or marigolds, do not release enough of these chemicals into the air to create a deterrent. The chemicals need to be extracted and concentrated in order to have a deterrent effect.

How do mosquitoes find us?

Mosquitoes use their senses to detect a combination of carbon dioxide, body heat, and sweat to find their hosts and then use visual cues to hone in on their target. The National Institutes of Health (NIH) studies and other studies indicate lighter clothing is less attractive to mosquitoes, which may be because it confuses the visual cues (like the high contrast created between humans and light sources) they use to identify targets. Long sleeves and pants can also help because they reduce the amount of skin showing—studies show that no matter a person's skin pigmentation, any human's skin emits a strong red-orange visual signature that mosquitoes can see, and they apparently connect these long-wavelength colors to food sources.

What does work?

Protect yourself. Take standard precautions by wearing white or light-colored clothing and using an EPA-registered insect repellent containing DEET, picaridin, or oil of lemon eucalyptus on exposed skin.

Take away their breeding grounds. This is the single most important thing you can do to reduce mosquito populations in your yard. Tiger mosquitoes are famous for being able to breed in as little as a bottle cap of water. Think about all the places in your yard that can hold much more water than that.

Kiddie pool. https://commons.wikimedia.org/wiki/File:Black_Labrador_Retriever_kiddie_pool..jpg Photo credit Pete Markham

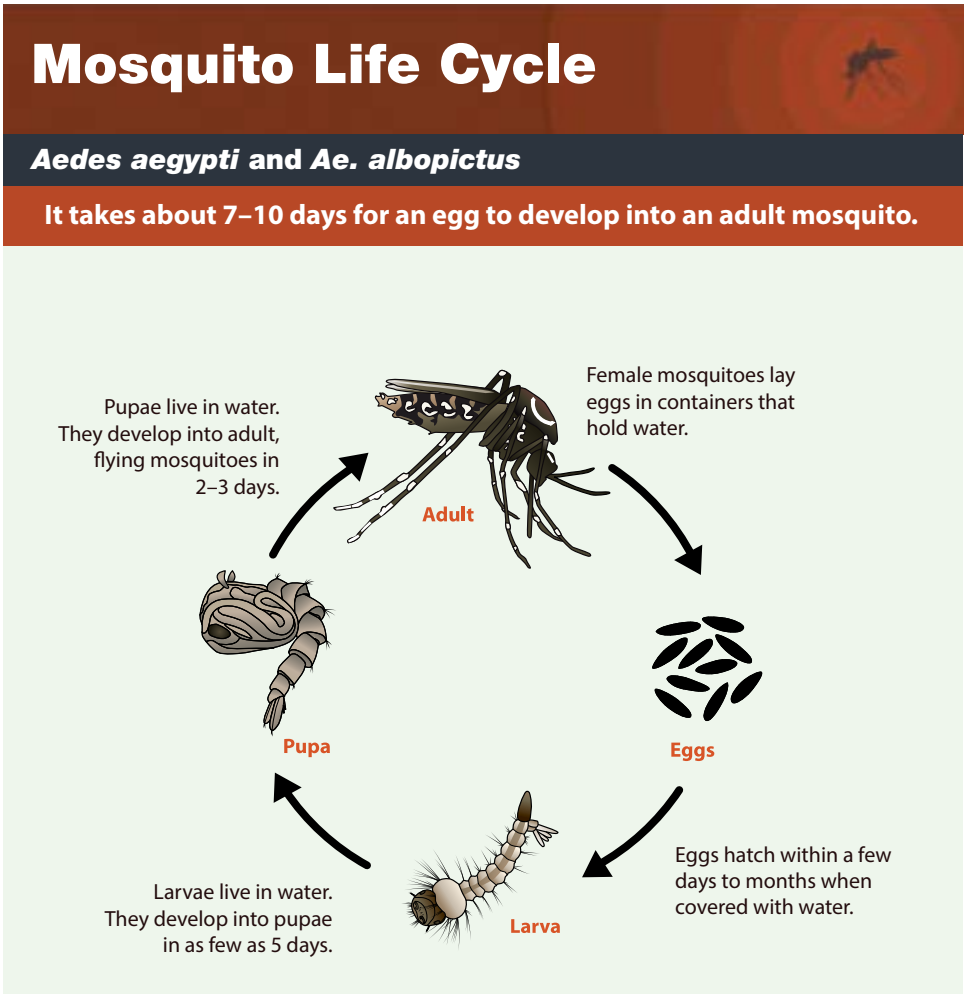
1. Remove standing water—check everything: flower pot trays, gutters, children's toys, buckets, kiddie pools, gutter splash blocks, corrugated downspout extensions, tarps, pet water dishes, hollow trees, cans, trash and recycling bins, and trash—including bottle caps! Again, check everything. Shallow water is more attractive than deep water, but check everything, including ensuring your gutters are draining properly and not holding water.
2. Change water in bird baths every 2 to 3 days.
3. Use mosquito dunks in rain barrels, even if they have a screened top, and in small water gardens without fish.
4. Make a do-it-yourself mosquito trap like the "bucket of doom" to trick mosquitoes into laying their eggs in water containing Bti (*Bacillus thuringiensis israelensis*, a larvicide that kills mosquito larvae) that will prevent the offspring from hatching and break the mosquito lifecycle. Information on how to make a bucket of doom is found below.

