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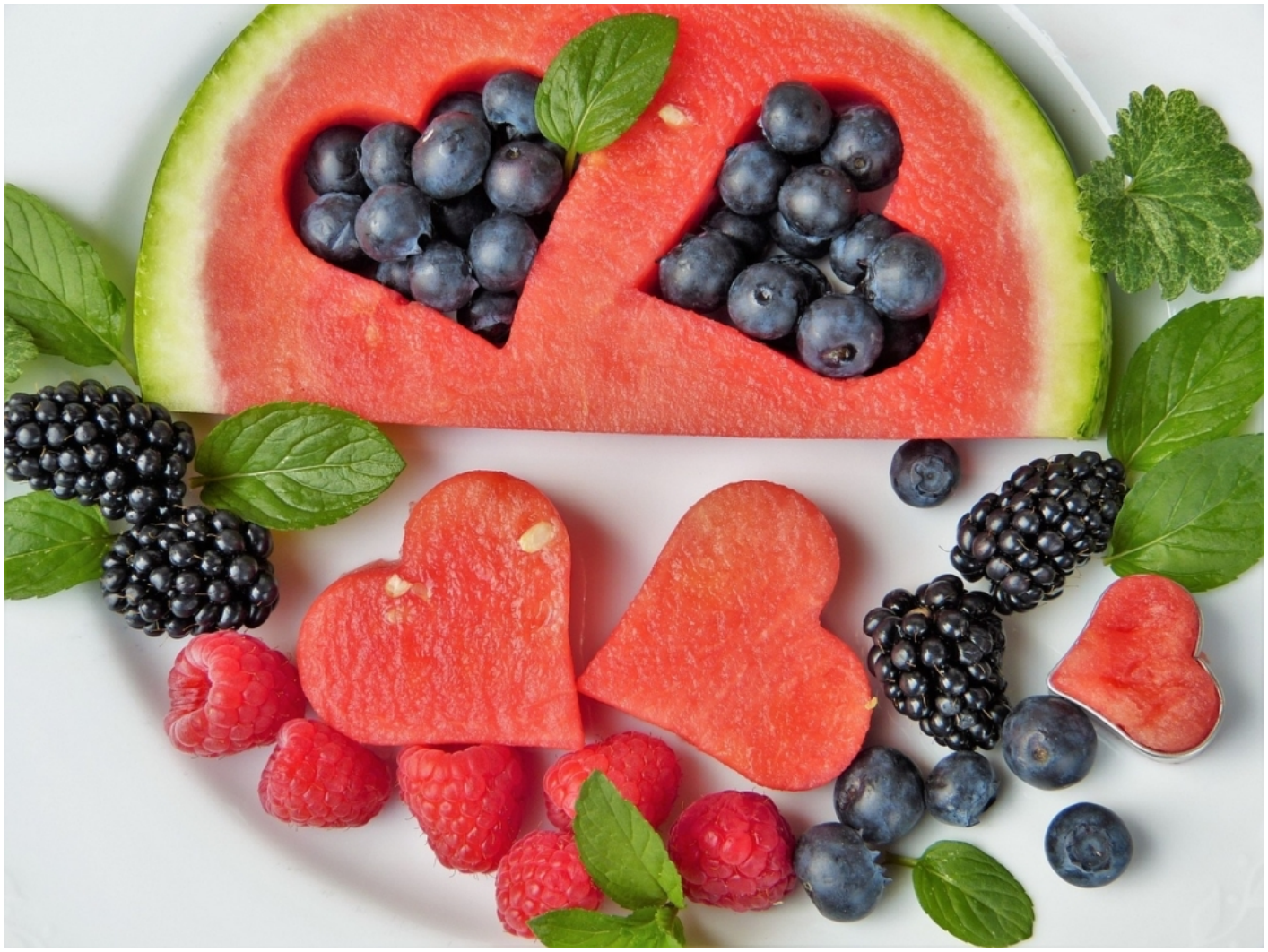
Applause for Dark Red, Deep Blue, and Purple Produce

By mking | October 2023-Vol.9,No.10



Safeguard your health by eating a rainbow every day. Photo: Pixabay

You may have heard that it's healthy to consume a colorful rainbow every day. In fact, eating fruits and vegetables of various colors helps ensure that your food intake includes a wide variety of vitamins and minerals. Why? Scientific studies have shown that plant-based foods get their vibrant colors from phytochemicals, which are naturally-occurring, bioactive compounds. These phytochemicals, also called phytonutrients, help protect plants from parasites, viruses, bacteria, and fungi. They also offer distinct health benefits for people. Phytochemicals support digestion of larger nutrients, help remove harmful toxins from our bodies, and provide protection against certain diseases. So, a daily diet that includes colorful produce can contribute to good health.

Phytochemicals are responsible for the unique tastes and aromas of plant-based foods that we enjoy. In addition, they shore up a plant's immune system, strengthening its resistance to environmental stressors and disease. So, it's not surprising that the phytonutrients we ingest when consuming colorful fruits and vegetables can reduce the risk of certain ailments in humans, too. In fact, certain colors signal specific nutritional benefits.

For example, the carotenoids and beta cryptoxanthin found in orange and yellow produce such as carrots, apricots, peaches, oranges, pumpkins, and yellow peppers support improved vision, healthy skin, reduced inflammation, and increased immunity to certain diseases. Members of the onion family, which are predominantly white and brown in color, are rich in allicin, known to help resist tumor development. Green fruits and vegetables contain phytochemicals called indoles and isothiocyanates, which inhibit the action of harmful carcinogenic compounds in the human body. Spinach, broccoli, collard greens, kiwi, and green herbs like basil, rosemary, sage, and thyme are rich in these substances.

Orange and yellow produce contribute to reduced inflammation and increased immunity. Photo: Pixabay

Allicin in the onion family helps fight tumor development. Photo: Pixabay

Green fruits and vegetables can reduce the harmful effects of carcinogenic compounds. Photo: Pixabay

But there's more to this fascinating story. It turns out that fruits and vegetables with the most vibrant colors are jam-packed with vitamins, minerals, antioxidants, and fiber. Scientific research has shown that deeply-hued produce are phytochemical superheroes. Those intensely saturated colors – dark red, deep blue, or deep purple – indicate rich flavor and an abundance of nutritional benefits. For example, dark red fruits and vegetables, such as cranberries, tomatoes, cherries, beets, strawberries, radishes, and red peppers contain lycopene. That phytonutrient is an antioxidant that neutralizes free radicals in our bodies, leading to some protection

against prostate cancer, as well as support for cardiovascular health.

