July 2020-Vol.6 No.7

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In the Ornamental Garden

By Cathy Caldwell | July 2020-Vol.6 No.7

The key words for the month of July are watering and weeding. This is not the time for planting or transplanting, and if either becomes necessary, be vigilant about watering and mulching to keep soil temperatures down as much as possible. It's best to postpone new plantings until the cooler days of September. Cutting back and deadheading perennials for re-bloom are definitely on the agenda.

Watering

- **Water new plantings** to be sure they stay moist. The root systems of recently-planted perennials, shrubs, and trees are too small to cope with drought conditions initially. Even drought-tolerant plants require ample moisture during their first year or two in the garden.
    - Water plants in the cooler, early morning hours so that the water will soak into the ground rather than evaporate into the air.
    - Water plants deeply, giving them about an inch of water per week.
    - Avoid sprinkling plants from overhead. That just moistens the top of the soil but it

doesn't put water down at the root level where it's needed.
    - Use drip irrigation or soaker hoses under the mulch to water slowly and deeply at the base of each plant. If you don't have drip irrigation, use a hose with an adjustable nozzle or a watering can to deliver water only at the base of each plant.
    - Don't water foliage; that can encourage diseases.
- In the absence of sufficient rainfall, even **established plants may need water**.
- **Check containerized plantings daily** for sufficient moisture levels. Potting soil dries out at the surface but it may be wet deeper in the pot. Stick your finger about two inches into the soil. If the soil at the tip of your finger feels dry, then add water. Water the soil – not the leaves. Bear in mind that plants have different moisture needs. Succulents and cactus, for example, prefer to be kept on the drier side whereas many annuals prefer evenly moist soil. How often you need to water will depend on the planting medium used, the type of container, the amount of sunlight, and the plants themselves.
- Be efficient in your use of water. To learn more about how we gardeners can conserve this essential resource, read Creating a Water-Wise Landscape, Va.Coop.Ext. Pub. 426-713. As this publication makes clear, sprinkler systems and other kinds of overhead watering are not nearly as efficient as drip or trickle irrigation systems:

"Avoid watering by hand. It often wastes water as there is excess runoff, and water does not penetrate beyond the top 1 inch of soil. This irrigation practice harms plants by forcing root growth too close to the surface. If you must water by hand, place a 5-gallon bucket with a few holes in the bottom next to the plant and fill it with water; when it is has drained, move it to the next plant and refill.

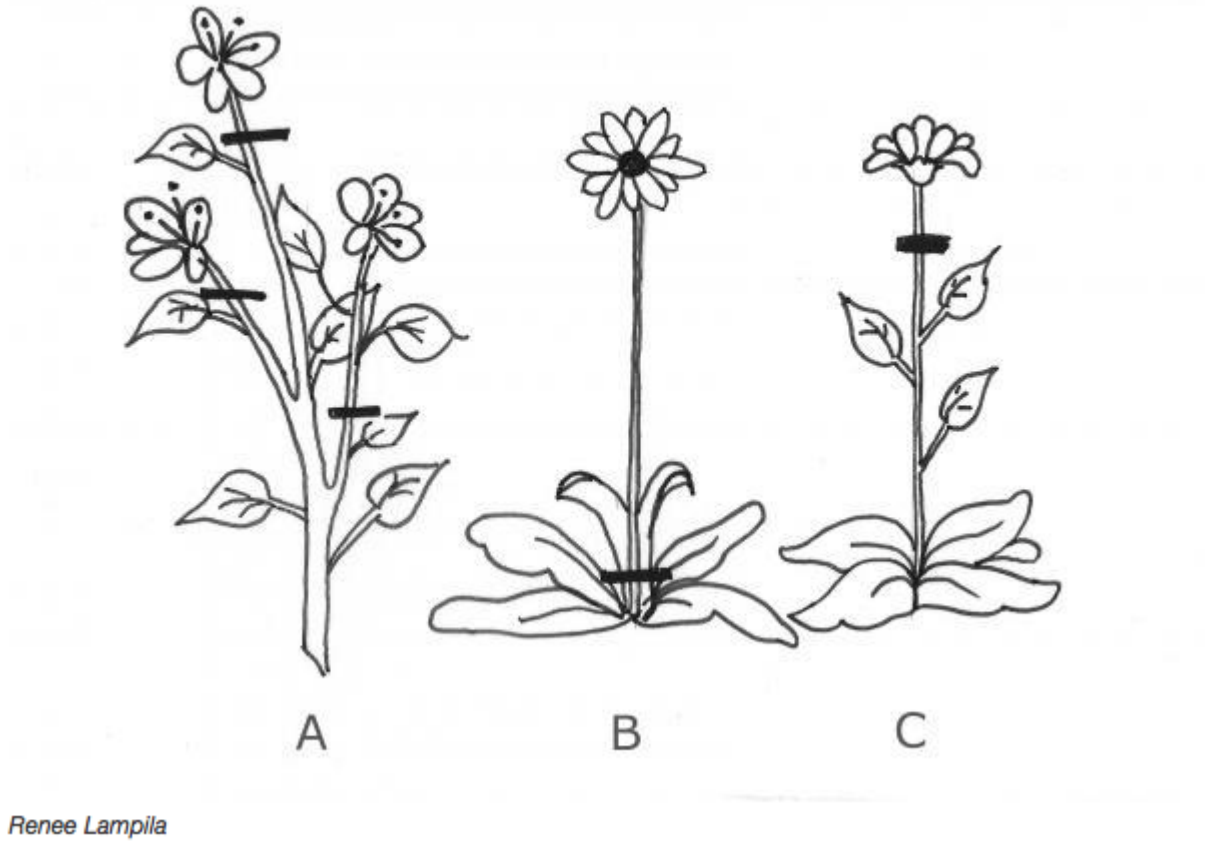
If you're using rain barrels or stock tanks to store rainwater — an earth-friendly practice — be sure to **treat that standing water to prevent mosquitos.** The larvicide in mosquito dunks or rings is a naturally-occurring bacteria from the soil and does no harm to wildlife, except to mosquito larvae. Read more about backyard mosquito control in "Battling Mosquitos," N.C.Ext.,https://chatham.ces.ncsu.edu/2014/08/battling-mosquitoes-2/.

Weeding

Weeding is the last thing you'd choose to do on a hot summer day, but it's truly important. Try attacking the weeds in the cool of the morning or evening. You want to get them before those weeds set seed and before they steal nutrients and moisture from your desirable plants. And keep in mind that weeds may spread disease.

Pruning, Cutting Back and Deadheading

- **Deadheading and pruning can yield more flowers** on certain perennials and annuals. Shear or pinch back the spent blossoms of zinnia, lavender, scabiosa, snapdragons, garden phlox, purple coneflower, and thread-leaf coreopsis so that the plant will develop more blooms later on. If you want to know more about how to employ deadheading and pruning for reblooming or staggering blooms through the season, I highly recommend the book *The Well-Tended Perennial Garden* by Tracy DiSabato-Aust, whose studies in her own garden have made her an expert.



How to Deadhead Plants of Different Growth Habits. Drawing: Renee Lampila, courtesy of N.C.Extension

- **Deadleafing —** the removal of dead leaves from perennials — can improve the appearance of a plant, especially one that has already bloomed. It can also prevent or reduce the spread of disease or pests.
- **Pinch back chrysanthemums and asters** one last time no later than mid-July. Do not pinch them back after that. Otherwise, the plant will not have time to set buds for this growing season. Pinching these plants back helps keep them from splaying open in the middle and also delays bloom time until later in the growing season.
- **Pruning shrubs:** July has traditionally been the final opportunity to prune azaleas and rhododendrons before they begin to set buds for next spring. This is true for a number of other shrubs as well, including quince, mountain laurel, deutzia, forsythia, winter jasmine, lilac, and deciduous viburnums, as well as several others. Before you start, consult the Cooperative Extension's Shrub Pruning Calendar. And hone your pruning techniques with help from A Pruning Primer: Tools, Techniques and Timing in *The Garden Shed*, Feb. 2020. If you see signs of earlier bud set due to our changing climate, please comment below.

Monitor for pests and diseases

Mid-summer is when many problems with pests and diseases become noticeable. Watch for powdery mildew, black spot, rust, root rot, and for pests like aphids, Japanese beetles, and stinkbugs. Prompt removal of diseased foliage can help prevent the spread of disease, as can picking off insect pests. Review the recent Garden Shed articles on "Integrated Pest Management," The Garden Shed, May 2020, and

"Natural Pest Control: Attracting Beneficial Insects," The Garden Shed, June 2020.

Bearded Iris: To Divide or Not? And How?

"Dividing Iris," Video, Kansas State Research & Extension.

Unlike most perennials, daylillies and iris are usually divided in late summer. Very few of my irises — and I have both Siberian and Bearded types — bloomed this year, so I suspect they need dividing, which needs to be done between July and the end of summer. The most frequent causes of failure to bloom are (1) rhizomes are planted too deep instead of near the surface where they need to be, (2) too much shade, (3) too much fertilizer, or (4) plants have become overcrowded and need division. Mo.Botanical Garden/ Iris Germanica. Typically, iris need to be divided every three years. For instructions on how to do this task properly, look at Dividing Iris/Univ.Md.Ext. and Dividing Iris/Penn.St.Extension. And you can **watch a video**: Dividing Iris, Kansas St. Univ.Extension.

Be sure to take a look at the additional tasks and tips at Monthly Gardening Tips, July.

July is often the peak month of bloom in many gardens, so be sure to stop and enjoy those flowers. This is a good time to take some pictures and to take a hard look at your design and spacing, making note of plants to move or remove or divide or add in autumn or next spring.