Use fans. Mosquitoes are notoriously weak fliers and a simple fan—ceiling fan, pedestal fan, box fan, oscillating fan—makes it more difficult for them to fly in the turbulent air created. This can really help in outdoor seating areas. As a bonus, the fans disperse your carbon dioxide and body heat and keep you cool so you sweat less, which makes it harder for mosquitoes to find you in the first place.

Eastern pondhawk dragonfly (*Erythemis simplicicollis*) https://www.flickr.com/photos/atlnature/48569818652 photo credit Shawn Taylor

Encourage their predators. There is no creature on Earth that only eats mosquitoes, or even one that prefers mosquitoes, but there are some that can and do eat them. Welcome predators like bats, frogs, and toads, which can eat mosquitoes flying at dusk and dawn. Dragonflies and some of our favorite backyard birds such as bluebirds, hummingbirds, purple martins, and swallows can eat day-flying mosquitoes. Fish in water gardens or backyard ponds can eat mosquito larvae as well. Provide diverse, chemical-free habitats to support these helpful predators.

Encourage your neighbors to join you in doing the things that work, and discourage them from doing the things that don't work, especially those that can harm pets and local wildlife. The more neighbors taking positive action to break mosquitoes' lifecycles, the fewer mosquitoes you will have in your neighborhood.



Mosquito life cycle graphic. https://www.cdc.gov/mosquitoes/pdfs/aedeslifecycle-p.pdf - CDC public domain image

Bucket of Doom

The so-called bucket of doom was created by noted entomologist Professor Doug Tallamy and his non-profit Homegrown National Park organization. It is a simple do-it-yourself project that can be completed in minutes. As the name suggests, it uses a bucket of water to attract mosquitoes to lay their eggs in water has been treated with Bti, which will kill the larvae before they can hatch and turn into mosquitoes, thereby interrupting the mosquito lifecycle and eventually reducing mosquito populations. Lots more information including sample text to tell neighbors and friends what you are doing, FAQs, and more are found at the Homegrown National Park website: https://homegrownnationalpark.org/mosquito-bucket-challenge/

Homegrown national park graphic. https://hnp-event-materials.s3.us-east-1.amazonaws.com/MBC+Materials/Mosquito+Bucket+Sticker+for+Home+Printing.pdf

What do you need to build your bucket?

Required materials. Credit: Barbara De Rosa-Joynt

Materials

- Bucket (5-gallon or similar)
- Metal hardware cloth
- Zip ties
- Bucket lid (optional)

Tools

- Drill
- Wire cutter
- Utility knife (if using optional bucket lid)

What do you put in your bucket?

- Water
- Organic material (leaves, grass clippings, straw, or similar)
- 1/4 of a mosquito dunk (Bti)

Mosquito dunk. Credit: Barbara De Rosa-Joynt

Before you assemble your bucket:

1. Drill a small hole in the side of your bucket at the desired water line. This will prevent the bucket from overflowing from excess rain.
2. Create a lid to prevent very young children, pets, or wildlife from accidentally falling into your bucket. While the contents are nontoxic, you don't want anyone or anything in there except mosquito larvae.