Cranberries deliver lycopene, that can fight cancer. Photo: Pixabay

Dark red, ripe cherries; photo: Pixabay

Deep blue and purple fruits and vegetables contain flavonoids called anthocyanins (antioxidant pigments) that give deeply-hued fruits and vegetables their vivid blue and violet colors. They help those plants attract pollinators and offer some protection from sunlight and cold temperatures.

Figs are packed with anthocyanins that can help you stay healthy. Photo: Pixabay

It turns out that these anthocyanins provide valuable health benefits for humans, too. Anthocyanins are powerful flavonoids that fight off harmful free radicals and help regulate cellular activity in our bodies. Scientific evidence indicates the following advantageous properties of those substances:

- Cancer prevention – protection against certain cancers, such as colorectal, by destroying cancer cells or slowing their growth
- Anti-inflammatory properties – risk reduction for numerous medical issues, such as asthma, diabetes, allergies, and heart disease
- Cardiovascular strength – more flexibility in the arteries, leading to improved blood flow and lower blood pressure
- Brain function – increased blood flow within the brain to support cognitive activity, including learning, focused attention, and memory
- Cellular health – healing damaged cells, delaying the process of cellular aging, and anti-inflammatory activity to prevent the formation of blood clots

Where can you get a daily dose of those curative anthocyanins? Try adding any of these fruits and vegetables to your diet for a powerful antioxidant punch: blueberries, elderberries, blackberries, plums, figs, Concord grapes, purple sweet potatoes, purple cabbage, purple cauliflower, and eggplant. Be sure to eat the skins, as they tend to have the highest levels of these beneficial phytochemicals.

Current dietary guidelines from the U.S. Department of Agriculture recommend nine daily servings of fruits and vegetables. One serving equals ½ cup of chopped raw vegetables or fruit, so based on a 2000-calorie diet, this translates to approximately 2 ½ cups of vegetables plus 2 cups of fruit every day. Your best bet for optimal health is to aim for 2-3 different colors of produce at every meal, including at least one dark red, blue, or purple fruits or vegetables, also known as "superfoods." Here are some quick tips to help you reach that goal.

Purple produce offers distinct health benefits. Photo: Pixabay

- Try to consume a colorful rainbow every day.
- Strive to include 1-2 servings of deeply-hued produce to daily meals.
- Think fresh and simple. Whenever possible, eat deeply-hued produce raw (without cooking).
- Celebrate seasonal offerings. Choose fruits and vegetables from local farms available at different times of year. Fresh produce is free of preservatives and nutrient-rich in its natural state.
- When fresh produce is unavailable, select frozen fruits and vegetables, instead of canned. (Frozen produce is picked at peak ripeness for best flavor and nutrient value, and canned produce may contain bisphenol A (BPA), which has been linked to heart disease, diabetes, and infertility.)
- Add red, blue, and purple berries to your oatmeal, cereal, or yogurt in the morning.
- Fortify your snacks with dark red, deep blue, and purple options, such as red pepper slices, blueberries, plums, or figs.
- Be creative with delicious smoothies, adding bits and pieces of deeply-hued produce into nutritious drinks.

Nutritious beet smoothie; photo: Pixabay

For those with vegetable gardens, there's an added bonus: the anthocyanins in deeply-hued produce can help prolong the growing season. As an example, purple lettuce tolerates cold temperatures quite well, making frost protection in our region during winter months unnecessary. Beets and purple cabbage can also survive cold and freezing temperatures, extending the availability of those rich sources of nutrition well beyond the traditional growing season. In general, deep red, dark blue, and purple produce are also more resistant to root rot, which can become a problem for some vegetable crops during winter rains.

Now that you know about the value of deeply-hued produce, perhaps you'll be motivated to dress up your meals with more vibrant colors. You might be rewarded with better health!

Online resources

Phytonutrients paint your plate

Eat a rainbow

A rainbow of colors for nutrition

Add color to your diet

Why eat colorful food

Value of colorful, plant-based food

Anthocyanin

Health benefits of anthocyanins

Eat more phytochemicals

Cold-hardy vegetables

Enjoy the bounty of mouth-watering fruits and veggies at farmers' markets. Photo: Pixabay

Landscape Fabric for Garden Bed Weed Control: Good or Bad choice?

By Ralph Morini | October 2023-Vol.9,No.10

Minimizing weed growth in garden beds is an issue for all gardeners. There are several weed management practices available, one of which is the use of landscape fabric. The fabric is laid on the soil surface and mulched over, to prevent the germination of surface weeds and weed seeds. The idea of applying what appears to be a relatively permanent solution to stopping weed growth is very appealing. However, there are drawbacks. We will explore the options and present some of the good and not-so-good uses of this product.

What is Landscape Fabric?

Agricultural fabric for weed control. Photo: R Morini

There are a variety of landscape fabric products on the market. Agricultural fabric (photo above) is used to hold down weed growth in areas around crop plants. This is a single year use of a plastic product that can make sense to minimize weed growth, albeit in an unsustainable way.

The landscape fabric that is sometimes used as a weed barrier in non-agricultural gardens is typically a woven plastic or a spun polyester fabric. It is marketed using claims of a long-term ability to suppress weeds while allowing air and water to permeate through it, providing a good soil environment for plants. It is sold in rolls at garden centers and is widely used by commercial landscapers. It can offer a short-term weed management solution when installed directly on the soil and covered with an organic mulch.

Does Landscape Fabric Do What It Claims?

The fabric does prevent weed growth for a while and its claims about water and air penetration are valid, initially. The idea that it provides a "forever" weed solution is misleading.

The fabric allows water and air to move through it for a short period, but it becomes progressively clogged with soil particles, diminishing air and water permeability. Eventually some weeds from the soil beneath the fabric will break through and grow anyway. And, weed seeds blowing onto the surface mulch will germinate above the fabric as the mulch breaks down. If the mulch used is the finely ground type commonly used commercially, it decomposes during the first year, allowing surface seeds to grow above the fabric. To make matters worse, roots from surface weeds can penetrate downward through the fabric creating a weed-pulling challenge that can yank the fabric to the surface, creating coverage and appearance issues. In addition, trying to plant through the fabric, which typically requires cutting it with a cutting instrument, is frustrating at best. Finally, the fabric degrades when exposed to the sun, ultimately depositing plastic into the soil.