SOURCES:

The Well-Tended Perennial Garden (Tracy DiSabato-Aust, expanded ed. 2006)

Va.Coop.Ext. Shrub Pruning Calendar

Featured Photo: courtesy of Gail Clark

Native Species or Cultivars of Native Plants–Does it Matter?

By Susan Martin | July 2020-Vol.6 No.7

There is a lot of excitement about planting native plants, and the reasons for choosing them are well-researched. However, when home gardeners look for native plants in nurseries, they often find cultivars of natives rather than straight species. Straight species native plants have grown in a particular area or ecoregion for hundreds or even thousands of years, are open-pollinated, and grow true to seed. Many plants marketed as “natives” in garden centers have never grown naturally in the wild. The word cultivar means a cultivated variety; to meet the definition of a cultivar, a plant must be bred asexually. Some cultivars originated as “sports” or mutations that were discovered in the wild. Most cultivars, however, are the result of selective breeding by humans. Hybrids are the result of a genetic cross between two different species. A plant label will give the genera and species in italics, followed by another descriptive name in single quotes. This last name indicates that the plant is a cultivar. An example of a naturally occurring cultivar is the eastern redbud tree, *Cercis canandensis* ‘Appalachian Red’. This native, fuchsia-pink- to red-flowered tree was discovered growing along a road in Maryland. The purple coneflower cultivar, *Echinacia purpurea* ‘Pink Double Delight’, is a hybrid developed by plant breeders for its showy double blooms.

Cultivars are developed for attractive characteristics such as striking flower colors; shorter, bushier forms; colored or variegated leaves; winter hardiness; and improved disease resistance. These qualities make them easier to incorporate into a home garden design, particularly when space is limited. There have been many

field trials on native cultivars that assess these “improvements” relative to the straight species and to different cultivars. Gardeners can look up the findings on specific plants to see which cultivars have performed best. This article, however, focuses on a different aspect: “Do native cultivars provide the same benefits to our home garden ecosystems as straight species native plants?”

To answer this question, we’ll focus on current research. At this point, there are two main areas of study. The first looks at woody plants, and the effects of cultivar characteristics on leaf-eating insects, caterpillars in particular. The second area focuses on herbaceous plants, and the effects of cultivar characteristics on pollinators.

Readers who would like to refresh their familiarity with terms such as straight species, open pollination, variety, cultivar, and hybrid, can refer to a past article from *The Garden Shed* on plant nomenclature.

WOODY NATIVE CULTIVARS AND NATIVE LEAF-EATING INSECTS

Many of us are familiar with Douglas W. Tallamy, noted entomologist from the University of Delaware and author of *Bringing Nature Home* (2007) and *Nature’s Best Hope* (2019). Although his research has been ongoing for many years, he more recently has been conducting research trials at the Mt. Cuba Center with doctoral student Emily Baisden. The studies focus on **whether cultivars of native woody plants are as productive as straight species,** productive in the sense of supporting native insects, caterpillars in particular. Gardening for wildlife, such as butterflies, birds, and bees, requires plants that can support juvenile stages of insects, not just the nectar-sipping adults.

The field study included 16 species of woody plants, both trees and shrubs, with cultivars of each species, for a total of 160 plants. The species were planted in the middle of a ring surrounded by the cultivars matched to each species. Tallamy chose cultivars that varied from their straight species counterparts in one of four ways:

- plant habit
- disease-resistance
- leaf color variation
- increased berry size

His team studied three insect behaviors: how lepidoptera caterpillars react to the changed characteristics found in cultivars; how and whether hatching bagworms recognize plant differences; and the overall insect impact on the plant during a season. Researching insect response takes years to reach conclusions. To appreciate the challenges of setting up a trial study and collecting data, as well as a listing of plants in the study, and a discussion of study results, see this video of Kim Eierman of EcoBeneficial interviewing Tallamy. Or, read a transcript of Eierman interviewing Tallamy.

Ninebark (Physocarpus opulifolius) Photo: courtesy of U.S. Fish & Wildlife Service

Do his study results vote yay or nay on using cultivars? **The only trait out of the four that consistently deterred insect eating was changing green leaves to red or purple or blue.**

Ninebark 'Autumn Wine' (Physocarpus opulifolius) Photo: Susan Martin

As Tallamy explains, "Red leaves remove chlorophyll from the leaf and load it with anthocyanins, which just happen to be feeding deterrents."

Regarding the other cultivar traits, slight variegation did not affect insect feeding; however, **as the percentage of variegation increased, the leaves became less attractive**. **Changing plant habit, such as making a shrub more compact, had no effect on insect feeding.** On the other hand, **the larger-berried highbush blueberry cultivars supported more insect species** than their straight species counterparts.

As Tallamy has noted, "What we're looking at is **different types of genetic changes,** and then we can extrapolate because there's no way we're going to look at all tens of thousands of cultivars. Fortunately, there are only a few types of genetic changes that create a cultivar. **We are looking for patterns that emerge from these few changes."**

Cultivar research offers opportunities for **important work on plant diseases**. Preliminary results of Tallamy's study of American elm (*Ulmus americana*) indicate that the 'Princeton' cultivar, which is resistant to Dutch elm disease, is no less attractive to insects. A very good sign, according to Tallamy who holds great hope for the introduction of "back-crossed" American chestnuts (*Castanea dentata*) that were almost eradicated in the last century by chestnut blight.

HERBACEOUS NATIVE CULTIVARS AND POLLINATORS

The next area of research to cover is the comparison of native plants vs. cultivars of natives with regards to pollinators. Several studies have conducted comparative field trials, the first undertaken by **Dr. Annie White of the University of Vermont** (2016) in replicated research gardens at two sites in northern Vermont (see photo of Maidstone Plant Farm at top of article). The field trial included 500 plants, 14 native species with native cultivar pairings. For a description of the study, a listing of species and their pairings, and study results for particular plants, see White's blog (3/01/16), From Nursery to Nature: Are native cultivars as valuable to pollinators as native species? You may also wish to see a video of Kim Eierman's interview with White on her study and results.

Asclepias tuberosa. Photo: Sarah Bingham

Asclepias tuberosa 'Hello Yellow'. Photo courtesy of Missouri Botanical Garden PlantFinder, PlantFinder/Mo.Botanical Garden

What her studies have revealed is that the more **manipulated the cultivars became, the less attractive they became to pollinators.** Therefore, if considering native cultivars for use in a pollinator garden, open pollinated seed-grown "selections" or "sports" (naturally occurring mutations) are the best choices. **Cultivars that differ significantly in color**

and morphology from the native species should be used cautiously. (Morphology is a study of the form of things. In plants, it includes the roots, stems, leaves, flowers, and fruits.) White hypothesized that color differences and decreased nectar and pollen production in hybridized cultivars are the leading factors. However, she also cautioned that **cultivars should be evaluated individually.** White found that about half of the cultivars in her study were comparable to the native species, and about half

were inferior. It's important to note that although the cultivars in the study were sometimes less attractive to pollinators than the native species, the cultivars were still visited by pollinators. This suggests that cultivars provide valuable floral resources in the landscape. For example, all pollinators combined exhibited a significant preference for *Agastache foeniculum* over the cultivar *Agastache* 'Golden Jubilee'. However, 'Golden Jubilee' had a higher mean pollinator

visitation rate than all but two other native species in the study. There were also cases when the native cultivar was equally attractive, such as *Aesclepias tuberosa* and the cultivar *Aesclepias tubersosa* 'Hello Yellow', a naturally occurring mutation in the natural population. One native cultivar selection, *Veronicastrum virginicum* 'Lavendelturm' (Lavender Towers) attracted significantly **more total pollinators** than the native species and had a longer bloom time.

Tallamy's research showed that making a woody plant more compact did not change its attractiveness to **leaf-feeding insects.** But White found that **compact form** for herbaceous plants **does seem to have an influence on pollinator attraction,** because compactness often equates with fewer flowers per plant and

fewer floral resources.

A comparison of the straight species, *Echinacea purpurea* and three *Echinacea* cultivars focused on altered traits of color, compactness, double-flowered, hybridization, and sterility.

Echinacea purpurea Photo: Sarah Bingham

Echinacea purpurea 'White Swan' Photo: Susan Martin

Echinacea purpurea 'Pink Double Delight' Photo courtesy of Missouri Botanical Garden PlantFinder, PlantFinder, Mo. Botanical Garden

Results of the study showed pollinator preference for the straight species, *E. purpurea*, followed by *E. purpurea* 'White Swan', an open-pollinated seed cultivar of *E. purpurea*. The interspecific hybrid, *Echinacea* 'Sunrise', a cross between two different species of *Echinacea*, was less attractive to pollinators. The double-flowered cultivar, *E. purpurea* 'Double Pink Surprise', was the least attractive. The reproductive organs (stamens and carpels) in double-flowered varieties have been modified into additional petals, thus rendering the plant sterile or near sterile, and reducing the quantity and/or accessibility of floral rewards. These results are consistent with the recommendation to use open-

pollinated cultivars that are true to seed. Choosing a cultivar that's **as close to the native species as possible—in morphology, bloom time, and color**—is going to increase the likelihood that it's a comparable substitution.

NECTAR REWARDS

White also studied patterns of nectar production in two native species of *Lobelia*, *L. cardinalis* and *L. syphilatica*, and four native cultivars. One cultivar had nectar equivalent to the species, but the rest of the cultivars had less. One cultivar had only 20% of the nectar available from the species. This means that **when pollinators are attracted to the cultivars, they may have to work harder to get energy rewards equivalent to their visits to native species.** White is studying not just the quantity of nectar produced by flowers but also the quality. In this video, using *Monarda fistulosa,* she shows how she measures both the standing nectar, which is the amount of nectar at any time, and the secretion rate, which is how quickly the plant can reproduce nectar. With sugar content ranging from about 15-75%, not all flowers are equally valuable to pollinators. She will study the differences in nectar production between native species and cultivars, and she plans to measure pollen in future research as well.