   Simplest lid to create: Cut a piece of hardware cloth to cover the top of the bucket with enough left over to bend down on the sides an inch or two. You will need to drill two to four or more holes near the top of the bucket that you will use to zip tie the hardware cloth down to anchor it after you have assembled your bucket. You will need to replace the zip ties when you need to add a piece of mosquito dunk to your bucket every 30 days.

   Simplest lid to use: Cut out the middle of the 5-gallon bucket lid in whatever shape you like. Cut a piece of hardware cloth to fit that hole plus a little extra. Drill four or more holes through the lid near the opening. Use a zip tie to fasten your hardware cloth to the inside of the bucket lid using the holes you just drilled. To keep things neat, fasten the zip ties on the inside of the lid and trim off the extra zip tie material, as shown in the photo. This style of lid is more complicated to make but will be easier to use when you need to add a piece of mosquito dunk to your bucket every 30 days.

Plastic lid with hardware cloth. Credit: Barbara De Rosa-Joynt

3. **Decorate your bucket.** (optional) Many people opt to paint or otherwise decorate their buckets to explain what they are doing, and many examples for inspiration can be found on the internet. Get creative! The graphic above is available to download for free from the Homegrown National Park website. That site also has a sticker of the graphic you can get for a fee.

How to assemble your bucket:

1. Fill your bucket 2/3 full with water.
2. Add a small handful of dead leaves and/or grass clippings. These materials will break down as the water sits and create an ideal habitat for mosquitoes looking for a place to lay their eggs. To speed this process along you can leave your bucket in the sun for a few days before moving it to its permanent location in a shady spot.
3. Add ¼ of a mosquito dunk. In this case, more is not better—the amount of dunk you use is based on the size of the surface area of the water.
4. Attach your lid.

Assembled buckets of doom.
Credit: Barbara De Rosa-Joynt

5. Place your bucket in its new home. (As indicated above, you may want to let it marinate in a sunny spot for a few days before moving it to its final destination.) According to Homegrown National Park, buckets work best in quiet, shaded areas where mosquitoes are likely to gather. Corners of your yard or along property lines often work well. Look for a spot that stays damp and undisturbed.

How to maintain your bucket. You can dump out your bucket and reassemble it every 30 days if you like—the contents are safe to pour out into a garden bed or in the grass—but you don't need to do so. The grosser the water is the more the mosquitoes will love it! Whether you replace the water or not, you will need to add ¼ of a dunk every 30 days during mosquito season (early May to early November in Virginia).

Get on the map! Homegrown National Park has a map of properties with buckets of doom—you can add yours here: https://homegrownnationalpark.org/build-mosquito-bucket/

Hydrangea Basics

Lina B. Burton, Loudoun County Extension Master Gardener

Hydrangea is a very large genus comprising 70 or more different species. Of these, only six are generally grown in the United States. Cultivars of this summer-blooming shrub range from an impressive 20 feet tall (*H. paniculata*, when grown as a small tree) to a diminutive two feet tall, suitable for small gardens and pots. The woody vining species, *Hydrangea anomala* ssp. *petiolaris*, can grow up a wall, building, or tree to 60 feet or more if really happy with its site. Hydrangeas can be used as specimen plants in the landscape, massed as a flowering hedge, in mixed garden borders, or even in large pots.

The six commonly available species are:

- *Hydrangea macrophylla* (bigleaf hydrangea, French hydrangea, mophead hydrangea, garden hydrangea, hortensia, florists' hydrangea, snowball hydrangea). This is the traditional hydrangea, found in old homestead gardens, a small-to-medium shrub with white, blue, pink, and purple flowers
- *Hydrangea serrata* (mountain hydrangea, serrated hydrangea, tea of Heaven). Sometimes treated as a variety or subspecies of *H. macrophylla*, a smaller plant with flower buds more cold hardy than *H. macrophylla* but very similar in other aspects.
- *Hydrangea quercifolia* (oakleaf hydrangea). Large native shrub with oak-like leaves and conical white flowers fading to purplish pink/rose in midsummer and good fall leaf color.

