Trumpet Vine

Knowledge for the Community from Loudoun County Master Gardeners

Winter 2016-2017

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A Gardener's Time for Reflection

Winter has settled in and for gardeners it's a good time to slow down, reflect and refresh.

Cozy up with garden books. It's time to read those garden books we buy and then put on the shelf because we're too busy gardening. Combine gardening with history and read Andrea Wulf's books—*The Brother Gardeners*, *The Founding Gardeners* and *The Invention of Nature,* or Peter Hatch's very readable book about Thomas Jefferson's vegetable garden, *A Rich Spot of Earth*. Two more botany/science books are reviewed in this issue, *Seeing Trees* by Nancy Ross Hugo, and *What A Plant Knows by* Daniel Chamovitz.

Take in the winter forest. Without leaves, trees reveal the beauty of their structure and views normally hidden by leaves are exposed. For striking hilltop views of the Potomac River hike either side of Great Falls or walk the trails at Balls Bluff in Leesburg. Any favorite woodland trail is a totally different experience in the winter.

Explore a garden's winter bones. Like forests, winter gardens provide new views, insights and inspiration. Visit Oatlands, the Virginia or the National Arboretums, Meadowlark Gardens in Vienna and Green Spring Gardens in Annandale.

Visit a conservatory. There's nothing like the warm, moist air and scent of soil in a conservatory in the winter. The US Botanic Garden just off the Mall across the street from the Capitol is an aesthetic and intellectual experience. If you are travelling south, visit the Lewis Ginter Botanical Gardens in Richmond. If you are travelling north visit Longwood Gardens in Kennett Square Pennsylvania, or in New York, The New York Botanical Gardens and the Brooklyn Botanical Gardens.

Then you'll be ready to great spring refreshed and inspired.

Every gardener knows that under the cloak of winter lies a miracle … a seed waiting to sprout, a bulb opening to the light, a bud straining to unfurl. And the anticipation nurtures our dream.

Barbara Winkler

LOUDOUN COUNTY MASTER GARDENER LECTURE SERIES

FREE AND OPEN TO THE PUBLIC, 7PM

RUST LIBRARY
380 OLD WATERFORD RD NW
LEESBURG, VA 20176

Jan. 5, "*The Healing Nature of Gardening*" by Jan P. Lane, registered Horticultural Therapist (HTR)

Feb. 2, "*Finding Balance: It's Not Easy Being Green"* by Claudia Thompson-Deahl, Senior Environmental Resource Manager, Reston Association.

March 2, "*A Garden Tour of the Emerald Isle*" by Margery Erickson, garden lecturer.

April 6 "*The Real Dirt: Trade Secrets from a Loudoun Vegetable Farmer*" by Ellen Polishuk, Potomac Vegetable Farm

May 3, *"Tick Ecology: the Facts"* by Ron Circe', Manager, Banshee Reeks Nature Preserve

For more information, please visit our web site at loudouncountymastergardeners.org

Visit us on Facebook: Master Gardeners of Loudoun County, Virginia.

2017 "Let's Get Growing" Annual Symposium

The Loudoun County Master Gardeners are sponsoring a one day gardening symposium, Saturday, March 18th. Four prominent speakers will provide inspiration, ideas and information to prepare you for this upcoming growing season. Please join us at the Ida Lee Center in Leesburg to learn more as this year's outstanding speakers share their expertise.

Thomas Rainer: Landscape architect, teacher, and author.

Mr. Rainer has designed landscapes for the U.S. Capitol grounds, the Martin Luther King, Jr. Memorial, and The New York Botanical Garden. He works in Washington, D.C., as a principal for the landscape architectural firm Rhodeside & Harwell, and blogs at the award-winning site Grounded Design. In his talk, ***Planting in a Post Modern World,*** you will learn how to marry ecology with horticulture and create smarter gardens. The talk will explore strategies inspired by wild plant communities that result in more robust, diverse, and resilient plantings for our own yards that allow us to create gardens that are more satisfying, more resilient, and less work. Thomas Rainer's blog: *www.groundeddesign.com*

Joe Murray: ISA certified arborist, educator, and trainer for the International Society of Arboriculture.

Joe Murray, a former college biology professor, is a trainer for the Mid-Atlantic Chapter of ISA and an independent consulting arborist. When Joe is not busy managing his farm's soil health, he morphs into an educator, traveling around the US teaching and learning about trees and people. Trees and turf are expected to grow together in today's urban landscape, but in nature the two don't share the same spaces, either above or below ground. In his talk ***Trees and Turf: An Antagonistic Relationship*****,** Joe discusses the relationship that impedes the vigor of both trees and grass. Homeowners will learn how to sustain trees and turf in the home landscape. Joe Murray's website: http://www.treebio.com/home

Gregory K. Evanylo: Professor of Crop and Soil Environmental Sciences at Virginia Tech.