ADDITIONAL RESEARCH ON POLLINATOR ATTRACTION

Phlox paniculata. Photo courtesy of Missouri Botanical Garden Plantfinder, PlantFinder, Mo. Botanical Garden

At the University of Delaware, **Keith Nevison,** a graduate student (2016) with Dr. Deborah Delaney, conducted field trials at Mt. Cuba. **He compared insect attraction, nectar quality, and floral characteristics between U.S. Eastern *Phlox* species and associated cultivars.** In total, 6 straight species, and 10 cultivars were evaluated for factors having the greatest influence on insect visitation. Results suggest that certain *Phlox* cultivars, especially those selected from the wild, are more attractive to insects than their straight species counterparts. Cultivars *Phlox* 'Jeana' and 'Lavelle' were far more attractive to pollinators than the straight species *Phlox paniculata*. This is presumed to be due to the ease with which the insects were able to get at the nectar in the narrow-shaped flowers. Both cultivars also had high nectar volume and sucrose content, making them ecologically beneficial to feeding pollinators. For the majority of *Phlox* cultivars, however, insect attraction and nectar quality did not differ significantly in comparison to their associated straight species. In the case of *Phlox paniculata* and its cultivars, the narrowness of a flower's corolla, in

Phlox paniculata 'Jeana' Photo: Missouri Botanical Garden Plantfinder, PlantFinder, Mo. Botanical Garden,

particular, has a strong influence on insect attraction. Like White, Nevison cautions that native **cultivars need to be considered on a case-by-case basis.** In addition, more experimentation in different parts of the country over a longer time frame may yield different results.

Also at the University of Delaware, Deborah Delaney and graduate student, Owen Cass, are looking at **how well various plants attract insects** by assessing floral traits such as color, **nectar and pollen quantities, and the nutritional qualities of nectar and pollen.** They are comparing differences among cultivars within two genera: *Coreopsis* and *Monarda*. Plans are to use the diverse selection of flowers present at Mt. Cuba Center to develop a pollen library for commercial and hobbyist beekeepers. Study results have not yet been published.

OTHER WILDLIFE CONSIDERATIONS

It is important to note that although the larger fruits produced by some cultivars, such as the highbush blueberry, may be more attractive to insects, larger berry size may be problematic for some birds. In addition, although more compact form on woody plant cultivars did not deter insect feeding, a more compact form might negatively affect bird nesting. This reminds us to **consider ways in which cultivar characteristics might impact wildlife in addition to insects.**

BIODIVERSITY AND NATIVE CULTIVARS

A major consideration when using human-bred and hybridized native cultivars in the landscape is the **loss of genetic variation naturally found in open-pollinated plant populations.** Humans reproduce most hybrid varieties through vegetative propagation, either by tissue culture, or by cuttings and divisions, making hybrids genetic clones of each other. **This sameness can make our planted landscapes more vulnerable to disease, pests, or other disruptions.**

There is also the **potential for cultivars to hybridize with surrounding populations of native species.** According to the Maryland Cooperative Extension, studies have shown that, in some cases, cross-pollination with cultivated varieties resulted in the loss of the wild species. This loss has ramifications for all the species that interact with the native plant. Or, cross-pollination with strong cultivars can make wild species stronger. Although this could benefit the plant species, increased vigor could also make the wild relatives more effective at competing with other plant species, putting the balance of the ecosystem at risk.

Sterile cultivars of native plants can’t cross-pollinate with their wild relatives, so they pose no risk to wild plant populations. Sterility is a two-edged sword, however, because sterile cultivars may have reduced pollen and nectar production. As White points out:

> *Breeding for sterility can inhibit flowers from setting seed, hence resulting in longer bloom duration. This could be a benefit to pollinators if the flowers continue producing ample nectar and pollen, but this is often not the case. Degrees of sterility can vary among cultivars, along with quality of nectar and pollen production, making it important that floral resources for pollinators are evaluated on a plant-by-plant basis. To our knowledge, nectar and pollen production have not been studied in Echinacea cultivars, but in other species, male-sterile cultivars have significantly decreased nectar and pollen flow.*

Additionally, gardeners need to consider the impact of sterile, non-seed-producing cultivars on seed-eating bird populations.

COLLABORATIVE RESEARCH

In 2017, a diverse group including representatives such as ecologists, geneticists, public garden professionals, government organizations, and research/cultivar developmental entities, met to discuss the development of an analytical tool that would evaluate which native species and/or native cultivars might be appropriate to different planting objectives and to different planting sites. Sites were identified as: 1) large, undisturbed sites identified as candidates for restoration, that were in proximity to wild plant populations or, 2) small, highly disturbed sites that were isolated from wild plant populations, such as urban gardens. For the large undisturbed areas, native species were recommended as essential for restoration. For the small sites, the group proposed a lower risk/higher rewards trade-off analysis for including cultivars that met various criteria. For information on their recommendations, see this report.

A CALL TO HOME GARDENERS

Four botanic gardens (Chicago Botanic Garden, Denver Botanic Gardens, North Carolina Botanic Garden, and San Diego Botanic Garden) are asking home gardeners to join a study across the country to investigate whether cultivars of native plants or "nativars" (a popular term, rather than a scientific term, often used in casual reference or in marketing) provide the same pollinator service as native species. Since spring 2018, participating public gardens have been planting popular native species with matched cultivar pairings to compare pollinator use. In addition, **home gardeners are being asked to watch such comparisons in their own gardens,** and to complete weekly 10 minute observations while flowers are blooming, and record the number and type of pollinators that visit. Data will be uploaded via the Budburst Data Portal. The **Nativars Research Project runs through fall 2022**. For information on the native plants and native cultivars recommended by geographic area, pollinator identification, guidelines on how to participate, and to register with **Budburst**, go to this link.

SUMMARY

At first, we were so happy to have a "simple" way to help the environment: plant native plants. But then the cultivars started multiplying, and the choices became more difficult. Were we even asking the right questions? Fortunately, there is good research, and more is coming. Studies have shown that cultivars aren't always good, and they're not always bad. In fact, goodness and badness can be partly defined by our gardening priorities. Researchers have concluded that cultivars of native plants should be evaluated on a case-by-case basis. The research is providing us with a framework for analysis: does the native cultivar exhibit characteristics similar to the species plant, or has the cultivar been altered too far from its origin? Annie White advises, "Choosing a cultivar that's **as close to the native species as possible—in morphology, bloom time, and color**—is going to increase the likelihood that it's a comparable substitution." **This means, of course, that we must begin by knowing the species' characteristics, and how they've been altered in the cultivar.**

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Feature Photo of Plant Trial Gardens, Maidstone Plant Farm, University of Vermont, Dr. Annie White.

Root Vegetables: Underground Culinary Treasures

By mking | July 2020-Vol.6 No.7

Like many of my fellow gardeners, I enjoy digging in the dirt, feeling soil textures with my fingertips, and discovering earthworms wriggling around those dark places. Although some people might find this somewhat odd, most young children are eager to grab a stick and poke around in that brown stuff underfoot. Why the compelling interest? For kids, it's fascination with unexpected critters and other mysteries waiting to be revealed. For me, it goes beyond that. My respect and appreciation for the earth beneath my feet relates to an awareness that good soil is the secret to success with most horticultural pursuits. That said, let's explore some of the vegetables that grow at or below the soil's surface.

What's a Root Vegetable?

Beet. Photo courtesy of Pixabay.

Vegetable is a general term that refers to any of the plant parts, such as flowers, stems, leaves, seeds, fruits, or roots, that humans or other animals consume. What we call a *root crop* is a special type of vegetable with an enlarged storage organ that develops from the root tissue of a plant. So, a *root vegetable* grows underground, and its starchy contents provide essential nutrients for the rest of the plant that grows above ground. This article focuses on four root crops that are easily cultivated in our region (Zone 7a): beets, parsnips, turnips, and rutabagas. Perhaps potatoes, sweet potatoes, and yams come to your mind as root crops, but technically, they are classified as *tuber crops* that grow horizontally beneath the surface of the soil. One major difference between tubers and root crops is that tubers can be sliced apart and subsequently replanted to develop a new plant. What about onions, garlic, and shallots that grow underground? Well, those are actually *bulbs*, although some people consider them a special type of root vegetable.

Why Bother with Root Crops?

First of all, root crops would never be winners in a beauty contest. When you spot them in the produce section of a grocery store, these lumpy, slightly dirty, misshapen specimens look a bit like ugly ducklings that no one really wants. To make matters worse, because root vegetables inhabit the damp, gloomy underworld, they develop tough skins for protection and must be thoroughly cleaned and peeled before being eaten. On top of that, in order to soak up water and moisture below ground, these edible roots typically have hairy extensions that must be removed before they are cooked or consumed. And, if that's not enough of an inconvenience, beets, parsnips, turnips, and rutabagas are very dense and must be boiled, roasted, or sauteed for quite a while before they soften up enough for your dinner plate. Oops, that sounds like a negative marketing pitch.