Landscape fabric after a year and a half. Photo: R Morini

The photo above shows a bed (from a neighbor's lot, not mine) that was covered with landscape fabric and then mulched with 2 inches of finely ground hardwood mulch a little less than two years ago. The mulch has decomposed and eroded, exposing the fabric, showing how the surface weed seeds germinated in the remaining mulch and that the roots grew through the fabric into the soil below. The bottom line is that landscape fabric is at best a short term weed deterrent that is cursed with many longer-term issues that make its use in garden beds ill-advised.

What is the best weed control option?

There is no known way to prevent weed growth forever. Weeds are survivors that are tough if not impossible to eliminate. There are practices however that can minimize weed issues if applied carefully and renewed as needed.

There are chemical and herbicidal weed killers available. They can kill weeds but carry other health and environmental drawbacks and are not recommended here. Some more desirable solutions are listed below.

One possibility is to mechanically remove weeds prior to mulching to minimize immediate growth of surface weeds. When covered with a thick organic mulch this practice can help reduce weed generation. I have had success using a stirrup hoe to cut weeds slightly below the soil surface and below the plant crown, most often killing the weed while leaving the organic matter from its roots to decompose in the soil.

Coarse wood chips over cardboard after 6 months. Photo: R Morini

A more aggressive option is to use newspaper, a few sheets thick and overlapping a bit, to cover the bed, and then mulch generously on top of it. This provides a short term weed barrier but will ultimately allow air, water and critters to move through to the soil surface. As the mulch decomposes, it will add organic matter and nutrients to the soil. Select the newspaper with some care. Colored printing is ok, but don't use glossy paper which has too many undesirable components. Rolls of landscape or construction paper are also appearing in home improvement and garden supply establishments as the public desire to keep plastic out of the soil increases.

Single thickness cardboard, overlapped to avoid gaps for weeds to pass through, is another potential weed barrier. It takes longer to decompose than the newsprint but will break down in a year or two. Moisten the ground and the cardboard prior to adding mulch. Be sure to remove plastic tape and labels from cardboard and don't use any glossy product.

Use of coarsely ground wood chips or arborist waste as mulch provides a longer lasting cover than finely ground wood mulches. When a thick layer is applied (experts typically suggest 3 to 6 inches), it provides protection against extensive weed growth, although it must be supplemented, typically annually, to continue to be successful. Most commercial landscapers seem to use the fine-ground mulch materials that look nice and smell good but decompose quickly and succumb to surface-seed-generated weed growth within the first year. Coarser chips may be viewed as less stylish, but they offer better air and moisture permeability and a significantly longer life.

Other mulch possibilities include pine needles, straw, and shredded leaves. They break down faster than wood chips and have a different esthetic but can help restrain weed growth, especially if a layer 4 to 6 inches thick is applied.

Use of non-organic mulches (plastic and rubber) and rock mulch are not recommended. Covering the surface with organic material that will ultimately break down and strengthen the soil is a far more sustainable approach.

Conclusion

It's best not to obsess over weeds. We have discussed a couple of simple ways to start a bed without major weed infiltration in the first year, but weed growth is basically inevitable over time. Using paper-based soil covers along with a healthy layer of coarsely ground wood or other organic mulch is a practical way to minimize weed invasions, although it will require regrooming periodically to maintain the bed's appearance.

In any case, non-organic landscape fabric, while it may start off appearing successful, inevitably causes problems with weed growth, soil condition, and plant health. As usual, adding organic material to the soil provides the best solution for long term gardening success.

SOURCES:

Featured Photo: Weeds and tree shoots growing through landscape fabric. Photo: R Morini

The disadvantages of landscape fabric | Illinois Extension | UIUC

Landscape Fabric | Nebraska Extension (unl.edu)

"The Myth of Landscape Fabric," Microsoft Word – B&B #17 – landscape cloth.doc (wsu.edu) (Linda Chalker-Scott, Ph.D., Extension Horticulturist and Associate Professor, Puyallup Research and Extension Center, Washington State University)

Putting an End to My Landscape Fabric Nightmare (psu.edu)

Should I use landscape fabric to keep weeds out of my perennial garden? | Extension (unh.edu)

Knowing Better: The Appropriate Use of Landscape Fabric | Extension Marketing and Communications (ncsu.edu)

Landscape Fabric: A Good Option for Controlling Weeds? | Gardening in the Panhandle (ufl.edu)

Mulches for Home Grounds – 7.214 – Extension (colostate.edu)

The Edible Garden in October

By Ralph Morini | October 2023-Vol.9,No.10

October signals the beginning of the end of our outdoor vegetable and fruit growing season. It's the last chance to plant a few short cycle vegetables, to harvest frost-sensitive produce before our first frost, document the gardening year, clean up the beds, and prepare beds for winter. Let's dig into the possibilities.

Planting

If you planted crops for fall harvest in September, you may already be picking fast-maturing plants like some lettuces and radishes. According to the VCE Home Garden Vegetable Planting Guide, those of us in Hardiness Zone 7a are still able to plant baby lettuces, radishes, mustard, and spinach during the first part of the October. With an average first frost date of October 15th-25th and a warming trend that may push it later, late planters have the possibility of another crop before winter.

Fall is the best time to plant garlic, and it is reasonable to plant it into early November. Good guidance is available in the article Growing Garlic: Fall Planting from the Penn State Extension.

Follow the two-week weather forecast and plan to protect any sensitive crops ahead of predicted frosts to maximize your harvest.

Frost preparation:

To get a better understanding of frost damage and vegetables that are susceptible to light (28-32° F) and hard frost (below 28° F) exposure, refer to the article Identifying and Preventing Freeze Damage in Vegetables from the Michigan State University Extension.

To nurse plants further into the fall and winter, there are a few helpful practices:

- **Wet your soil:** there is some evidence that watering ahead of a frost will keep the air temperature just above the soil up to 5 degrees warmer than dry soil and will maintain the differential overnight.

DIY Row Cover: Photo: Ralph Morini

- **Cover your plants:** For better protection, cover the crops that aren't cold hardy. Spun polyester row cover fabric is a proven choice, although gardeners use everything from newspapers to buckets to commercially available water-jacketed individual plant covers. Fabric cover protection varies from 2° to 6° F, depending on soil conditions and fabric used. Air space between cover and plants increases the protection over that obtained by simply laying the cover directly on the vegetation. Spun fabric covers let light and water through and can be left in place across the season and around the clock. Most other options that restrict air and water flow need to be opened or removed during the day after the temperature is above freezing. For more information on row covers, please check out the *Garden Shed article*: *Row Covers: A Season Extender with Benefits*.

"Large Cold Frame" by Ofer El-Hashahar is licensed under CC BY-SA 2.0

- **Cold Frames**: Cold frames provide a more permanent way to combat both spring and fall frosts. Tips on construction and on using cold frames are available in the Colorado State Extension article Extending the Season with Cold Frames.