***Hydrangea macrophylla*, in typical mophead flower form.** Credit: Shihmei Barger, Licensed under Creative Commons at www.flickr.com/photos/beautifulcataya/3760271024/in/album-72157624344853262

- *Hydrangea arborescens* (smooth hydrangea; seven-bark, wild hydrangea). A small to medium-size native shrub with white flowers. Pink cultivars are now available.
- *Hydrangea paniculata* (peegee hydrangea). Another old garden favorite. A large shrub frequently grown as a small tree now being bred in smaller sizes for smaller gardens. Conical flowers are white, fading to purplish-pink in late summer. A few pink and lime cultivars are now available.
- *Hydrangea anomala* ssp. *petiolaris* (climbing hydrangea. This climber has large sterile flowers surrounding a central cluster of fertile flowers, all of them white.

Generally, hydrangeas are easy to grow if you give them a site appropriate for the specific cultivar and follow some very basic guidelines for their care.

A few prefer full sun; most are contented with partial or dappled shade; and a few prefer full shade, but not deep shade, where they won't flower well. Ideally most hydrangeas should have 4-6 hours of sun to flower well, preferably morning sun and afternoon shade.

- They all generally like moist but well-drained, rich, loamy soil. Don't plant them in either wet, soggy soil or excessively dry soil; they won't thrive in either situation. A layer of compost or mulch helps keep the soil cool, retain moisture, and control weeds.

Typical lacecap flower. Credit: Ken McMillan Licensed under Creative Commons At https://www.flickr.com/photos/kamcmillan/14702586335/in/album-72157626766945839

- Because of their large leaves, hydrangeas tend to need a lot of water, particularly the first year after they are planted. A thorough soaking once or twice a week may be needed if rainfall is inadequate, but don't overdo it – soggy is not good! Generally, one inch of water a week during the growing season is sufficient. Even if adequately watered, the leaves of some may wilt in the heat of the day, particularly if the plant receives hot afternoon or full sun. Before watering, check the soil 4-5 inches down to make sure it's actually dry. It may be moist and the plant may not need watering at all; it simply may not be able to replace the water fast enough that it's large, leaves transpired during the day. It will recover in the cool evening. If this happens, moving the plant to a shadier spot may solve the problem. People with wells cannot water safely during a drought; in these cases, hydrangeas, particularly bigleaf and smooth hydrangeas, will look ratty but they will survive.
- Fertilizer requirements are species specific, however, all hydrangeas appreciate an occasional dose of fertilizer, generally 8-8-8 or 10-10-10 applied in March, May, and July, or a timed-release fertilizer in March only, sprinkling it around the plant's dripline.
- Pruning is rather specific to each of the species, and needs to be done carefully. It is important to know if the plant blooms on old or new wood (see below) as this affects the pruning schedule. Generally, pruning should be done only for one of the following reasons:
    - To remove dead wood;
    - To snip off flower heads if these aren't wanted for late summer and fall interest;
    - To remove leaves damaged by a late frost;
    - To increase air circulation;
    - To reduce the size of an badly overgrown plant if absolutely necessary; or
    - To reshape a plant.
- Diseases and pests are few and rare if plants are well grown. The most serious problem in our area is deer – hydrangeas occasionally are severely damaged by deer, and if they nip off the flower buds in winter browsing, you'll have little or no bloom the next year.

Old vs. New Wood

Some hydrangeas (specifically bigleaf, mountain, oakleaf, and climbing hydrangeas) bloom on old wood, i.e., growth made by the plant the previous growing season. Pruning these hydrangeas at the wrong time will result in no bloom or diminished bloom the following summer. Generally, these hydrangeas need little or no pruning except to remove dead wood. Prune these lightly, if at all, *immediately* after flowering, before flower buds begin to set.

***H. paniculata* 'Vanille Fraise' with panicle flower.** Credit: Eleanor (Ellie) Enking Licensed under Creative Commons at https://www.flickr.com/photos/33037982@N04/9952012756/in/album-72157624042781700

Others (specifically smooth and panicle hydrangeas) bloom on new wood, i.e., growth made the current year. These hydrangeas can be pruned at any time after they bloom, even in late winter or early spring. Even if killed to the ground by a particularly harsh spell of freezing weather, they will regrow from the roots and you'll still have flowers that summer.