Before you cast off these bumpy underground edibles, consider their many favorable features. Root vegetables tend to be relatively inexpensive, and ounce for ounce, they are packed with nutritional benefits. As earth dwellers, root crops absorb plenty of minerals and nutrients directly from the soil around them. Unlike many other colorful, fresh vegetables that have to be consumed fairly quickly before they spoil, beets, parsnips, turnips, and rutabagas can be stored for weeks or months, if given the right conditions (a cool place is best). Although taste preferences vary from person to person, most would agree that root veggies are excellent options that can be prepared in various ways to add tantalizing flavors to any meal. Finally, root vegetables are generally low in calories, cholesterol, and fat, but notably high in dietary fiber. What a great combination! Here's more about the nutritional value of these root vegetables.

Be Heart Healthy with Beets

Red beets. Photo courtesy of Pixabay

Known as *Beta vulgaris* in the scientific community, the common beet is a dark red, spherical taproot. Other cultivars of this vegetable are available (e.g., golden beets), but their nutritional value will differ. Red beets contain betaine, an antioxidant pigment that provides important cardiovascular benefits. They are a rich source of folates, manganese, iron, and B vitamins, as well as nitrates, which are converted to nitric oxide in the body to help relax and dilate blood vessels. This support for better circulation can lead to lower blood pressure. The potassium found in beets works to help flush out extra sodium from the bloodstream. Some research suggests that beet consumption has general anti-aging effects, such as improved brain function, physical performance, and endurance. Other studies show that beetroot extract can even reduce the growth of cancerous cells. Not to be forgotten are the beet greens that grow above the soil, which are well-known for even greater nutritional benefits. No wonder beets are listed as a "superfood."

Cancer Protection from Parsnips

The scientific name for parsnips is *Pastinaca sativa*. A parsnip, which is closely related to carrots and parsley, has a long, slender, dense, cream-colored root. Parsnips are rich in vitamin C, which helps resist infection, boosts immunity, and supports healthy connective tissue, teeth, and gums. This root vegetable provides a rich supply of B vitamins, plus vitamins K and E. The antioxidant compounds in parsnips fight inflammation, in addition to offering some resistance to liver disease, colon cancer, and certain types of leukemia. Compared to other vegetables, parsnips boast the highest potassium content, which is a factor in strong bones and muscles. The generally high mineral content of parsnips, including calcium, copper, iron, manganese, selenium, and phosphorous, offers an impressive set of health benefits.

Parsnips. Photo: Courtesy of Pixabay.

Stay Fit and Trim with Turnips

Turnips, also referred to as *Brassica rapa*, are thick, round roots with purplish-white coloring on the outside and tough white flesh inside. An excellent source of vitamin C, turnips help fight respiratory infections, such as the common cold, as well as harmful free radicals that play a role in the development of cancer. As a high-fiber cruciferous vegetable, consumption of turnips can aid in digestion and prevent constipation. As a result, they may contribute to reduced obesity rates and lower incidence of stomach and colorectal cancer. Turnips also contain protein and phytonutrients, which are associated with long-term benefits for human health. In addition, turnip greens are rich in vitamin A, B-complex, and C, along with calcium, copper, iron, potassium, and manganese, offering a more potent nutritious punch than the turnip root.

Turnips. Photo courtesy of Pixabay.

Rutabagas, Low-Calorie Powerhouses

Rutabaga. Photo: Garitzko, Public Domain.

Rutabagas are a hybrid of wild cabbage and turnips. First developed in Sweden, they are often called Swedish turnips, but the proper scientific name is *Brassica napus, var.napobrassica.* Rutabagas are similar in appearance to turnips, but bigger and slightly more elongated in shape. Light brown on the outside, their inner flesh is golden yellow, with a taste that's noticeably sweeter than turnips. Rutabagas are proportionally richer in B-complex vitamins than turnips, but offer a similar high level of vitamin C. They have relatively high amounts of glucosinolates, known to reduce inflammation and decrease the risk of heart disease and certain types of cancer (colorectal, prostate, breast). Rutabagas also contain phytonutrients, antioxidants that support eye health. Sufficient consumption may prevent

cataracts and macular degeneration.

Getting Started with Root Vegetables

Now that you know more about the nutritional value of root crops, I hope you're inspired to try growing at least one of these vegetables. For success with cultivation, keep the following information in mind. You don't need a large area, since root crops can be quite productive in a fairly small space. They thrive in full sun, so choose a spot with 6 – 8 hours of sunlight per day. Root crops require a soil pH of 6.0 – 6.8, so you'll want to get your soil tested and find out how to amend the soil, if needed. If you provide a soil sample, the Virginia Tech Soil Testing Laboratory will conduct a comprehensive analysis and make recommendations for nutrient management (for a fee of $10 – $16). Visit their web site for instructions and required forms: https://www.soiltest.vt.edu/

Photo courtesy of Pixabay

Root vegetables prefer loose, well-drained soil with sufficient air penetration. For heavy soil (like typical Virginia clay), consider adding compost or other organic matter. Raised beds work well for root crops because this method reduces soil compaction, allowing the vegetables to grow downward more easily. Raised beds also enable better water management to prevent the soil from being too waterlogged or dried out. Classified *as cool weather crops*, root vegetables can be planted in early spring, up to 30 days before the last frost date for a summer harvest, or in late July or August for a fall harvest. They tolerate chilly temperatures and can be harvested close to the first frost date in the autumn.

If you choose to fertilize, two pounds of 10-20-10 per 100 square feet for parsnips, turnips, and rutabagas and 10-10-10 for beets can be broadcast onto the soil prior to planting. Moisten the soil to prepare it and then water it every other day until germination for a higher percentage of seeds that sprout. At planting time, read the spacing recommendations on seed packets carefully; root crops that are overcrowded may not develop well. Then, be patient, as root vegetables tend to have slow germination rates.

Cultural Practices and Potential Problems

Pull any weeds you notice around seedlings when they are small, or they may become entwined around the roots of developing vegetables, making it difficult to separate them from the crops. Don't forget to thin out rows of new seedlings, or there will be too much competition for water and nutrients. If plants are too close to each other, root vegetables may fail to thrive or become misshapen. Spacing beets and rutabagas every 4 – 6 inches, and parsnips and turnips every 3 – 5 inches will work well. Consider eating the greens from the plants that you thin out. The leaves of beets and turnips are nutritious and tasty, but wait until the greens are 6 – 8 inches tall.

After seedlings emerge, lay mulch around them to control weeds and keep the soil moist, which will

maximize crop yield. However, if the site remains too wet, vegetables can get root rot or decay. Be vigilant about hand weeding to allow the vegetables to thrive as they grow beneath the ground. These root crops have relatively few diseases, but they are subject to blight and downy mildew. Turnips and rutabagas may also get club root. A three or four-year rotation of your crops in the garden area will help to reduce these problems. Possible insect pests to watch for are root maggots on turnips and rutabagas, leaf miners on beets, and rust flies on parsnips.

Photo courtesy of Pixabay

Harvesting and Storing Root Crops

After all your hard work, be sure to harvest these vegetables at the appropriate time. Root crops left in the ground too long can get pithy and bitter. Beets are ready when they are 1 – 3 inches in diameter (45 – 80 days to maturity). Turnips are ready when 2 – 3 inches in diameter (30 – 60 days to maturity), and rutabagas are ready at 3 – 5 inches in size (80 – 100 days to maturity). Parsnips and rutabagas like chilly weather, which improves their taste. Harvest rutabagas after a couple frosts, but parsnips can remain in the ground throughout the winter, if you mulch them with straw (94 – 120 days to maturity).

After harvesting root vegetables, you can keep them for several weeks or months, as long as they are kept in a cool place (32 – 40 degrees F) with relatively high humidity. Remember to trim the tops off (within ½ inch of the root) before placing them into storage, but don't wash the crops until you're ready prepare them for a meal. Note that turnips and rutabagas give off a slight odor, so plan accordingly when choosing where to store them.

Enjoy the Produce

All your hard work raising these crops should lead to some culinary adventures for your mealtime enjoyment. Root vegetables are generally too hard to eat raw, but they can be steamed, boiled, roasted, grilled, or sauteed as a key ingredient in many delicious recipes. For steaming or boiling, peel and prepare beets, parsnips, turnips, and rutabagas just as you would potatoes before mashing them. Roasting or grilling these vegetables will add to their zesty flavor. Slice or cut them up, drizzle with olive oil and your choice of spices, and roast on a baking pan in the oven or in a metal basket on the outdoor grill. You can also saute' root crops that have been cut into small chunks, but allow sufficient time for them to soften up and then add your favorite spices.

Photo courtesy of Pixabay

Looking for recipes for your root crops? Check these out:

https://www.foodnetwork.com/recipes/food-network-kitchen/glazed-carrots-and-turnips-recipe-2011522

http://www.tasteofsouthern.com/mashed-rutabagas/

https://www.lovebeets.com/recipes/orange-beet-salad/

Enjoy this short video that reviews the benefits of roots crops and how to prepare them: www.youtube.com/watch?v=7EjTnc-dL8U

If you haven't tried growing or preparing root crops before, this might be a great time to dig into something new!

Photo courtesy of Pixabay

SOURCES

https://ext.vt.edu/lawn-garden/home-vegetables.html

https://extension.umd.edu/hgic/topics/growing-vegetables

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https://ag.purdue.edu/btny/ID56/184_RootCrops.pdf

https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/426/426-422/426-422-pdf.pdf

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https://draxe.com/nutrition/root-vegetables/

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Plant a Pollinator Paradise

By Cathy Caldwell | July 2020-Vol.6 No.7

A quick Google search for “pollinator gardens” yields a bevy of results: YouTube videos, books, articles and many items for sale – preplanned gardens, seed mixes and something called a *push garden* — “a curated selection of perennial wild flower seeds” — that is one of Oprah’s favorite things and is sold out on many sites. Clearly something is going on. Gardeners are eager to help the pollinators who are facing threats to their survival. With no offense to Oprah, it takes more than a *push garden* to truly create plantings that benefit pollinators. It is first important to understand who the pollinators are and then create in your yard, not just a garden, but a habitat that gives them the resources they need. Your yard is an ecosystem whose health and functionality depend on how you manage it. By working to benefit the living things that exist in your ecosystem, you will create the biodiversity, or variety of living things, that leads to an ecologically sound environment. Here are the basic steps you can take to attract pollinators and make your home a

paradise for living things.