Asparagus bed before fall trimming. Photo R Morini

- If you are an asparagus grower, cut back **asparagus foliage** to within 2 inches of the ground after frost browns the stalks.

- If you haven't done a soil test in a few years, fall is a good time to get one. Organic amendments added in the fall will be ready for plant uptake in the spring. In the Charlottesville/Albemarle area, test kits and instructions are available at the Stagecoach Road entrance to the County Building, just off 5th St. Extension.
- There is still time to plant a **cover crop**. Cover crops protect the soil over the winter, store unused nutrients to prevent them from leaching, and provide organic matter in the spring when tilled under or composted. It is late for planting a mixed crop, but Winter Rye is a possible late season solution that adds organic matter and helps break up compacted soil. The article Cover Crops from the University of Maryland Extension provides guidance.

Aged wood chips with fungal mycelia, a good winter mulch. Photo: R Morini

- **If you aren't planting a cover crop, protect the garden soil with a few inches of mulched leaves, aged wood chips, or straw**. Mulch reduces nutrient leaching and carbon loss while moderating temperature variation and adding organic matter to the soil.
- As leaves begin to drop, chopping them with a mower or other device creates a very useful winter mulch for growing beds or beginning a compost batch. While composting will be dormant when temperatures drop below 50°, spring decomposition can provide usable compost for late spring/early summer planting.
- If you haven't kept up with **garden documentation** this year, this is your best last chance. It's a good idea to diagram the garden along with specific crop locations. Crop rotation is an

important organic tool for minimizing passing insect and disease problems from one season to the next.

- **Vegetable crops in the same botanical family are often susceptible to the same diseases and insects**. For crop rotation to be effective, gardeners should not plant vegetables belonging to the same family in the same location for at least three years. Crop rotation in a small garden may be difficult. However, we should rotate our vegetable crops as best we can. You can find an informative listing of plant families in the Penn State Extension article Plant Rotation in the Garden Based on Plant Families.
- Preserve any herbs that are still growing prior to the cold weather's arrival. Good "how to" advice is available from the article Harvesting and Preserving Herbs for the Home Gardener by the NC State Extension.

Guidance for Fruit Growers

- Protect strawberry plants over winter by weeding beds and mulching before temperatures get down to 20° F. Chopped leaves and straw are good mulches. More details are offered in the Iowa State Extension article Yard and Garden: Prepare Strawberry Plants for Winter.
- **If you are thinking about planting a fruit tree, fall is a good time to do it**. Water newly planted trees thoroughly. Add a 3-inch or higher layer of organic mulch to retain soil moisture and moderate soil temperature. Leave a 3-4" gap around the tree base to discourage varmint damage. Research has shown that roots will continue to grow until the soil freezes, which is typically late November in Virginia. Stake and wire newly-planted trees only if added stability is necessary. Use a piece of rubber hose around the guy wires to protect the trunk. The guy wires should be tied loosely enough that the tree is able to move a little in the wind. The supports and stakes should be removed once the tree becomes established, usually in a couple of months.
- **Pick up dropped fruit from under fruit trees** so that deer and rodents will not be attracted to the fruit or your growing tree. Raking and disposing of diseased leaves will help keep insects and diseases under control next season.
- High grass and mulch are a haven for rodents whose gnawing can severely damage trunks. Keep the grass mowed around new trees. **Be sure that mulch is pulled back 3-4 inches away from the base of the tree.**
- For more information about selection and care (especially the timing and techniques for pruning) for a variety of small fruits, refer to the VCE publication Small Fruit in the Home Garden.

Okay, got everything taken care of? Relax. You've earned it. Hoping for a more leisurely visit with you next month at *The Garden Shed*.

Sources:

Featured image: October pumpkins: Photo: R Morini

Phillips, Ben and Collin Thompson, "Freeze Damage in Fall Vegetables: Identifying and Preventing," http://msue.anr.msu.edu/news/freeze_damage_in_fall_vegetables_identifying_and_preventing

October Tips: Fruit and Nuts, VA Cooperative Extension: https://albemarle.ext.vt.edu/content/dam/albemarle_ext_vt_edu/files/hort-tip-sheets/10-14-fruit-nuts.pdf

Garlic Production for the Gardener, UGA Extension, https://extension.uga.edu/publications/detail.html?number=C854&title=Garlic%20Production%

20for%20the%20Gardener

Harvesting and Preserving Herbs for the Home Gardener, NC State Extension: https://content.ces.ncsu.edu/harvesting-and-preserving-herbs-for-the-home-gardener

Frequently Asked Questions About Autumn Leaves

By Patsy Chadwick | October 2023-Vol.9,No.10

All too soon, crisp fall days and frosty nights will give way to winter. In preparation for the seasonal change, trees and shrubs transform their leaves from a sea of green to a riotous combination of vivid reds, yellows, oranges, and purples. No two autumns are alike and it's exciting to see how the foliage display varies from year to year. As the leaves change color, detach from their branches, and slowly drift to the ground below,

we are left wondering about the science (or mystery) behind this annual phenomenon.

Why do trees shed their leaves in autumn?

With some exceptions, most **deciduous** trees and shrubs are genetically predisposed to shedding their leaves in preparation for winter dormancy. During the growing season, the leaves convert sunlight into energy. We all know this process as **photosynthesis**. But as days become shorter and temperatures cool down in autumn, complex physiological processes cause the leaves to start shutting down. As photosynthesis slows, vital nutrients (nitrogen and phosphorus) gradually move from the leaves to twigs and branches for storage during winter. Cells within the leaves begin to break down and the vessels that transport water to the leaf and sugars to the rest of the plant close off. This triggers the formation of an **abscission** layer at the base of each leaf where it attaches to a twig or branch. This is the point where the leaf will shed from the plant. The purpose of the abscission scar is to protect the plant from disease and cold weather once the leaf drops off.

What causes leaves to change color?

The colorful display that occurs before leaves drop off is due to a combination of three factors: day length, weather conditions, and changing levels of pigments in the leaves. Of these three factors, day length is the only one that is relatively consistent from year to year. Shorter days and longer nights are the initial trigger that starts the change in leaf colors and preparations for leaf drop.

Weather conditions can vary widely from hot, dry, and sunny to chilly, overcast and rainy. Hot, dry weather can cause early onset of color changes. Chilly, wet weather can postpone the color display. Meanwhile, the gradually lowering of temperatures is a key trigger that influences the onset of leaf changes.