Dr. Evanylo's areas of expertise are waste by-product management (including composting) and use for the improvement of soil and crop production and protection of air, water and soil. He is a member of the Soil Science Society of America, the American Society of Agronomy, the U.S. Composting Council, and the Water Environment Federation. Due to suburban construction practices, soil is often constrained by compaction, poor drainage, low nutrition and high salts and pollutants. This presentation will explain the causes of such soil limitations, how to assess your soil, and remediate it to improve its health for a better lawn and garden.

Prof. Evanylo's publications: https://pubs.ext.vt.edu/author/e/evanylo-greg-res.html

Peggy Cornett**:** Curator of plants at Monticello.

Ms. Cornett has focused on researching and restoring Thomas Jefferson's gardens for over 30 years. She writes for gardening magazines and professional journals. She has also lectured on a variety of garden history topics throughout the United States, and at the American Museum in Bath, England, and the Bermuda Rose Society in Hamilton. Her presentation, '***Roots, Fruits, & Leaves'—Thomas Jefferson's Continued Harvest at Monticello Historic Gardens,*** features the many heirloom vegetable and fruit varieties that have been collected, propagated, and maintained in the gardens at Monticello.

Monticello website is https://www.monticello.org/

On-line registration opens February 1st (mail-in payment available). Tickets that include a box lunch are $70, or $60 if you choose to BYO lunch. This symposium is sure to sell out as it did last year. Buy your tickets early!

See our website for more information and registration
http://loudouncountymastergardeners.org/events/annual-symposium/

Safeguarding Boxwood Crops and Plantings: Mind Your Holiday Decorations

It's that time of year to get the house decorated for the holiday season. Do you know that boxwood greeneries and decorations could carry the **boxwood blight** pathogen to your property, destroying precious boxwood plantings that your family has had for generations and threatening those of your neighbors? This is what happened to a Williamsburg neighborhood during the holiday season of 2015.

As usual, the Christmas party with the neighbors was a lot of fun and all used greeneries and decorations were placed by a trash can after the New Year. A few months later, boxwood blight symptoms first showed up on an English boxwood bush near the trash can. The disease symptoms included brown leaf spots (below, left), black streaking on stems (middle), and defoliation (right). This disease quickly spread to sixty English boxwoods in the backyard (60+ years old) and destroyed the entire planting by July of 2016. At the same time, the disease was also seen impacting the boxwoods on neighboring properties.

The devastating loss of the boxwood plantings to the property owners was both economical and emotional. To prevent the pathogen from further spreading, they removed all the boxwoods from their property and worked with the local Fire Department to burn them on-site, which was another substantial cost in time and money. The overall impact on the neighborhood and nearby historic boxwood plantings is unknown at this time.

How to prevent such a devastating incident from occurring again in the future? the following points are some recommendations:

- First, it is advisable to purchase and use non-boxwood plant materials for fresh-cut greenery decorations. This is particularly important for homeowners, private and public institutions with boxwood plantings on their properties.

- Second, if fresh-cut boxwood greenery is highly desired, homeowners, private and public institutions must be sure to verify boxwood materials used are NOT infected with the boxwood blight pathogen. These practices include, but are not limited to, checking with the vendor to determine if:

    a. The **greenery producers are** located in **areas known NOT to have boxwood blight**

    b. The greenery producer's materials were from his own production facility or another grower(s) and

    c. His own boxwood production facility or other growers who supplied the boxwood materials have enrolled in the Boxwood Blight Cleanliness Program? (http://www.vdacs.virginia.gov/plant-industry-services-boxwood-blight.shtml).

- Third, when the holiday season is over, all greenery decorations need to be disposed of properly - double bagging them immediately then throwing in the trash can to be taken to the landfill without delay to avoid any unnecessary complications.

- Fourth, use 70% alcohol or Lysol Spray Brand III with 58% alcohol to sanitize everything that has been in contact with the greeneries and decorations. As noted in the Williamsburg neighborhood, any accidental pathogen introduction will have tremendous impact on your own boxwood plantings, your neighbors' and the communities in which you reside. Thus, a community effort needs to be made to safeguard boxwood plantings in the Commonwealth of Virginia and beyond.

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Norm Dart, Debra Martin, Virginia Department of Agricultural and Consumer Services

Hard Working House Plants

In order to save energy and reduce our carbon footprint, we have insulated our homes very well, caulked all the cracks and sealed them up tight. In solving the drafty house problem we have created another problem— toxic fumes trapped inside our houses.

In the late 1980s, NASA researchers studied the ability of houseplants to purify the air and remove toxic agents such as benzene (in glue, paint and auto fumes); formaldehyde (in particleboard, paper, carpets, cigarette smoke and natural gas); and trichloroethylene (in paint stripper and spot remover). The study contained a list of air-filtering plants, and subsequent studies have shown similar benefits of houseplants.

There are many lists of air-purifying plants. The champion air purifier does not fall in the common and easy indoor plant category. It's an outdoor plant — the common garden mum. It would take some rotation and work to maintain one indoors but it may be worth the effort depending on the indoor pollution problem.

The following is a list of air-purifying plants that are easy to grow common house plants. Choose several different types to place one in every room. Some of these plants may not be safe for pets. I have had almost all of these plants at one time or another and I have always had house cats and have never had a problem, but be forewarned!