KNOW THE POLLINATORS

Wind, water, and animals all help plants reproduce by spreading pollen from the male to the female parts of a plant, creating seeds or fruit. Of the animal pollinators, bees are by far the most efficient and therefore most important. To feed their young, bees actively collect pollen on their legs or abdomens, and by doing so, transfer the pollen from the anther to the stigma, fertilizing the flower. Butterflies, moths, flies, beetles, hummingbirds, and even wasps also carry pollen as they move from flower to flower sipping nectar. Trying to meet the needs of each of these creatures sounds daunting, but if you focus on creating a habitat for bees and butterflies, most other insects will find the habitat suitable for their needs. An effective pollinator habitat needs the right flowering plants that provide nectar and pollen as well as appropriate leafy plants that feed caterpillars, the larvae of butterflies.

REDUCE THE LAWN

Turf grass covers an area three times larger than any other irrigated crop in the U.S., according to the International Society for Photogrammetry and Remote Sensing, 2016. Compared to bare soil, lawns prevent soil erosion and filter water. These positives, however, are counteracted by the negative environmental impact from the chemical pesticides, herbicides, fertilizers and water that lawns require. Add in the air and noise pollution from mowers, blowers, and weed eaters, and the obsession with lawn is hard to understand. From a pollinator standpoint, lawns are a food desert. Even if lawn has clover or weeds in bloom, there is little for a bee to eat. The first step in creating a habitat for pollinators is to reduce areas of lawn. Tearing out the entire lawn would be daunting and is not necessary. Start small. Are there patches of lawn that could be re-planted with understory trees, shrubs and insect-attracting perennials? Can existing beds be expanded? Can single trees be surrounded by beds of flowering ground covers? Over time, you can link these garden pools to one another and create a bountiful habitat, with lawn only in the areas you need for walking, sitting or playing.

PLANT NATIVE PLANTS

Photo: Cathy Caldwell

The USDA Natural Resources Conservation Service defines a native plant as "a plant that is part of the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem." NRCS/Native, Invasive, and Other Plant-Related Definitions The most important word in this definition is *region*. Because the native plants and insects of a region evolved together, they have formed relationships that are the basis of a complex and sustainable ecosystem. Native plants provide food that the pollinating insects require, and in turn, the insects provide the pollination services the plants need to produce seeds and fruit; it's the web of life that keeps the world humming. Research by Doug Tallamy at the University of Delaware has shown that native insects not only prefer native plants, some species can only feed on certain species of native plants. (Douglas Tallamy, *Bringing Nature Home*, Timber Press, 2007). Unfortunately for native insects, most of the ornamental plants we have loved and planted in our gardens have been introduced from other areas, notably Asia. While beautiful, these introduced plants did not evolve with the

insects of our region. Many of them do not provide food for the insects and so do not contribute to the biodiversity needed for a healthy ecosystem.

When creating a habitat for pollinators, there is no need to remove every non-native plant from your landscape. Many pollen and nectar eaters, such as bumblebees, have a wide diet and throng to non-natives such as nepeta, Russian sage, lavender, and herbs. Examine your garden and see where the bees are gathering to decide what to keep and what to replace. If you decide to retain exotics such as crepe myrtle, iris, and peonies that do not provide much for pollinators, remember that they are for you. Keep adding natives so that your garden becomes 70 – 80% native species for the pollinators. Natives are especially important for caterpillars, who can only eat leaves from certain plants. A switch to natives will not be disappointing; a garden of viburnum, witch hazel, bee balm, penstemon, liatris, and turtleheads — teeming with life — will be just as beautiful as any other garden. Native plants have adapted to the soil and climate of their region so typically need less supplemental watering and fertilizing, which is healthy for the environment and a boon to the gardener.

Often native plants are associated with meadows, which, by their nature, can be wild and untidy. But there are native trees, shrubs, perennials and grasses appropriate for every situation. They can be incorporated into a formal landscape as well as a casual cottage garden. Because natives are specific to certain areas and you are trying to create a functioning habitat of interrelated plants and insects, it is worth learning which plants are native to your area. Take the guess-work out of your planning by using one of the **online native plant finders**. The National Wildlife Federation identifies natives appropriate for you based on your zip code. Or you can try a search at Va.Dept.Conservation & Recreation/Native Plant Finder, which is organized by region of Virginia (Mountain, Piedmont, Coastal Plain) and allows you to refine your search by type of plant, amount of sun, etc. Even more refined searching is possible with the Piedmont Natives Plant Database, which allows you to focus on a particular county and to specify types of pollinators desired, as well as soil type, flower color, bloom time, and other variables. Each plant is then linked to the USDA Plant Database, which allows you to look at photos of the plant.

When choosing native plants, know the differences among species, cultivars and hybrids and how they affect the overall effectiveness of your garden as a habitat for pollinators. For more information on this topic, refer to the article “Native Species Plants or Cultivars of Native Plants – Does it Matter?” in this month’s issue of *The Garden Shed.*

PLANT FOR A SUCCESSION OF BLOOMS THROUGHOUT THE SEASON

Native bees have varied life cycles. They emerge from their nests, forage, mate, and build nests at different times throughout the year and have varied lifespans. On March 18, I saw a mason bee, newly-emerged from its nest and looking for the first meal of its adult life. A few short weeks after emerging, the mason bee will have mated, built a new nest, provisioned it with pollen, laid her eggs, and died well before spring has turned into summer. Those larvae will rest in the nest until next spring. The first bumblebee of the year appeared in my garden March 23. She had mated and retreated to her nest in October or November to hibernate through the winter. Now hungry and ready to lay her eggs and start a new colony, she staggered unsteadily, looking about the leafless landscape for a bit of nourishment. Provide a feast for bees by planting for overlapping blooms, from very early spring through late fall.

Early spring, when the first bees appear, is the most challenging time for them and the time most likely to be neglected by the gardener. The blooms of the tall trees often found in the home landscape, *Acers* (maple), *Quercu*s (oaks) and *Liriodendron* (tulip trees) are an important food source in early spring. Consider adding early-blooming understory trees and shrubs such as *Amelanchier* (serviceberry) *Cercis canadensis* (redbud) *Cornus* (dogwood) , *Lindera benzoin* (spicebush) or *Aronia* (chokeberry), to supplement

the food provided by the big trees. These native trees and shrubs are also host plants to many butterfly larvae. If you have room, plant some pawpaw trees in the dappled shade of larger trees for a three-fold bonanza, The brownish, drooping flowers are pollinated by beetles and flies rather than bees, the paddle-like leaves are food for the beautiful zebra swallowtail butterfly, and the resulting pawpaw fruit is a delicious treat for the gardener. Before you start planting, take advantage of growing advice on these shrubs and trees in previous issues of *The Garden Shed*:

Serviceberry, The Garden Shed 3/2016

Redbud/The Garden Shed 3/2015

Dogwood/The Garden Shed

Spicebush/The Garden Shed-3/2019

Aronias/The Garden Shed 11/2019

Pawpaws/The Garden Shed 4/2020

Learn about and plant spring ephemerals such a spring beauty, hepatica, bloodroot, Dutchman's breeches or trillium along with the more common bleeding hearts and Virginia bluebells. Scattered among early blooming bulbs, they provide food for the early pollinators and their blooms are a welcome sight to the gardener after a long winter. The ephemerals grow in the part sun of the woodland garden or under mature trees and then recede when leaves overhead cast shade. To the Victorians, violets were a symbol of modesty and fidelity. Let these sweet, old-fashioned flowers ramble in your beds or lawn as an early source of pollen for bees as well as a host plant for fritillary butterflies.

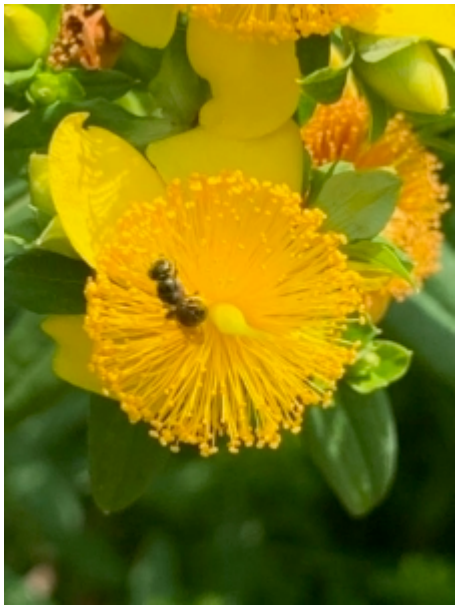
As the seasons progress, keep the feast going by planting these easy-to-grow and readily-available pollinator attractors:

Mid to Late Spring	Early Summer	Mid-Summer	Late Summer and Fall
Wild Columbine	Penstemon	Coneflower	Sunflower
Wild Geranium	Spiderwort	Blazing Star	Rudbeckia
Creeping phlox	Coreopsis	Mountain Mint	Aster
Baptisia	Asclepias	Joe Pye Weed	Goldenrod

As your fascination with pollinators grows, (as it surely will), expand your knowledge by seeking out local native plant societies and native plant nurseries to learn about less-common, but equally beautiful plants such as skullcap, wild petunia, cup plant, Culver's root and New York ironweed. For an easy-care pollinator paradise, make room for summer-blooming shrubs such as blueberries, sweetspire, shrubby St. John's wort and elderberries that bring the pollinators in droves. For growing information about blueberries and elderberries, consult Blueberry Cultivation/The Garden Shed 4/2019 and Elderberry/The Garden Shed 3/2020. A native viburnum belongs in every garden. The leaves are hosts for caterpillars, the flowers feed bees and butterflies, and the fall berries feed migrating birds.