Pigments within the leaves are responsible for the colors that are revealed in autumn. They are influenced by both day length and weather as to the onset of color changes and the intensity of colors.

Why do some leaves turn red while others turn yellow or some other color?

Three types of pigments are responsible for leaf color – chlorophyll, carotenoids, and anthocyanins. Here's how they work in determining the various colors of autumn leaves.

- **Chlorophyll:** This pigment gives leaves their green color and is present throughout the growing season. Essential to the process of photosynthesis, chlorophyll absorbs sunlight and processes carbon dioxide from the air and water to produce carbohydrates (sugars and starch), which plants need for food. Chlorophyll is not a very stable compound and sunlight causes it to decompose with the result that it must be continuously regenerated over the summer months. As the days grow noticeably shorter and temperatures cool in fall, plants use chlorophyll faster than they can replace it. This reduction in chlorophyll causes the green color to fade allowing the other pigments in the leaves to become visible.
- **Carotenoids:** In addition to chlorophyll, carotenoids contribute to the capture of sunlight for photosynthesis. **Carotene** contributes to the orange colors in leaves, while **xanthophyll** contributes to the yellow colors. These pigments are present in leaves all summer, but they are masked by chlorophyll and don't normally become visible until chlorophyll levels recede in autumn. However, they can become apparent during the growing season if chlorophyll levels are reduced due to nutrient deficiencies, drought, or disease.

Orange and yellow carotenoid pigments displayed in crape myrtle (Lagerstroemia) autumn foliage. Photo: Pat Chadwick

- **Anthocyanins:** While chlorophyll and carotenoids are present in **leaf cells** throughout the growing season, most anthocyanins are not. They are produced in autumn in the **cell sap**. When anthocyanins are combined with sugars in the leaf cells, these complex compounds produce a range of pinks, reds, and purples in leaves. The color variances are influenced by cell pH. Reds result from acidic pH conditions whereas purples result from more neutral pH conditions.

The role of anthocyanins isn't entirely clear. Unlike chlorophyll and carotenoids, anthocyanins don't contribute to photosynthesis. However, they do appear to serve as a protective sunscreen, which prevents ultraviolet radiation damage to foliage cells. Also, anthocyanins help deter insect feeding and their darker hues make leaves appear less visible to herbivores.

While anthocyanins are typically absent in the leaves of most woody species until fall, there are some exceptions to the rule. Plant species that naturally display deeply hued purple or red foliage all season long owe their color to anthocyanins. A few examples include some varieties or cultivars of beech, smokebush, redbud, and ninebark.

Anthocyanin pigment displayed in young black gum (Nyssa sylvatica) sapling foliage. Photo: Pat Chadwick

In addition to the three types of pigments described above, **tannins**, which are common waste products of the metabolism process, also influence leaf color. Like chlorophyll and carotenoids, tannins are always present in leaves, but they don't become visible until the chlorophyll and carotenoids disappear. In combination with carotenoids, tannins can enhance the deeper golden yellow hues visible in the leaves of some species such as beech or hickory. They are also responsible for the subdued brown color in the leaves of some tree species such as oaks and beeches.

Brown autumn foliage on white oak tree (Quercus alba). Photo Credit: Missouri Botanical Garden Plant Finder

What causes leaves to look beautiful one season and blah the next?

The intensity of fall leaf color varies from year to year depending on the availability of moisture, nutrients, sunlight, length of day, and temperatures. Those factors vary from year to year and explain why fall colors may be spectacular one year and disappointing the next.

The most vivid leaf colors are influenced by **warm sunny days followed by cool (below 45°F) but not freezing nights**. That's because more sugars are produced on warm, sunny days, which means the more pigment available to leaves, the more intense the colors. Cool night temperatures cause sugars to remain in leaves further enhancing vivid leaf color, whereas warm night temperatures cause the sugars to move out of the leaves resulting in duller colors.

What are some examples of trees and shrubs that turn yellow, red, orange, or purple?

Some woody plant species are genetically predisposed to turn specific colors in fall. For example, because hickory and ginkgo trees do not develop anthocyanins in their leaves, they reliably turn golden yellow or bright yellow, respectively. Other species that do produce anthocyanins, such as maples, may turn various shades of yellow, orange, and red, depending on the variety and cultivar. Some plants such as Fothergilla and fragrant sumac can display a vibrant mix of colors or hues on the same plant.

Fothergilla shrub displaying a variety of autumn foliage colors. Photo: Pat Chadwick

A few examples of trees and shrubs that display showy fall color in Virginia include:

- **Yellow** – Birch, yellow poplar, ginkgo, hickory, clethra, spicebush, Ohio buckeye, sycamore, ash, witch hazel, and winterberry.
- **Orange** – Some crape myrtles (which can turn yellow, orange, or red, depending on cultivar), Fothergilla, black chokeberry, flameleaf sumac, and sugar maple (which may display yellow, orange, or red leaves).
- **Red** – Dogwood, redbud, sourwood, sumac, blueberry, chokeberry, some oak varieties such as scarlet oak and pin oak, and some maple species such as red or Japanese.
- **Purple or burgundy red** – Sweet gum, smoke tree, purple leaf plum, some ninebark varieties, oakleaf hydrangea, Virginia sweetspire, and some viburnum species.

Why do ginkgo trees drop all their leaves at once?

Typically, abscission scars form at different rates and in different parts of trees with the result that leaves fall off individually over a period of several weeks. However, ginkgo trees are unique because they form their abscission scars on their leaf stems simultaneously. A hard frost finishes the abscission process and triggers the leaves to fall all at once. That's why you see a fully leafed out tree one day and completely bare limbs the next.

Fallen Ginkgo leaves. Photo Credit: Missouri Botanical Garden Plant Finder

Why do some trees hang on to their leaves in winter?

Most deciduous tree species drop their leaves before the onset of winter. American beech, ironwood, musclewood, and some oak species are exceptions to this rule. Their leaves turn brown in fall but continue to cling to their twigs over the winter months due to a physiological process called **marcescence**. This term refers to the incomplete development of the abscission layer at the base of a leaf's petiole in fall. The abscission layer doesn't completely form until spring, at which point the newly emerging leaves push the old leaves off. Marcescence is typically observed on younger, immature trees and in the branches closest to the ground of more mature trees.

Why don't evergreen or conifer species drop their leaves?

While deciduous plant species shed their leaves in autumn, most evergreen or conifer species in cold climates don't. That's because they are capable of withstanding harsh winter conditions. Their leaves or needles have a waxy coating that protects them from cold temperatures. Also, they have the equivalent of antifreeze in their leaf cells. A few needled species such as Larch and bald cypress trees are exceptions to this rule. Their needles both change color and drop to the ground in autumn.