Aloe plant

An aloe vera plant is in greater danger of being overwatered than under watered. Aloes like a soil that drains well. A cactus mix or a sandy soil is good for larger pots. Bright, indirect light is best. Watch for scale.

Photo Clemson U.

Dracaena 'Janet Craig' (*Dracaena deremensis*)

Dracaenas are easy to grow. This large group of houseplants comes in all shapes, sizes, and colors. Choose from the tall corn plant, which has interesting markings, or the rainbow plant, which comes in bright purple. Keep the soil damp but not soggy, as too much water is a kiss of death for this plant. Eliminates formaldehyde, xylene, toluene, benzene, and trichloroethylene.

Peace lily (*Spathiphyllum*)

These are one of the top three plants for removing common household toxins, even ammonia. Keep soil slightly moist. Peace lilies thrive in most lighting conditions, but too little light can prevent flowers from blooming. Eliminates formaldehyde, benzene, trichloroethylene, xylene, ammonia, and more.

Photo UF House Plants

Photo Clemson U

Bamboo palm (*Chamaedorea seifrizii*)

It likes bright, but not direct sunlight. Keep the soil moist. Place bamboo palms where air circulates freely, and mist occasionally to prevent spider mites. Bamboo palms also transpire a healthy dose of moisture into the air, making it a welcome addition in dry winter months.
Eliminates formaldehyde, benzene, carbon monoxide, xylene, chloroform.

Rubber plants (*Ficus elastic*)

These plants love bright, filtered light. Water moderately to keep the soil moist, especially in the winter. Prune the leaves and wipe them down to keep them looking pretty. Eliminates carbon monoxide, formaldehyde, trichloroethylene and more.

Golden Pothos (*Epipremnum aureum*)

Photo Okla. St. U.

Golden Pothos flourishes in a variety of conditions and is virtually indestructible. It can grow up to 8 feet long. It's also considered one of the most effective indoor air purifiers for removing common toxins. Water when the soil is dry. You can trim the tendrils when the plant gets too big. Eliminates formaldehyde, xylene, toluene, benzene, carbon monoxide, and more.

Chinese evergreen (*Aglaonema*)

UF Gardening Solutions

Water moderately and allow compost to almost dry out before watering. Chinese evergreens like high humidity, a little regular misting, and getting repotted every few years. Eliminates benzene, carbon monoxide, formaldehyde, trichloroethylene, and more.

Spider plants (*Chlorophytum comosum*)

Spider plants grow quickly and look great in hanging baskets, especially in your work space. Water your spider plants two to three times a week. Eliminates formaldehyde and xylene.

Photo Clemson Ext.

Ficus tree (*Ficus benjamina)*

This popular indoor plant sometimes called a weeping fig, does best with plenty of bright indirect natural light. Water it frequently, but to avoid root rot allow the soil to dry before adding more water. It prefers normal house temperatures and humidity above 50%. Eliminates formaldehyde, xylene and toluene.

Snake Plant *(Sansevieria trifasciata)*

These plants are very low maintenance. They can endure low amounts of light for long durations but grow best with plenty of bright light. Don't overwater as it is likely to rot if the soil is too moist for too long. Eliminates formaldehyde, nitrogen oxide, benzene, xylene and trichloroethylene.

Four Benefits of Indoor Plants

In addition to cleaning the sir, there are other benefits of house plants:

Higher Oxygen Levels: During photosynthesis, plants absorb carbon dioxide and release oxygen. Plants add oxygen to indoor air during the day. At night, most absorb some oxygen and release carbon dioxide. A few types of houseplants release oxygen at night—mainly succulents, moth orchid, dendrobium orchid, snake plant and bromeliads—making them ideal companions for the bedroom.

Lower Mold and Bacteria Counts: A home filled with lots of houseplants has 50 to 60 percent fewer mold spores and bacteria. Houseplants emit substances called phytochemicals that suppress these microbes in indoor environments.

Improved Mood: Studies from the University of Technology in Sydney, Australia, found that indoor plants reduce anger by 44 percent, anxiety by 37 percent, fatigue by 38 percent and depression by 58 percent. Amazingly, just one plant can make a difference.

Natural Humidifier: Plants release moisture through their leaves. Use plants to keep indoor air within the ideal humidity range. Palms and ferns in particular have high transpiration rates. Most indoor plants prefer higher humidity and may need their leaves misted with water for optimum health.

Treat yourself to several of these healthful plants.

Carol Ivory, Loudoun County Extension Master Gardener

Flecking of Ash trees

Have you noticed trees in your neighborhood that look like the one below? With bark stripped off areas over the entire length of the tree, starting at the top? And strips of bark on the ground around the tree? What could be causing this damage? Is it a bear sharpening its claws? Squirrels?

Nope. The culprit is your friendly neighborhood woodpecker. And he/she is going after the borers in your tree. The true culprits are the borers, the cause of the damage. In my case, the borers were NOT the Emerald ash borer, as the holes in my tree were round rather than D shaped. The tree was killed by the borers and had to be removed. Even chipping up the wood will not stop the spread of the borers, so total removal is necessary. After taking out one tree last week, this morning there was a pileated woodpecker going to town on another tree. At least he will be well-fed going into winter.