Go exploring at the following websites: the Virginia Native Plant Society, Va.Native Plant Guides, the North Carolina Native Plant Society, https://www.ncwildflower.org/ and the Maryland Native Plant Society, https://mdflora.org/, all of which offer guides for the best native plants for each region. Another excellent source is the Xerces Society, which provides a wealth of information on attracting pollinators and regional lists of native plants, xerces.org/Pollinator Plants: Mid-Atlantic Region.

ATTRACT DIFFERENT TYPES OF POLLINATORS WITH A DIVERSITY OF FLOWERS



Small sweat bee on Shrubby St. John's wort.
Photo: Deborah Harriman

Bees have various sizes, shapes, tongue length, body strength, and flight range. A successful pollinator garden will include a variety of flower shapes to accommodate these differences. Bees with short tongues will forage on flatter, more open composite flowers such as shrubby St. John's wort while burly bumblebees can muscle their way into tubular flowers such as penstemon and turtlehead. Only pollinators with long tongues, such as bumblebees, butterflies, and moths can reach deep into the long tubular flowers of monarda fistulosa. Butterflies pollinate phlox and gravitate to the composite flowers of Joe Pye Weed. Hummingbirds, with their long probosces, need the long tubular flowers of salvia, cardinal flower, and *Monarda didyma*.

Flower color also plays a role. Bees are attracted to white, yellow, blue, and purple flowers, but, as they see light on the ultraviolet spectrum, cannot see and so seldom forage on red flowers. Hummingbirds are well-known for their attraction to the color red, but also go to blue and purple blossoms. Moths, mostly flying at night, are attracted to white, or other pale, sweet-smelling flowers.

Remember that nectar and pollen are only half of the story. Be sure to provide host plants that feed the caterpillars. In addition to the trees and shrubs already mentioned, include milkweeds and butterfly weeds for the monarch, pussytoes for the American lady, and turtleheads for the Baltimore Checkerspot. Bumblebees and many other native bees are generalists and can forage on several flower species. Other bees are specialists and can only forage on specific species. Vegetable gardeners are familiar with the squash bee that pollinates squash plants. The Spring Beauty bee, *Andrena erigeniae*, collects pollen exclusively from

A Spring Beauty bee in blossom of a spring beauty (Claytonia virginica).
Photo: Judy Gallagher, CC BY 2.0, flickr.com

the ephemeral Spring Beauty (*Claytonia virginica)* and the closely related *Claytonia carolinana.*

It is enough for most gardeners to simply know that providing a variety of native plants with various blooms appearing over a long season is needed to meet the spectrum of pollinator characteristics. But to delve more into the specifics of who eats what, investigate the research of Heather Holm on the interactions between native pollinators and native plants: *Pollinators of Native Plants (*Pollinator Press, 2014) and *Bees: An Identification and Native Plant Forage Guide* (Pollinator Press, 2017). Refer to Douglas Tallamy, *Bringing Nature Home* for regional lists of caterpillar hosts.

PLANT IN MASSES

Bees exhibit a characteristic called *floral constancy*. They visit and collect pollen from one variety of flower on each foraging trip. While a big bumble bee can fly up to a mile, smaller bees may only manage a range of 500 feet. Make life easy for them by siting your pollinator gardens close to possible nesting sites and planting one kind of flower in a large swath; three feet square is best. In a small garden, it might be difficult to devote a square yard to one flower, especially when you want to spread the buffet throughout the season. But do the best you can to plant in clumps and avoid the singletons. Remember, planting for pollinators gives you permission devote more and more of your landscape to flowering plants, and every gardener should be happy to do that.

PROVIDE NESTING SITES

Seventy percent of native bees nest in the ground. Others are tunnel nesters, snuggling into abandoned beetle tunnels in stumps and snags, or chewing into the hollow stems of plants. Some find homes in the crevices of stone walls. Bumble bees live in colonies underground, in old mouse tunnels or under tufts of grass. Help them find a home by leaving some areas of ground in a dry, sunny location free of mulch. If you have room, place old stumps or logs in a sunny area. They may already sport beetle tunnels, but if not, drill a few holes in the wood.

In the fall, allow fallen leaves to stay on your garden beds. These will nourish the soil and provide overwintering sites for caterpillars and other insects. Avoid the temptation to clean up your perennial garden in the fall and leave the stems standing through the winter. Those pithy stems might be harboring a snug nest of bees. It will be tempting to start cleanup at the first sign of warmth in the spring, but resist that urge in order to give insects time to awake and become active. Wait until temperatures are consistently warm, and then stagger your cutting back over a few weeks. If the garden looks too messy for your taste, cut the stems close to the ground and leave them lying in the garden for a while. Not only will this give the creatures time to emerge, you will be adding good organic matter to the soil.

Densely-packed brush piles provide good habitat for bees as well as shelter for birds, chipmunks, and other wildlife. Even if your property is small, find an out-of-the-way place to bundle and stack the branches from your pruning efforts. If you have been reducing your lawn and creating a lush habitat of trees, shrubs and perennials, it will be easy to conceal that brush pile.

Mason bee nest. Note that 3 holes are inhabited and sealed off. Photo: Deborah Harriman

Every garden center and catalog now feature ***bee hotels*** for mason bees, but it is easy to construct your own. Drill holes, between 3/32" and 3/8" in diameter in a block of untreated wood. The holes should not go all the way through the wood, so the nest is closed at one end. Alternatively, gather some hollow tubes made from bamboo or cardboard, and tightly pack them into a can, bucket, cup, or wooden structure. The tubes should be 6-8" in length and closed at one end. A roof over the top to deflect rain and a wire grid to discourage bird predators will give the larvae a better chance of survival. Place the nests 3-6 feet above ground, in a sheltered spot, facing east or southeast to get the warmth of the morning sun. You will know bees have taken up residence if you see the opening sealed with mud. Leave the nest alone all winter. The eggs will hatch, the larvae will feed on the pollen the female has deposited and then will emerge as adults in the spring. When you see that the mud has been broken through, replace the tubes with fresh ones and wait for a new crop of bees to take up residence. For detailed instructions on constructing bee nests, see the Xerces Society recommendations at xerces.org/Nests for Native Bees.

ELIMINATE PESTICIDES

Pollinator decline can be attributed to loss of habitat, degradation of existing habitat due to the proliferation of invasive species, and to the use of pesticides. Foraging bees can absorb pesticide toxins through their exoskeletons, might drink poisoned nectar, or eat pesticide-covered pollen. Even if they are not killed outright, bees exposed to poisons may suffer neurological damage that prevents them from finding their way back to their nest or makes them unable to fly at all. Secondary damage may occur to the larvae who eat the tainted pollen. (Xerces Society, *Attracting Native Pollinators,* Storey Publishing, 2011).

Systemic pesticides, such as those in the category called neonicotinoids, remain in plant tissue and can cause harm long after application. https://www.xerces.org/pesticides/risks-pesticides-pollinators For a deeper study of neonicotinoids, see "Another Pesticide Controversy: Neonicotinoids and Pollinator Decline," in a prior issue of *The Garden Shed*, The Garden Shed May 2019. There is very little need, if any, for the home owner to use pesticides in the lawn or garden. Pesticides, even those derived from natural sources such as pyrethrums, are broad-spectrum and kill anything they contact, including bees and other beneficial insects. If you create a healthy, diverse landscape with a preponderance of native plants, you will not only attract pollinators, but will also attract the birds and beneficial insects that keep the predators in check. Create a habitat that nourishes all living things, and find the balance that will reduce or eliminate the need for pesticide.

If undesirables do appear, identify the pest so you can understand its life cycle, then decide how much damage you can tolerate. Integrated Pest Management, The Garden Shed May 2020. A few chewed leaves might not be noticeable. Will the pest soon die anyway? Can you wait to see if a beneficial shows up to take care of it? Hand-picking or blasting the pest with a spray of water may be all that is needed. For more information on attracting beneficial insects, check out last month's article, Natural Pest Control, The Garden Shed June 2020. A large infestation on a valuable tree or shrub might require the services of a professional. When buying nursery plants, check the label to be sure they have not been treated with a systemic pesticide. *Reducing Pesticide Use in the Home Lawn and Garden,* is an excellent guide for homeowners on preventing

and dealing with pests in the landscape. https://www.pubs.ext.vt.edu/450/450-725/450-725.html.

SITE YOUR POLLINATOR GARDEN

The adage of right plant in the right place is also true for pollinator gardens. Be sure to match your plants to the conditions of your site – wet or dry, sun or shade. Most pollinators need sun to warm up and be active so pollinator-attracting plants are typically sun lovers. Selecting a sunny spot will yield the best results, but do not be discouraged if your property is shady. Those early-blooming ephemerals will be just right for you. Can you garden along the "edge" of that shady area? Plant shade-loving wild geranium, heuchera, and tiarella for spring bloom. Native azaleas, *Calycanthus* (sweetshrub), *Itea* (summersweet) and *Clethra* (sweet pepperbush) tolerate shade, and their common names give a hint to another benefit of including them in your landscape. Summer bloomers such as Joe Pye weed and fall-blooming white wood aster and zig-zag goldenrod do well in part shade. If you do not have a yard at all, you can still attract pollinators by planting native plants in pots. Remember that the roots of native plants go deep, so select large containers. Because natives are perennials and will not bloom all summer, choose plants that will look good after bloom has ceased, such as heuchera for shade or threadleaf coreopsis for sun. Look for cultivars of natives that have been bred to be smaller such as Pixie Meadowbrite coneflower or Viette's Little Suzy black-eyed susan. Gather a collection of pots, each with a different perennial of various heights and bloom times and move them around to change the scene and feature the current bloom. A tall native grass in a pot would make a great back-drop to a collection of flowering plants.