What are some benefits of fallen leaves?

Colorful autumn leaves provide spectacular beauty and wonder to the landscape, but they provide more than just visual interest. As they fall, they carpet the ground where they gradually decompose and nourish the soil. On the forest floor, they become part of the spongy humus layer where they absorb and retain moisture from rain and snow. Early in the decomposition process, they provide shelter for overwintering insects as well as their larvae and eggs. Once they decompose, leaves become food for numerous soil organisms that are vital to our ecosystem. For these reasons, leaf drop is a vital contributor to the health of our forests and landscapes.

In Summary

Leaf drop and the intensity of fall foliage colors depend on a variety of factors: Shorter days, longer nights, cooler temperatures, ground moisture, plant hormones, nutrient levels, genetic predisposition, and more. The science behind how and why leaves change color in fall and are shed is mostly understood, but more remains to be learned about these complex processes and why they matter. In the meantime, enjoy the show.

FEATURED PHOTO: Fallen leaves carpeting the grass in autumn. Photo credit: Anita Breach

SOURCES

Changing Colors of Leaves, University of Tennessee Publication SP 529 by Wayne K. Clatterback, Assistant Professor Forestry, Wildlife and Fisheries

"Leave" them Alone: Lawn Leaf Management, Virginia Cooperative Extension 430-521

Science of Fall Colors, U.S. Department of Agriculture Forest Service

The Chemistry Behind the Color, U.S. Department of Agriculture Forest Service

Why do leaves fall off in autumn?, Purdue University Extension – Forest and Natural Resources

Why Fall Color is Sometimes a Dud, The Purdue Landscape Report, October 2019

Why Leaves Change Color — The Physiological Basis, Purdue University Extension Publication FNR-FAQ-5

Why Some Oak Trees Retain Their Leaves, University of Illinois Extension

The Ornamental Garden in October

By Cathy Caldwell | October 2023-Vol.9,No.10

October rivals anything that spring has to offer in terms of beauty, color, and interest in the ornamental

garden. Masses of late blooming perennials, shrubs with brightly hued berries, and the vibrant fall foliage on many trees and shrubs collectively provide a truly glorious gardening experience. Meanwhile, this month is a particularly busy time for gardeners. So let's get started on that "to do" list.

PLANT, DIVIDE, AND TRANSPLANT

- **Plant spring flowering bulbs** now that soil temperatures are dropping into the 60s or below. For a succession of color throughout spring, plant a variety of early, mid- and late season bulbs starting with the earliest snowdrops and ending with late blooming tulips and alliums. Tip: Some gardeners have a reaction similar to contact dermatitis when handling tulip, daffodil, or hyacinth bulbs. As a precaution, wear gardening gloves when handling bulbs or wash your hands with cool water and soap immediately after planting.
- **Plant cool-season annuals** such as snapdragon, calendula, Iceland poppy, sweet alyssum, stock, and larkspur. Seeds sown in fall of cool-season annuals will bloom about two weeks earlier than spring-planted seeds. Transplants of other cool-season annuals, such as pansies and violas, are generally easy to find in local garden centers. For best results, they need to be well established in the soil before freezing winter weather sets in.
- **Divide overcrowded perennials** such as daylilies, yarrow, coreopsis, shasta daisy, and *Stachys* (lambs' ears). Water them in well so that they become well established before winter, but hold off on mulching them until after the first hard frost to help prevent frost heaving.
- **Plant deciduous trees and shrubs** before the ground freezes and keep them well watered until they become dormant. Think about planting trees and shrubs that offer multi-seasonal interest. A few suggested trees to consider include maple (*Acer*), black gum (*Nyssa sylvatica*), dogwood (*Cornus*), or sourwood (*Oxydendrum arboretum*). Some suggested shrubs for multi-seasonal interest include Virginia sweetspire (*Itea virginica*), oakleaf hydrangea (*Hydrangea quercifolia*), fothergilla (*Fothergilla gardenii*), blueberry (*Vaccinium* spp.), red-twig dogwood (*Cornus* spp.), or spicebush (*Lindera benzoin*). For tips on how to prepare the planting site and care for trees and shrubs while they are becoming established, see Virginia Cooperative Extension (VCE) Publication 430-295, Tree and Shrub Planting Guidelines. Also, check the National Weather Service's Climate Prediction Center for long-term forecasts so that you can time the planting before a rain is predicted to fall.

TACKLE GENERAL FALL GARDEN CLEAN UP TASKS

- **Clean up all flower beds**. Remove all weeds, twigs, spent annuals, and other debris from flower beds. However, if you're a bird lover, leave some seed-bearing perennials in place. *Echinacea* (coneflower), *Rudbeckia* (black-eyed Susan), ornamental grasses, and other plants, such as sunflowers, will provide food for the birds this winter as well as sanctuary for overwintering beneficial insects. Wait until late winter or early spring to cut them back before new foliage emerges.
- **Not sure which perennials to cut back and which to leave standing over the winter**? Some plants should be cut back for aesthetics and to prevent the overwintering of pests and diseases. The best time to do this is after a couple of killing frosts. If the weather continues to stay warm in October and the plants are still producing flowers, this task may need to wait until November. Here's a brief selected listing of **perennials to cut back in autumn and why**:
    - ***Achillea* (yarrow)** – Cut back to induce new basal growth, which helps protect the plant crown in winter.
    - ***Aquilegia* (columbine)** – Cut back to control leaf miners.
    - ***Baptisia* (false indigo)** – Unless you like the dark seed pods, cut the plant back for aesthetics. The foliage turns black after frost and is unattractive.