If you see this type of damage to your trees, call a certified arborist to identify the borer and to remove the tree. You may call the Help Desk (703-771-5150) for a referral or go to http://www.isa-arbor.com/findanarborist/findanarborist.aspx to search for an arborist near you.

Barbara Arnold, Loudoun County Extension Master Gardener

Growing Hops in Virginia

If you are a home brewer you may want to experience the pride of brewing beer with your own home-grown hops. That way you can control the flavor and aroma of your home brewed beer and enjoy your own unique creation.

Some Hops Basics

Hops are *rhizomatous*, meaning they have underground stems that can produce additional roots. Their roots consist of a large taproot and small lateral roots. Hops are perennials but when you start your hops "farm" you will likely buy your initial hops rhizomes online. It is very important that home growers buy certified clean plant material to avoid the introduction of diseases that affect hops. See http://nationalcleanplantnetwork.org/HOPS_CPN/ for more information.

Hops are *dioecious*-meaning male and female flowers are produced on separate plants. Female plants produce the cones (mature flowers). Female rhizomes are the type usually available for purchase. This is because brewers prefer seedless hops.

Hop stems are called **bines**. They climb by wrapping around a supporting structure in a clockwise direction, clinging to the surface using stiff, hooked hairs. Hop plants can grow 15' and higher.

Cultivars for Brewing

Cultivars developed for brewing are divided into 2 basic groups:

- **Bittering hops**-high levels of acids that produce bitterness.
- **Aromatic**-lower content of acids and a balanced oil level producing a pleasant flavor and aroma.

The hops cultivar you choose will depend on the intended use. Select hops cultivars available to the public are:

- **Bianca**-ornamental, yellow foliage
- **Blue Northern**-ornamental, blue green foliage.
- **Cascade**-common aroma hops, easy to grow.
- **Centennial**-aroma hops, high oil content.
- **Comet**-ornamental, bright yellow foliage.
- **Newport**-bittering hop, good disease resistance.
- **Nugget**-bittering hop, good disease resistance.
- **Willamette**-aroma hop, good disease resistance.

Growing Hops in the Ground

Choose a permanent, full sun location that allows plenty of room for growth, as they are perennial. They prefer a neutral to alkaline ph of 6-7.5.

Plant when frost danger has passed, typically in April or May. Plant by mounding the soil and digging a hole twice as wide as the rhizome. Plant no more than 2 rhizomes (of the same variety) per hill. Install a trellis beside the hop plant. You can use a natural trellis such as a tree, tree

branch, porch bannister or fence. Or use an adjustable trellis and allow the plants to grow until the tendrils are a foot long. Train the plant by selecting 2 to 6 healthy shoots and removing all others. Train 1 to 3 bines up the trellis and allow the others to grow outward.

Fertilize with nitrogen every other month during the growing season through July.

Hop plants require **consistent moisture** throughout the growing season. But, do not oversaturate as nutrients may leach out. A plant could require several gallons of water a day during a dry season. Water the plants at the base of the plant or, ideally, use a drip system. Wet foliage can lead to disease problems.

Growing Hops in Containers

If you lack a suitable in ground space to grow hops, there is the option of growing in a container. A disadvantage is that the crop will yield less than an in ground hop plant due to the constrained root space..

You will need to find a suitable place for your container, a location that gets full sun the longest during the day. Remember the sun and shade will change as the growing season progresses. The nice point about growing in a container is that it can be moved if needed to maximize the sun exposure.

You will need a planter or container with a minimum of a 20” diameter. You will need to use a simple trellis or stake with jute, sisal or twine. Hang the hop twine from the eave of your roof or a structure that can support hop bines growing upward.

Use a soil or medium with good drainage, but not ‘dirt’ from your yard. Potting mix is recommended. Fill the container to the top with the potting mix. Set up your trellis when you plant the rhizome. Plant the rhizome 2” to 3” below soil, placing them horizontally or vertically. Keep the soil moist until the first sprouts appear.

Hops grown in containers need more attention during the growing season. Even if your planter looks large, the volume that the root system would normally occupy is much larger. Your primary goal is to compensate for this. To partially compensate for the constriction, train only 2 shoots to the trellis wire.

Water based on the needs of the plant. Do not wait until the leaves start wilting; instead monitor the top layer of the potting mix. Learn to spot when the planter is running low on water and add before the lack of water stresses the plant. The ‘drench and dry’ method is better than smaller amounts on a regular basis. Make sure to soak the entire growing area.

Hops require a small amount of nutrients. Adding too much fertilizer can burn the plant and cause the roots to die back. Add a slow, steady stream of fertilizer and dispense throughout the container. Liquid fertilizer is the best solution although time release granules also work.