GROW FROM PLANTS OR FROM SEED

The simplest way to create your pollinator habitat is to buy plants or plugs from a reputable garden center or native plant nursery. This can be pricey and some gardeners, especially if designing a larger meadow type planting, will prefer the challenge and excitement of starting from seed. Planting from seed will also assure that you are getting the exact species you want. If seeding is your preferred method, stay away from pre-mixed collections unless you know they have been mixed purposely for your ecologic area. Native seeds also have specific germinating requirements. Some need a period of cold called stratification, some need moist conditions, some need light, some need dark. Will you start your plants in flats or direct-sow in the ground? Before launching into seeds, Consult the Missouri Botanical Garden write-up on *Native Seed Propagation Methods, Missouri Botanical Garden*. The Ecological Landscaping Alliance also offers good information on starting natives from seed, Ecolandscaping.org/Native Perennials from Seed. The best approach for growing from seed is to start in a small area and then expand when you see success. Remember that native plants want to spread. Start your garden, whether from plants or seeds, and let the pollinators do their work. Over time your garden will increase naturally and eventually become a pollinator paradise.

GET INVOLVED IN POLLINATOR CONSERVATION

Become a citizen-scientist and gather data for scientists studying the conservation needs of pollinators. For example, you can help track bumble bees by photographing those in your yard and submitting your photos for identification by experts at Bumble Bee Watch, Bumble Bee Watch.

Upload your photos and be counted by joining Bumble Bee Watch, Bumble Bee Watch

Register your garden with the Great Sunflower Project, https://www.greatsunflower.org/

Sign the pollinator pledge, Xerces.org/Pollinator Pledge

REFERENCES AND MORE INFORMATION

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Bringing Nature Home (Douglas Tallamy, Timber Press, 2007)

*Nature's Best Hope (*Douglas Tallamy, Timber Press, 2019)

Habitat for Wildlife, Virginia Department of Game and Inland Fisheries, https://www.dgif.virginia.gov/wildlife/habitat/

Native Pollinators and *Plants for Pollinators*, USDA National Resources Conservation Services

https://www.plants.usda.gov/pollinators/Native_Pollinators.pdf

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/plantsanimals/pollinate/?cid=NRCS143_022326

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The Bees in Your Backyard, Joseph S. Wilson and Olivia Messinger Carril (Princeton Univ. Press, 2016)

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U.S. Fish and Wildlife Service https://www.fws.gov/

Xerces Society for Pollinator Conservation, htttps://www.xerces.org/

"Specialist pollinators deplete pollen in the spring ephemeral wildflower Claytonia virginica," Ecology and Evolution, vol. 6,15 5169-77 (Jun. 2016)

The Edible Garden: July

By Ralph Morini | July 2020-Vol.6 No.7

How are you adapting to the variable weather we are having? After an early spring, we had a couple of May freezes that threatened our warm weather crops. Then June turned out to be wet, with over 6 inches of rain registered in the first three weeks, compared to a historical average of about 4 inches. I've noticed fungal outbreaks at the base of trees and increasing slug presence in the vegetable garden. It makes sense to be vigilant for mildews and fungal diseases. Be sure to maintain good soil hygiene by removing spent and diseased plant material. Prune and space plants to allow for good air circulation. Water at the base of plants, in the morning, and avoid splashing soil on plants. A light straw or leaf mulch can help prevent soil splashing.

Planting and Harvesting

If you planted cool weather crops in the early spring, they are probably completing their life cycles. This typically includes greens and cole crops, although with luck you may be harvesting the last of your broccoli and chard. Clean the garden of spent plants, perhaps letting a few uneaten lettuces and herbs flower to draw pollinators and beneficial insects to the garden. The removed plants can be composted if not diseased and if they haven't set seed. Otherwise, it is best to dispose of them.

There is still time to plant summer vegetables including beans, okra, pumpkin, sweet potatoes, cucumbers, peppers, squash, corn, eggplant and tomatoes.

Late July into August is the time to make a fall planting of your favorite cool weather vegetables. Amend soils now by adding mature compost and organic fertilizer to the top couple of inches of soil to give soil life the time to make nutrients plant-accessible.

For a comprehensive listing of recommended planting times for your hardiness zone refer to Extension publication 426-331, Virginia's Home Gardening and Vegetable Planting Guide.

Advice for Tomato Growers

Tomatoes are a prized summer crop for many of us. It is best to support plants with stakes or cages. If you use **stakes** (I use half inch rebar, but wood is commonly used), tie plants loosely to the stake with a soft twine or cloth strip. Add ties to give needed support as plants grow and fruits develop. Prune lower leaves that touch the ground to reduce susceptibility to soil pathogens. Allow up to two main stems and pinch off all other "suckers" that sprout at leaf/stem intersections to focus the plant on fruit production rather than vegetative growth.

Photo: Ralph Morini

Pinch off "suckers" where leaf and stem join to focus tomato plants on fruit production

Cages require more upfront investment and off-season storage space, but reduce plant maintenance time during the growing season. If you use cages, prune plants to 3 or 4 main stems. The additional vegetation will help protect fruit from sun scald.

In all cases, remove any diseased foliage quickly with shears disinfected with a 10% bleach solution. Best to

bag and remove diseased vegetation with your trash. Mulching with straw helps maintain moisture, hold down weeds, and reduce soil splash during watering.

A more complete guide to growing tomatoes is provided in Extension publication 426-418, titled “Tomatoes.”

Summer Pests

Summer is the peak activity period for many garden pests. Here is some information about a few common ones:

Slugs: The wet June weather has led to a proliferation of slugs in my garden. Besides handpicking them where leaf damage signals their presence, improving air circulation by thinning heavy mulches and pruning and spacing plants can help manage them. Sprinkling diatomaceous earth or crushed egg shells around plant bases can create a barrier to slugs reaching plant stems. Toads are a natural predator, so creating a toad house nearby may also help. Other deterrents include placing a pan of beer with edge at soil level, inviting them to slither in and drown, or placing a partial melon rind upside down on the ground overnight, then collecting the rind and overstuffed slugs in the morning for disposal.

Striped cucumber beetle. Photo: Melissa McMasters, CC BY 2.0, https://www.flickr.com/photos/cricketsblog/37407574722/

Cucumber Beetles: Adult cucumber beetles emerge in late June/early July. Striped and spotted varieties can damage flowers, foliage, and roots of cucurbit family plants. They are also a vector for bacterial wilt disease. Control them with row covers, by hand picking, and good garden hygiene. For serious infestations, additional measures are outlined in Extension Publication 2808-1009, “Cucumber Beetles.”

Squash Bugs: Squash bug nymphs and adults can attack any cucurbit but prefer squashes and pumpkins. They pierce plant tissue and suck liquids out, while injecting a toxic substance into the plant that causes vines to wilt and die. A board on the ground near vines offers overnight shelter to the bugs which can be collected and dropped into soapy water in the morning. Maintaining good biodiversity can also help. The tachinid fly attacks squash bugs and can help control modest infestations. Details are available in Extension Publication 444-031, "Squash Bug."

Squash bugs. Photo: Lisa Zins, CC BY 2.0, https://www.flickr.com/photos/lisazins/20605091071

Stink Bugs: Brown marmorated stink bugs will attack a variety of plants including tomatoes, peppers, beans, cucurbits and sweet corn. They suck liquids from leaves causing spots and wilting. Handpicking, good hygiene, and minimizing wood mulches can help control them. Companion planting with chives, onions, garlic, radishes, nasturtiums, marigolds, bee balm, and dill also deter infestations. Again, beneficial insects, namely the tachinid fly, prey on the bugs and are helpful. Tachinid flies are not available commercially, so build a diverse ecosystem around the garden to attract them.

Cross-striped cabbage worm. Photo: NC State Extension, "Pests of Crucifers"

Cabbage worms: During the past few years my gardens have had serious infestations of the larva of imported cabbage moths and cross-striped cabbage moths that have decimated my kale and collards. This year I protected them with a row cover in early May and am happy to report that the greens have grown well with virtually no damage. Because we are approaching fall planting time for these crops and since the moths and larva are active until frost, this measure may be of interest if you have struggled with these pests. Simple and inexpensive row cover ideas are explained in the November 2019 Garden shed article "Row Covers: A Season Extender with Benefits".

The list below offers other ideas that can help maintain garden health during July:

- **Watering** becomes extra important in the hotter months, not only for overall plant health, but also for the taste and texture of many vegetables. The garden typically needs about an inch of water per week, more during very hot periods. Early morning is the best time to water. Giving leaves time to dry before dark reduces susceptibility to fungal diseases. Mulching with straw is a good idea to stabilize soil moisture and help hold weeds down.

- It's important to **control weeds** around vegetables because weeds can out-compete vegetable plants for nutrients, water, and sunlight. The best method of control is by mechanical extraction, meaning good old-fashioned weed-pulling or the use of a hoe. For small weeds, the "**hoop" or "stirrup" hoe** is highly recommended because it allows for shallow cultivation.
- Another plus for the hoop or stirrup hoe: it doesn't bring weed seeds to the surface of the soil! Many weed seeds require sunlight to germinate. Deep cultivation often brings seeds to the surface of the soil, facilitating germination of a new crop of unwanted weeds.