    - **Bearded Iris** – Cut back to prevent overwintering fungal disease and iris borers.
    - ***Corydalis*** – Cut back to contain the plant and to keep it from spreading.
    - ***Crocosmia*** – Cut back for aesthetics.
    - ***Hemerocallis* (daylily)** – Unless you have an evergreen variety, remove dead foliage and dried flower stalks for aesthetics and to help contain daylily rust (fungal disease).
    - ***Hosta*** – Cut back for aesthetics. Foliage turns to a mushy mess with the first hard frost.
    - ***Iris domestica* (blackberry lily)** – May be cut back in either spring or fall. Leave standing until spring if you want the interesting seed heads to add interest to the winter landscape. Cut back now if you want to avoid harboring overwintering borers or if you want to keep the seeds under control.
    - ***Monarda* (beebalm)** – Cut back to control the spread of powdery mildew.
    - ***Phlox paniculata* (garden phlox)** – Cut back to prevent the spread of fungal diseases and to prevent the plant from dropping seeds in the garden.
- While many perennials need to be cut back in the fall for aesthetics and pest/disease control, there are **advantages to leaving some perennials in place until late winter or early spring before the new foliage emerges**. So it's OK, in fact desirable, to leave some dormant foliage and stems in place over winter. A major reason is that the old foliage helps protect the crown of the plant over the winter months. Another good reason is that many beneficial insects overwinter in the dead stems and foliage as eggs or pupae and then hatch out in the spring. Here's a brief selected listing of **perennials that may be left standing and why**:
    - ***Agastache* —** The stems help protect the crown of the plant over winter and also provide habitat for overwintering beneficial insects.
    - ***Amsonia*** – The foliage helps protect the crown of the plant during the winter. Also, fallen leaves often catch in the plant's standing stalks and provide extra protection to the crown.
    - ***Aster novae-angliae* (New England aster)** – The foliage and stems on this late-blooming perennial help protect the crown and add texture and interest in the winter landscape.
    - ***Bergenia* (pigsqueak)** – The evergreen leaves turn shades of purple and deep red and provide interest in the winter garden.
    - **Chrysanthemum** – The foliage and stems help protect the crown over winter.
    - **Echinacea** – The seedheads provide food for birds as well as texture and interest in the winter landscape.
    - ***Gaillardia* (blanket flower)** – This plant may be cut back in either spring or fall. The seedheads provide food for the birds over winter. If you don't want the plant to re-seed, cut back in autumn.
    - ***Helleborus*** – The foliage remains green over winter, which adds texture and interest to the garden. However, it will look unsightly by late winter, at which point it should be carefully cut back before the new spring growth emerges.
    - **Tall Sedum –** The browned seedheads look attractive in the winter and the hollow stems provide overwintering sites for beneficial insects.
- **Dig up the bulbs or roots of tender perennials** such as canna, dahlia, caladium, *Alocasia* (elephant's ear), tuberose, and gladiolus and prepare them for winter storage. These bulbs are either not hardy to USDA Zone 7 or are only marginally hardy. This task is easier if you wait until after a light frost blackens the foliage. Cut off all the foliage, then carefully dig up the roots so that you don't damage them. Inspect them and discard any that appear diseased or soft. Allow the roots to dry thoroughly, clean off soil, and pack loosely in peat moss or vermiculite in open baskets or cardboard boxes. Store in a cool, dry, dark, frost-free location

over the winter. Don't forget to label the bulbs so that you can easily identify them next spring.

- **Mark where late emerging perennials are planted** so that you don't damage them next spring when you begin working in your flower beds. *Asclepias* (milkweed), *Platycodon* (balloon flower), *Baptisia* (false indigo), and some ferns are examples of late emerging perennials.
- **Bag all diseased foliage and stems from peonies, garden phlox, or roses** and dispose of the debris in the trash. Do not add it to the compost pile. This will reduce the overwintering of botrytis blight, mildew, and other fungal spores.
- **Remove cool-season weeds**, such as chickweed, dandelion, wild onion, plantain, and white clover. A few minutes spent pulling these weeds from flowerbeds now will save you many hours of work next spring.
- **Protect water features** from the accumulation of falling leaves and other debris. Spread netting over the water feature and secure it to keep the leaves out of the water. Remove the leaves from the netting as they accumulate.
- **Shred or chop fallen leaves** and compost them or save them to use as mulch on next year's garden. If you're new to composting, check out VCE Publication 426-703, Making Compost From Yard Waste. For additional information on mulching and composting leaves, see *The Garden Shed's* October 2018 Tasks and Tips for the Ornamental Garden in October.
- **Have a soil test done this fall** if you haven't had one done in the past two or three years. Soil amendments, such as lime, manure, compost, and chopped leaves, are best added to flower beds in the fall. But don't amend until after you get the results of the soil test. For additional information on soil testing, see VCE Publication 452-129, Soil Sampling for the Home Gardener.
- **Leave seed heads in place for annuals that you want to self-seed** or just scatter the mature seeds where you want them yourself. Some of the **annuals and biennials that reseed themselves** include cleome, cockscomb, cosmos, foxglove, hollyhock, larkspur, money plant, sweet William, forget-me-not, Shirley poppy, zinnia, four-o-clock, marigold, vinca (Madagascar periwinkle), and impatiens.
- **Take preemptive action to prevent deer damage** to the bark or branches of young or newly planted trees and shrubs. In fall and winter, male deer rub or scrape against young trees for two reasons: (1) to rub the summer velvet from their horns and (2) to mark their territory as a way to attract female deer and warn other male deer away. Wrap vulnerable tree trunks with a physical barrier such as wire or plastic mesh tree guards, chicken wire, or woven wire fencing. This will protect the trees while allowing them room to grow.

MANAGE AUTUMN INSECT PESTS

Irises are susceptible to a variety of pests and diseases. One of the most annoying is the iris borer, which is the larvae of the brownish-looking nocturnal Miller Moth (*Macronoctua onusta*). The moth lays its eggs on old iris leaves and flower stalks in autumn. The larvae hatch in late spring and tunnel into the leaves on their way down to the rhizome. The damage they cause makes the rhizome susceptible to bacterial soft rot. Iris borer eggs that overwinter on dead foliage are the source of infestation each spring. **To break the life cycle of this pest, remove dead leaves from rhizomes in autumn to prevent any eggs from surviving over the winter months**.

Inspect your evergreen trees and shrubs for **bagworms**. Bagworm eggs overwinter on evergreens such as junipers, spruce, hemlock, and arborvitae as well as many other trees. Pick off and burn any egg cases that you find. This may be done from fall until spring. See VCE Publication ENTO-351NP on Bagworm for additional information.

PREVENT UNINVITED WINTER HOUSE GUESTS

Around mid-October, the adult **Lady Beetle** (or Ladybugs as they are more commonly known) begins moving out of the garden and into nooks and crannies under tree bark, leaves, or other sheltered spots that will afford them protection from winter's cold weather. As they search for winter lodgings in earnest, they often enter our homes through tiny cracks around windows, doors, attic vents, or any other opening available to them.

The **Brown Marmorated Stink Bug** is another insect that often tries to overwinter in your home. Fortunately, the stink bug population seems to have dissipated somewhat over the past few years. However, if you see them gathering on the south or west-facing side of your house, chances are very good that they will try to seek entry into your home for the winter.