Dilute the liquid fertilizer to ¼ of the recommended strength. Soaking the planter is a good approach. Healthy hop leaves look dark green and bines grow steadily. If leaves turn purple or yellow and growth slows, this is likely a sign that fertilizer should be applied. Over fertilization can take longer to correct than nutrient deficiency, so add just enough nutrients to keep the plant

vigorous. A ¼ cup of bone meal (phosphorus) added once the plant flowers is a good 1 time addition.

The hop plant is ready for harvest when yellow powder sticks to your hands, the cones feel papery and have a very strong aromatic hop odor. Mid-August to mid-September is the most common time to harvest. A slight browning of the lower bracts of the cone is normal.

The hops may not all ripen at once, but you need to harvest each as it ripens. Dry the hops out in a warm dry spot in your house, and keep them away from sunlight. Sunlight can seriously damage picked hops. 'Fluff' the cones daily to allow for moist areas to move to the outside. When the inner stem is dry and brittle, the hops are dry. If you use a food dehydrator, keep the temperature below 140°. Store hops away from oxygen. The best way for home growers is to put the dry cones in zip lock bags and squeeze the air out. Store the bags in the freezer until ready for use.

You don't need a green thumb to grow hops. If you keep your container or soil watered, they will grow. If you follow the rest of the advice about nutrients and pruning, you can grow healthy productive hops. A search on "growing hops" will produce many good resources.

Hops were introduced in the Fall edition of the ***Trumpet Vine****, A New Crop Comes to Loudoun County.* For more information on the hops plant and its history see this article.

Cheers!!

Normalee Martin, Loudoun County Extension Master Gardener

Tree Identification Made...*Easier?*

Talk with any of the **Loudoun County Extension Master Gardener Tree Stewards** and they will attest that one of the most difficult tasks we encounter is tree identification. Certain trees have a feature that makes them simpler to ID: a distinctive bloom, such as the dogwood's; tell-tale bark, like the exfoliating skin of paperbark maple; or leaves that reveal the tree's true identity, as in the *Ginko biloba's* graceful fans.

All Photos by Edye Clark

When identifying trees, the most common aspects to consider are these:

- **Leaf** - many times the best feature to consider in determining the species. The leaf's shape, it's edge, it's arrangement on the branches (opposite or alternating), tells you a story...*unless they have all fallen off and blown away...sigh*
- **Bark** - can be extremely telling and is present year-round, unlike deciduous leaves and time-limited flowering. However, note that bark can vary greatly between a young and a mature tree of the same species.
- **Twig/bud** – twigs and buds can provide great clues, if you know how to read them**.**
- **Fruit -** the seed-bearing structure of the tree, which can take many forms—nuts, acorns, samaras, pods, etc.—is very helpful.
- **Flower –** it's color, form, whether it's conspicuous/inconspicuous, etc.
- **Form –** many trees have a very distinctive outline which can give hints (pyramidal, round, columnar, weeping, vase-shaped).
- **When still in doubt -** consider the site (moisture, soil type, sun exposure) and other trees/shrubs growing in the area, i.e. associated species.

Some trees can be tricky to ID. Very tricky. For example, there are roughly 24-27 species of oaks (Quercus sp.) in Virginia; I can't find consensus in my sources. It can often be difficult to tell one from another. Oaks are divided into "white" oak and "red" oak groupings. The tree named Quercus alba—literally "White oak" in Latin—is in the white oak group, but there are others in the white oak grouping as well.

White oaks *usually* have lighter colored bark and leaves with rounded lobes. Red oaks *usually* have darker bark and lobed leaves that come to a point. But I read an article last month about hybridization in oaks that was entitled ***Oak Promiscuity: the Dark Side of Oaks***

> "Just when you feel confident in your dendrology skills, good ole Mother Nature pulls a fast one. Oaks can be very promiscuous, meaning that they naturally hybridize with each other, but only between their own groups. The 'white' oaks only hybridize with members of the white oak group (bur, chestnut, chinkapin, overcup, post, water, swamp chestnut, swamp white, and white oaks). The 'red' oaks only hybridize with members of the red oak group (black, blackjack, cherrybark, northern red, pin, scarlet, shingle, Shumard, southern red, water, and willow oaks). **If you have identified multiple oaks of the same group on your property, chances are that they may have already been naughty.** Many oaks are unable to discriminate against pollination by other species in the same group. That is because they are wind pollinated, and ecological stresses, especially near habitat margins, can cause a breakdown of mate recognition as well as a reduction in pollen quantity and quality in one parent species. **These factors basically mean that when the oak is pollinating, any port in a storm will work.**"(*Emphasis added*)

(Read the full article here: http://www2.ca.uky.edu/kywoodlandsmagazine/Vol5_No_1/pdf/oakpg12-13.pdf)

Fortunately, there are wonderful resources online to assist with the difficult task of identification. One of the best is provided by **Virginia Tech's Department of Forest Resources and Environmental Conservation**, which has a great website. It provides **969 tree factsheets** on trees in North America and includes over 6,400 color photographs of leaves, flowers, fruit, twig, bark, form, and a range map for each species. (http://dendro.cnre.vt.edu/dendrology/factsheets.cfm)

This valuable tool was created in part by Alumni Distinguished Professor Dr. John Seiler, who answers email questions as his alter-ego, **"Dr. Dendro."** He and Laboratory Specialist John Peterson, also in the department, were approached by forest landowner and computer programmer Bob Potts about developing the website's factsheets and interview key into an app for smartphones. This provides a way for users to access the information while in the field, if desired—I find it extremely helpful.