Weeding with a stirrup hoe. Photo: Wayne Stratz, CC BY NC SA 2.0, Flickr.

Fusarium wilt of basil (Fusarium oxysporum, f. sp. basilicum). Photo:

- **Fusarium wilt of Basil** is a fungal disease specific to sweet basil. The fungus attacks the water-conducting tissue (xylem) within the stem. Infected plants will grow normally until they are six to twelve inches tall. Then the plants suddenly wilt. The stem may become curved and develop brown streaks. The fungus can over-winter and survive many years as spores, ready to cause new infections in basil or other members of the mint family that are planted in the same soil. There is currently no fungicide approved for its treatment, but it can be controlled somewhat by removing diseased plants, by rotating planting locations, and by planting disease-resistant varieties. Additional information is available at ncsu.edu/-fusariumbasil.
- **Okra blossoms are** one of the showiest blooms in the vegetable garden, but they only last one day. Keep an eye open for them if you don't want to miss them. If the flower has been pollinated, a miniature okra pod can be seen beneath the wilted flower.
- Wondering if your **blueberries are ripe enough to pick?** Just try pulling a few berries from the stems. If they come off easily, they are ready to harvest. If not, they need to ripen more. **Cover with netting** if the birds are beating you to the fruit.
- Swiss chard is relatively resistant to bolting during summer heat, but insufficient moisture will cause them to go to seed. Keeping them well-watered will extend the season.
- **Cucumbers** develop a **bitter taste** if the soil is not kept **consistently moist.** Leaf mulch will help maintain soil moisture.
- **Harvest cucumbers** for pickling when they reach 2-4 inches in length; for table use, harvest when no longer than 5-6 inches. Remove over-ripe cucumbers to encourage continuous production.
- **Withhold water on potatoes when the plants begin to die down.** Water and fertilizer may disturb the dormancy stage and cause regrowth, and may also cause potatoes to crack.
- **Pumpkin and squash** blossoms are both beautiful and **edible**. To prepare squash or pumpkin blossoms for an appetizer, pick them after they open. Wash and drain the blossoms to remove insects and dirt, dip them in a flour or beer batter, and fry until golden.
- If you use **insecticides on vegetables**, always check the label to understand how much time you need to wait before safely harvesting and eating.

For more tips on a variety of gardening topics, check out the **Monthly Gardening Tips** listed on the PiedmontMasterGardeners.org website under Gardening Resources.

I hope you find this information helpful and look forward to sharing ideas again next month.

Sources:

Virginia's Home Garden Vegetable Planting Guide: Recommended Planting Dates and Amounts to Plant

"Weeds in the Home Vegetable Garden," Virginia Cooperative Extension Publication No. 426-364, pubs.ext.vt.edu/426/426-364

"Basil Problem," NC Cooperative Extension. https://growingsmallfarms.ces.ncsu.edu/growingsmallfarms-fusariumbasil/

" Vegetable Planting Guide and Recommended Planting Dates," Virginia Cooperative Extension Publication No. 426-331, pubs.ext.vt.edu/426/426-33

Upcoming Events

By Susan Martin | July 2020-Vol.6 No.7

Heartflame Garden Open Days
Friday, July 3
6:00-8:30 pm

Heartflame Garden is a private garden located at 650 Sandy Bottom Road near Elkton, Virginia, adjacent to Shenandoah National Park. It is a lovely three-season display garden with about two acres of cultivated gardens and another four acres of rolling hills and streams to explore. The garden is open by appointment, and also offers "open" days when an appointment is not required. **It will also be open on Friday, August 7, 6:00-8:30 pm.** Check this link for more information, including contact information.

Virtual Eco-tour: Norcross Wildlife Sanctuary, MA
Thursday, July 9
12:00-1:00 pm

Operated by the Norcross Wildlife Foundation, the Sanctuary has grown to over 8,000 acres of forests, meadows, and wildlands in Massachusetts and Connecticut. The Sanctuary is managed and maintained for the benefit of native plants and animals of New England. Hundreds of plant species can be found in the various habitats and the 14 gardens maintained at the Sanctuary. This virtual tour will highlight many of these habitats and native plants, including: meadowscapes, both wet and dry, native orchids, Liatris, Actaea, Pycnanthemum, Solidago, and much more. Tour leader, **Dan Jaffe,** is the Horticulturalist and Propagator for Norcross Wildlife Sanctuary and the staff photographer. He is the co-author of *Native Plants for New England Gardens* and has contributed photographs to many more horticulture books.

Ticket cost is $10. To learn more and to register: https://www.ecolandscaping.org/events/category/webinars/

Nature's Best Hope **by Douglas W. Tallamy**
Wild Virginia Book Club Discussion
Monday, July 13
7:00–8:30 pm EDT

In *Nature's Best Hope*, Tallamy argues that "Restoring viable habitat within the human-dominated landscapes that separate habitat fragments… is the single most effective thing we can do to stop the steady drain of species from our local ecosystems." He proposes that the replacement of even half of our lawns with native plants would effectively create a twenty million acre national park that could be named Homegrown National Park. Join Wild Virginia for a discussion of how we can each make a difference while staying close to home.

A link to join the conversation will be sent to registrants before the event. Please join even if you don't have an opportunity to read the book in advance.
https://www.eventbrite.com/e/wild-virginia-book-club-tickets-109677133258?eType=EmailBlast-Content&eId=56f47e93-2d5a-453a-b1d4-fb26a66ad7e7

Virginia Cooperative Extension Master Gardener Webinar Series:
Urban Forestry is a Public Service
Thursday, July 16

10:00 am

Join Jamie King, University Arborist at Virginia Tech, as he talks about the whys and hows of urban forestry.Register in advance.

Jefferson Chapter Virginia Native Plant Society
Self-Guided Native Plant Walks at Ivy Creek Natural Area
Alternative Ways to "Walk"

Due to the challenges of maintaining physical distancing while in a group walk, the Virginia Native Plant Society and Ivy Creek have collaborated to bring you a non-traditional version of the monthly VNPS wildflower walk at Ivy Creek. We know that it is not the same as being there with others in a direct learning experience, but we believe we have found the next best thing and hope that you will enjoy it.

We recorded this month's walk leader, Phil Stokes, walking the route along the lavender/field trail and blue trail, talking about the plants that you will see. We marked each plant with an orange flag so that they are easy to locate, and we took a photograph so that you can check to see if you have found the correct plant. The photographs are also useful as this tour will be posted for a two week period and sometimes the blooms Phil talks about might have faded (or been eaten!). But once you identify the plant, you may see it in different stages of bloom all along the walk.

There are several ways to take this walk.

1. We have provided a Plant List which has the plants you will see in the order that you will find them. Print this out and bring along a field guide to tell you about the plant as you find it.

2. If you want to walk along with Phil, you can download the free Izi travel app from your Play Store or iTunes onto your phone and it will guide you by GPS along the tour, providing Phil's narration and the photograph of the plant as you come to it. It is helpful to download the walk before you come to ICNA, just so you are not reliant on cell phone service. You will also need to have your location turned on. To access all the photos on the app, just touch the box of images and scroll through them as you walk. Start this walk at the top of the lavender/field trail near the bat house.

3. If you prefer not to download the app, you can follow the tour on your home computer at https://izi.travel/en/efa1-june-wildflower-walk-at-ivy-creek/en. You can "walk" with Phil at home, hearing his narration, following the map of the walk and seeing the photographs. To scroll through all the photographs on your computer, use the red dots below the image that begins each section of the walk.

Also please feel free to contact catherine@ivycreekfoundation.org. Ivy Creek would love your feedback!

New Directions in Landscape Design (NDAL)
Cosponsored by: Ladybird Johnson Wildflower Center and
Wild Ones – Native Plants, Natural Landscapes
Webinars for Landscape Practitioners: *Ecology, Culture, and the Designed Landscape*
Professional Practice Across Disciplines and Scales
July 6 – August 18

A live series for landscape practitioners including landscape architects and designers, restoration ecologists, and horticulturists. Nonprofessionals may also attend. Douglas Tallamy, Ph.D., Larry Weaner, FAPLD, Chad Adams, AICP, and a diverse group of expert instructors will discuss a variety of topics from the art of naturalistic design to science-based native meadow creation**.**

The first session takes place on July 6; the last session is on August 18. Recordings of sessions will not be available after the webinar date. Sessions are categorized as **design**, **plants**, and **field**.

Topics include:
Ecological Design as Garden Art
Cemetery Landscapes as Habitat: New Paradigms Honoring Ecology
Specifications for Restoration Scale Projects
Rediscovering Historic Landscape Practice
Invisible Layers in the American Landscape
Regenerative Agriculture: A Landscape Architect's Role
Harmony, Rhythm, and Time: A Composer's Approach to Garden Design
Cross-Pollination
A Grassland Restoration Tale of Weeds, Wildlife, & Renewal
Native Annuals: An Underutilized Landscape Resource
Genetic Variation and Native Plant Design: All Coral Bells Are Not Equal
Seed to Landscapes
Organic Planting and Management: Glenstone Museum

Cost: 1.5 hour webinars: $48 each; 3 hour webinars: $74 each. The total cost for all 13 webinars will be $595. If you would like to purchase the full series bundle, please contact us at info@ndal.org.

For more information and to register: https://ndal.org/webinars-for-landscape-practitioners/

Lewis Ginter Botanical Garden, Richmond

The planned reopening is July 16; in the meantime, you can enjoy virtual tours of what's in bloom. **Rose lovers** in particular will enjoy an incredible virtual display.