Insects aren't the only creatures seeking a warm place to spend the winter. **Rodents** often look for entry points into the home. To prevent access, seal all potential entry points. Leaving the garage door up is an open invitation to a mouse or rat. Make sure there's no food available to attract them such as grass seed, bird seed, and seeds that you've saved from your garden.

ACCLIMATE HOUSEPLANTS

If you didn't bring your houseplants indoors at the end of September, definitely get them indoors this month. The longer they stay outside, the harder the transition to the indoors will be for them. Once they are indoors, keep a close watch on them for spiders, spider mites, white fly, scale, mealy bug, and other unwanted hitchhikers. These pests may not show up for days or even weeks after you've moved the plants indoors.

Houseplants may go through a period of adjustment to lower light levels. If they are getting sufficient water but dropping leaves, they may not be getting enough light. If that's the case, try relocating them to a brighter location.

ENJOY THE AUTUMN LANDSCAPE AND PONDER WHY LEAVES CHANGE COLOR

As you work on your October gardening tasks, take time out to enjoy the view. As the days have shortened and temperatures cooled, the vivid colors of autumn have transformed the landscape. The transformation starts in the cooler, higher elevations and gradually spreads to the warmer, lower-lying valleys. Meanwhile, the veins that transport fluids into and out of leaves gradually close off at the base of each leaf. The clogged veins trap sugars in the leaf, which promotes the production of anthocyanins.

Three types of pigments are involved in autumn color:

- **Chlorophyll**, which gives leaves their green color, is present in the chloroplasts of leaf cells throughout the entire growing season.
- **Carotenoids**, which produce yellow, orange and brown colors, are also present in the chloroplasts of leaf cells throughout the growing season but are masked by chlorophyll. Once the leaves stop producing chlorophyll, the carotenoid pigments become visible.
- **Anthocyanins**, which produce reds, pinks, and purples, are typically not present during the growing season. Anthocyanins are only produced in the fall and are manufactured from the sugars that are trapped in the leaves. They are water soluble and appear in the watery liquid of leaf cells. Their purpose is to protect leaves from being eaten or from getting sunburned.

Many of us are puzzled by the fact that fall colors are vibrant some years and subdued in other years. The intensity of color is influenced by temperature, sunlight, and soil moisture levels before and during the time chlorophyll is dwindling in the leaves. The most brilliant autumn colors are generally produced in years with

a warm wet spring, favorable summer weather with adequate rainfall, and warm sunny fall days with crisp, cool nights. See the US Department of Agriculture Forest Service website for more information on the Science of Fall Colors.

INVASIVE ALERT

Japanese honeysuckle. Photo: Leslie J. Mehrhoff, Univ. of Connecticut, Bugwood.org

Japanese Honeysuckle (*Lonicera japonica*) is a rapidly spreading nonnative vine that competes for both above- and below-ground resources, inhibiting the growth of desirable trees, shrubs, grasses, and wildflowers. A woody perennial vine, Japanese honeysuckle retains its leaves well into winter (year-round in mild climates). Hand pulling young vines is effective only if all roots are removed. Any roots left in the soil will resprout. A foliar spray may be a more effective way to kill the entire plant. The **best time to spray is autumn and early winter** after most native plants have lost their leaves or are dormant, but before a hard freeze (25°F). Foliar sprays are less effective in spring because the herbicide does not thoroughly move from the leaves into the roots during spring growth.

Foliage of Japanese Honeysuckle. Photo: Leslie J. Mehrhoff, Univ. Connecticut, Bugwood.org

For additional information on methods for eradicating Japanese Honeysuckle, refer to the Fact Sheet/Japanese Honeysuckle published by the Blue Ridge Partnership for Regional Invasive Species Management (PRISM). Also see the Invasive Plant Control Calendar in the May 2022 issue of *The Garden Shed*.

SOURCES:

Featured Photo of Aromatic Asters (*Symphyotrichum oblongifolium*): Fern Campbell

Monthly Gardening Tips/October/Piedmont Master Gardeners/Gardening Resources

Upcoming Events

By Cathy Caldwell | October 2023-Vol.9,No.10

Pollinator Gardening with Three Flowerpots

Tuesday, Oct 3 @ 6:30 pm

The Center at Belvedere, 540 Belvedere Boulevard, Charlottesville

Growing native plants is one of the best ways to promote biodiversity and create healthy habitat for wildlife, including pollinators like the monarch butterfly, now in migration. Even if you live in an apartment or townhome that lacks a garden space, you can still support pollinators by growing native plants on a patio or balcony. Learn how you can create a native plant garden with as few as three flowerpots that will attract bees, butterflies, hummingbirds, and other vital pollinators.

REGISTER **here** for this **free** program, which is open to all, sponsored by Piedmont Master Gardeners and the Center at Belvedere.

Find out more »

Blue Ridge Prism Invasive Plant Workshop

Friday, October 20 @ 10:00 am – 1:00 pm
Mcintire Park in Charlottesville

Invasive plant identification walk and in-person instruction. Space is limited to 25 participants.

Find out more ⇒⇒. Registration fee is $25. Register via Eventbrite HERE.

Garden Basics: Native Plant Propagation—Seed Saving and Winter Sowing

Saturday, October 21 @ 2:00 pm – 4:00 pm
FREE

Growing native plants is vital to sustaining pollinators, birds, and small mammals. Seed saving and winter sowing can extend your budget and widen the selections available. Participants will learn about

- seed collection and resources for buying native seed,
- various techniques for preparing native seeds for sowing, and
- propagation techniques for winter and spring and for outside and inside.

The class will feature a hands-on winter-sowing activity.

Garden Basics is a partnership with the Bread and Roses ministry at Trinity Episcopal Church.

RSVP here »

Fall/Winter Virtual Workshop: Introduction to Invasive Plants and Identification

Tuesday, October 24 @ 1:00 pm – 3:00 pm
$10.00

Register here⇒

Fall/Winter Virtual Workshop: Control and Management of Invasive Plants

Thursday, October 26 @ 1:00 pm – 3:00 pm
$10

Register here ⇒

Coming up in November . . .

Garden Basics: Season Extenders in the Edible Garden

Saturday, November 18 @ 2:00 pm – 4:00 pm.
Trinity Episcopal Church, 1118 Preston Avenue, Charlottesville FREE

You can grow fresh produce all winter in Central Virginia with the use of season extender techniques. Participants will learn:

- How to use crop choice, garden layout, and row covers to extend the growing season
- Where to go for supplies
- How to position and secure row covers in a garden through a hands-on demonstration.

Garden Basics is a partnership with the Bread and Roses ministry at Trinity Episcopal Church.

RSVP here »