Here is information taken from the iTunes description, where the app can be obtained for free (https://itunes.apple.com/us/app/vtree/id576191197?mt=8); also available on Google Play for android (https://play.google.com/store/apps/details?id=org.pottssoftware.agps21&hl=en).

Users can narrow the species list for any location in North America using the phone's GPS or any entered address or zip code. Basically the application can become "The Woody Plants of Where You Are Standing." For example, it can become "The Woody Plants of Southwestern Oregon," "The Woody Plants of Central Park," or "The Woody Plants of 37.108 lat., -80.452 long., elevation 2118." A feature also allows you to send any tree related question to "Dr. Dendro," a tree expert in the Department of Forest Resources and Environmental Conservation at Virginia Tech. You can send a tree description or pictures of your plant and experts will help with identification.

Tree identification is challenging, sometimes frustrating, often extremely rewarding and fun. To quote Dr. Denro, it requires: "...practice, practice, and practice."

Edye Clark, Loudoun County Extension Master Gardener and Tree Steward

Endlessly Fascinating . . . Part 3

Gardening is not all fun and beauty or success all the time. There is the hard work. There are diseases, pests, and cultural problems in the mix. And those necessary tasks like weeding and watering! But ask yourself, have you found fascination as well dealing with the hard work, pests and diseases, and tedium? Look deeper, and be honest with yourself.

Your Own Patch of Paradise

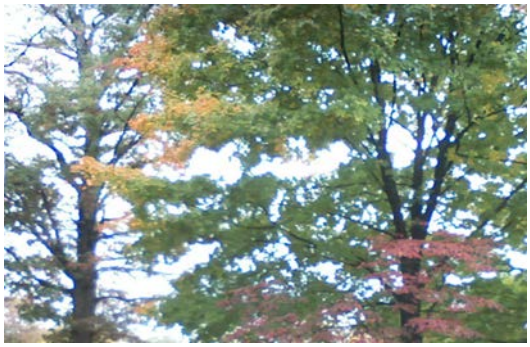
The hard work has many returns—exercise and health, mindfulness and calm, and the satisfaction of what has been created: The bouquets of eye candy on display, the beautiful corners for rest or entertainment, the whiff of fragrance, even the juicy berry and tangy-sweet tomato.

Isn't it paradise—like when you can go outside your home and into a garden to gather vegetables for your meal of the day and flowers for the vase? Or have a cozy breakfast nook in the open surrounded by lush container gardens like a beckoning sidewalk cafe?

There is a holistic sense of purpose and spiritual achievement in gardening. When nature is involved, humanity dances with the sublime and ethereal while standing on firm ground. Plant life. Fauna. The teeming life hidden or squirming in seemingly basic soil. All alive.

On a cold March day years ago, the Loudoun County Master Gardeners held a public lecture, "*Transforming Small Spaces into Organic Gardens*." The attendance was a whopping 110! How did that lecture attract so many? It could very well have been imaginations of one's own patch of paradise, playing with exciting thoughts at a time when cold and snow were still in the picture. It is fair to assume those lecture attendees were ready to get down in the dirt or fool around with grow lights and start some "transforming" as soon as they could. "Small spaces" meant those with the will can, regardless of space, with no one shut out of gardening. "Organic" means trying to work with nature. So they came to hear how that would be possible.

The idea of a patch of paradise can take on unlimited form and function. It need not be just a symphony of colorful blooms and lush greenery. Spend time being shut indoors this winter to let your imagination plan that garden.



Should all you have and want to have are trees, then plan to care for those trees or get to know them more. Trees do not merely stand there to provide shade or decorate a spot. Know that they host teeming life and natural activities too. And yes, even those dead or dying trees left standing. Gardens large or small, serene or abuzz with activities, all can be a patch of paradise.

Aroma for Well-Being

The senses bring fascination, and with that, pleasure. Sight, hearing, touch, taste, and smell. Fragrance and aromas in gardening can be a specific pleasure created by a determined gardener, such as purposely planting a fragrant rose garden. And then there is fragrance such as that pleasurable whiff of newly mown grass or cleansing rain. Want more of such pleasure? Then go further and plan for aromatic plantings.

We have heard of Aromatherapy. Is it art or science to capture natural aromas in service of human well-being? Let your fascination with the topic inspire you to do further research, as there is quite a treatment of the subject matter, from the academic community to lay holistic purveyors. But how can gardeners embrace it? Consider cultivating fragrance and aromas as an enhancement to the gardening life and well-being.

In the spring, the sense of sight is the most anxious. Just a glimpse of a cheerful daffodil peeking out of winter litter awakens. It is a bonus that some daffodils are fragrant, so why not plan for early boosts to the senses of sight and smell? Plant a fragrant daffodil in the fall, or even take the risk of planting some on a winter day. And while you're at it, don't forget fragrant hyacinths.