The distinction between old and new wood is also important when selecting plants. All of the hydrangeas grown in our region have roots and leaf buds which are hardy and will survive freezing temperatures. Some of the mountain and bigleaf hydrangeas, however, have weak flower bud

dormancy which may break during a warm spell in late winter. When freezing weather returns, the flower buds die and the plants will not bloom that summer. If this is a concern, select only varieties which say "improved bud hardiness" or similar language or a reblooming cultivar. Planting on the northern or eastern side of a slope or building reportedly is also helpful.

Thanks to hybridizing, some *H. macrophylla* and *H. serrata* cultivars have now been bred which will bloom on both old and new wood, obviating the bud hardiness question. Technically these are called "remontant" hydrangeas. Informally they may be referred to as "ever-blooming" hydrangeas. In catalogs and on nursery labels they are specifically referred to as "Reblooming" or "Rebloomers". Rebloomers generally don't need pruning except to remove dead wood.

Bloom Failure

Generally hydrangeas fail to bloom for one of the following reasons:

- The plant is getting too much shade.
- The plant blooms on old wood and the flower buds were browsed by deer, were cut off by pruning too late in the season, or were killed by a late winter or early spring freeze after they had started to expand.
- The plant is receiving too much nitrogen, resulting in large leaves, but no flowers.

Flower Forms

Not only are hydrangea flowers lovely in the garden, they also are useful in both fresh and very long-lasting dried bouquets. Hydrangea flowers are of three different types: mophead (globular), lacecap, and panicle (cone-shaped or pyramidal).

- **Mophead:** When people think of hydrangeas, the mophead flower form is the form which immediately comes to mind. This is the type usually seen at supermarkets and florists' shops around Mother's Day, grown specifically in pots for the occasion. Mophead clusters consist of many small sterile florets, clustered together to form what looks somewhat like round puffballs. Sometimes there are tiny fertile florets beneath the showy flowers, but they are very small, and hidden by the larger florets. The large sterile flowers can last for weeks on the plant. Mophead flowers appear in several, but not all, of the species.
- **Lacecap:** In the lacecap flower form the tiny, bud-like pollen-bearing fertile florets are readily visible to the naked eye and are surrounded by showy sterile florets. The entire effect is of a lacy, flat cap. Lacecap flowers can occur in all of the species grown in our gardens and some species only bear the lacecap form of flower.
- **Panicle (cone-shaped, pyramidal):** Cone-shaped flower clusters can be small or as large as 12-15 inches long. Oakleaf hydrangeas typically are arranged in cone-shaped clusters as are flower clusters of *H. paniculata*.

***Hydrangea anomala* ssp. *petiolaris*, Climbing Hydrangea.** Credit: Leslie Turek Licensed under Creative Commons at https://www.flickr.com/photos/33063009@N00/5192531473/in/photostream/

Flower Color

Hydrangea quercifolia, *H. arborescens*, and *H. anomala* ssp. *petiolaris* species are available only in white. In the past *Hydrangea paniculata* and *H. arborescens* also were only available only in white but thanks to hybridizers, color has now been introduced to these species.

Hydrangea macrophylla and *H. serrata* come in white, blue, pink, purple, combinations of these shades, and red. With these two species, and only these two species, the color-controlling factor for the blues and pinks (and only the blues and pinks), while expressed as soil pH, actually is the availability of aluminum in the soil. Soils where aluminum is readily available (i.e., acid soils with a pH of 5.5 or below) produce plants with blue flowers. Soils above pH 7.0 (alkaline soils) produce plants with pink flowers. Between these two figures, i.e., between 5.5 and 7.0 (neutral) plants will have a mixture of blue, pink, and purple flowers. To change the color of the flowers, the soil pH must be changed which, of course, can be done if it's important to have a specific color. Or you can simply let nature take its course and have a lovely tri-colored shrub with tones of purple intermixed among blue and pink.

With so many species and cultivars available, at least one of these wonderful hydrangeas is bound be suitable for inclusion in most gardens!

***Hydrangea arborescens* 'Annabelle'.** Credit: annasinfinityart, Licensed under Creative Commons at https://www.flickr.com/photos/annasinfinityart/14878188099/in/album-72157667140832720

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