Do you appreciate subtle aromas that do not waft but that invite a personal, up-close whiff or brushing against? The choices are many all through the gardening season. And then in winter, plan to engage in arts and crafts projects to transform the spoils of gardening into other forms and uses that can continue to fascinate.

Why not settle in on cold winter days and leaf through books and magazines on cultivating fragrance? Here is a list of aromatic plants (minus always-fragrant herbs) to consider growing in your garden. All are featured in the book, *The Aromatherapy Garden: Growing Fragrant Plants for Happiness and Well-Being*, by Kathy Keville: Balsam fir, clematis, clove pink/dianthus, daphne, flowering tobacco/nicotiana, freesia, gardenia, geranium, heliotrope, hyacinth, iris, jasmine, juniper, lavender, lilac, lily-of-the-valley, Mexican orange flower, mock orange, oriental lily, phlox, poet's daffodil, primrose, rose, stock, sweet box/*sarcococca*, sweet flag, sweet pea, sweet pepperbush, tuberose, trumpet flower, viburnum, violet, wallflower, wintersweet, and witch hazel.

Lilac

Sweet Pepperbush

Viburnum

Phlox

Continuous learning is part of the fascinating world of gardening. For example, one reminder about aromatic and fragrant plants is that not all varieties of a species or species of a genus are fragrant. As with daffodils, that is true of lilies too (oriental lilies fragrant, asiatic lilies not), or viburnums, among others. One giveaway would be "sweet" or "odorata/odoratus" in the plant name.

Aromatherapy of course is not limited to sweet, pleasant fragrance and scents. Happiness and well-being can be had from unpleasant aromas unleashing therapeutic powers as well. Consider this passage from the Keville book: *"Yarrow's bitter aroma is reminiscent of wormwood, tickling the back of the nose. Its pungency makes many people pull back the first time they smell it. The aroma of yarrow is linked with healing both emotional and physical wounds. It is also an insect repellent. Yarrow beer is still made commercially in Sweden, where it is considered more intoxicating than beer containing hops."*

Aroma, fragrance, scent, smell, odor … what's in a name? Harnessing them is easily an option for the gardener. In any way one regards it, or uses it, fascinating!

Water for Life

The first thing that comes to mind is that glass of clear liquid that quenches our thirst, so easily available. And then a litany of need for clean water fills our thoughts, and how we cannot live without that as humans. As gardeners we see further and think of water as equally vital to non-human life.

We can go on and on as we imagine water in all its forms. From the faucet, from the ground, from the sky, from a bottle, water is reliably available everywhere. Until it is not; and until it fails to sustain.

This is a wetland. Wetlands are part of the lifecycle of our very own gardens. Imagine that runoffs from our properties somehow end up in a body of water like this, and that what we do in our very own properties affect our waterways. Food for thought for a conscientious gardener. Why does it matter?

One concern: Water Quality. The whole cycle affects the quality of that glass of water from your faucet to the availability/quality of the crab cakes you may enjoy.

It is daunting to think about it. A little extra care in what one can control makes a difference incrementally to benefit the whole. Here is crash course in the water lifecycle. Read this from a Virginia Tech publication, "Hydrology Basics and the Hydrologic Cycle," and try to convince yourself this is not vital information:

"*The vast majority of Earth's water is salt water in the oceans. Only 2.5 percent of the water on Earth is fresh water, and an even smaller portion of that (0.034 percent) is fresh water readily available to humans*."
"One of the most fundamental properties of water is that it is neither created nor destroyed. That

is, there is the same amount of water on Earth today as there was millions of years ago; water just changes phases—from liquid to solid to gas. However, while the mass of water is conserved, water quality is not, and degradation of water quality effectively reduces availability of accessible waters for domestic, industrial or agricultural uses."

Gardeners in particular have an expected appreciation for water availability, especially when we hear of water rationing in places like California. We can be thankful here in Virginia that we have reliably assured water sources. Yes, we are water secure, but assured of water quality? Bottom line, gardeners are a critical player in the hydrologic cycle and water quality. What we do and do not do in our gardens have consequences much beyond our properties' boundaries.

On a lighter note, heard of "build it and they will come"? Here was one welcome surprise. A gardener started building a runoff to direct excess storm water toward a potential rain garden. The very next day, here was a surprise visitor. Heartwarmingly cute and … fascinating!

Maria Daniels, Loudoun County Extension Master Gardener
All photos by Maria

Pest Spotlight

Ants: The Unsung Heroes of the Garden

As an Entomologist, I am often asked what the benefits are of any insects we often think of as pests. While mosquitoes and horseflies cause one a bit of pause when dissussing their positive contributions to society, the ant is one of the easiest to put in a few good words for.

Black Carpenter Ant By Muéro at en.wikipedia [Public domain]

I Bet You Didn't Know…

- There are 12,000 species of ants that have been identified. There are probably even more than that in dense, tropical regions of the planet.
- Ants exist on every continent (aside from the obvious- they don't make winter hats and gloves that size yet!).
- Ants are in the same order, Hymenoptera, as bees, wasps, and hornets. They are genetically closer to wasps than bees.
- Ants can lift 20x their body weight. This might not seem that helpful to you, but stayed tuned. This amazing feat comes in handy in the garden!
- The most common pest species in Northern VA are pavement ants, odorous ants, sugar ants, and carpenter ants. Look forward to the Spring edition for more information on how to prevent home entry.

Taking Care of Business…literally!

One of the best qualities of our ant companions is their desire to keep things tidy. Lucky for us, this extends to our own backyards and gardens! Ants are natural decomposing machines and will happily take your lawn clippings, pet waste, food waste, etc. and help with the breakdown process. Carpenter ants, who have a bad reputation for eating decaying wood in the home, are equally as great at consuming the same outdoors.

Soil Cycling

Earthworms are probably the first organism that comes to mind when soil turning is discussed, but believe it or not ants actually play just as much of a role (if not more) in improving the quality of our dirt. Just think about the natural behavioral tendency for ants to tunnel and it should start making sense. Tons of tiny ants in the soil=tons of soil being turned every day. Not to mention they also tend to nest underground, leaving food and other collected materials that later will break down into quality nutrients. In doing so, this helps cycle important gases like oxygen, nitrogen, and phosphorous all of which make our plants very happy. In addition, it allows for:

- Increased water circulation
- Improved access of nitrogen fixing bacteria and fungi to their needed nutrients
- Accessible nutrients for lower food web animals at the soil level.

Assistant Gardeners

There is a whole category of ants known as "seed-harvesting" because they do just that. If you want a very scientific sounding word for this practice to bust out at holiday cocktail parties, it is known as, "myrecochory". They have a mutualistic relationship with several plant species where they take on the challenge plants face given their immobile nature and carry their seeds to far

and distant places. The first stop is usually their underground nest, and we have already discussed how nutrient rich these spots can be given the food storage potential. This leads to increased germination rates and once again, happy plants. Many interesting species we plant people tend to love, such as trilliums, rely on ants for future success. Carrying the seeds away from the nest also means less impact from predators and enhanced survival. There are not too many predator species out there who really want to mess with a large gang of ants! Here is a sampling of the plants that rely on ants for dispersal:

Trout Lilies At Balls Bluff by Carol Ivory

- Dutchman's breeches *(Dicentra cucullaria)*
- Trilliums *(trillium sp.)*
- Trout Lilly *(Erythronium americanum)*
- Violets *(Viola sp.)*
- Wild Bleeding Heart *(Dicentra eximia)*
- Bloodroot *(Sanguinaria Canadensis)*
- Wild Ginger *(Asarum canadense)*
- Virginia Bluebells (Mertensia virginica)

Ant: Destroyer of Pests

Ants like to fight! In fact, when ants pick a fight it usually means the unfortunate rival is in for a death match. Those of you who have seen ladybugs go after aphids tended to by ants have seen this battle first hand. In addition to causing harm to beneficial insects, they also prey upon the eggs of many garden and house pests such as silverfish, flies, and fleas. One recent study even documented cases of ants preying on cockroach and bed bug eggs if they were given the opportunity. If you do not have termites currently, ants may be helping you with that. They often will patrol the barriers of your yard and keep the "undesirables" such as termites and other pests out.

Ant Appreciation

Hopefully, this gave you some thought on how ants are actually helpful on a day to day basis in your garden. As gardeners, we are always striving to enhance the biodiversity of our yards and communities and ants have quite a role in that. By allowing ants to take up residence in your garden, you are enabling more nutrients, food sources, and enhancing the number of species present in your community. Even if you are not quite ready to get out that "welcome" mat, when looked at from that perspective, it makes their less than desirable attributes a little easier to put up with.

Resources:

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Amanda Rose Newton, BCE. Entomologist and Master Gardener

THE HERB REFERENCE

Sage *(Salvia officinalis)*

Common or garden sage is a much-loved herb by gardeners, herbalists, and cooks. Gardeners love the beautiful purple blooms and characteristic aroma, its drought tolerant nature, and objectionable scent to deer. Herbalists treasure sage for its valuable medicinal remedies, especially as a well-known sore throat and cold fighter. Cooks consider sage a must-have herb in the kitchen for poultry stuffing. As a beekeeper, I have noticed that honeybees flock to their nectar rich flowers.

History of Sage

It has been well documented that sage has been a multipurpose herb, used for thousands of years by the Egyptians, Greeks, and Romans. The genus name "Salvia" is derived from the Latin word *salvere*, meaning "to be saved". An ancient proverb asks, "Why should a man die whilst sage grows in his garden?" This saying stems from the long held belief in the many curative properties of this perennial plant. Although sage has had a long history of use by herbalists, a scientific panel of experts from Germany's Commission E has now verified that sage indeed holds a wide variety of medicinal benefits, due to its antiviral, antibacterial, antifungal, and astringent properties. Herbalists consider sage teas and gargles as a classic remedy for sore throats, colds, and flu. In the U.S., sage is often used as a dietary supplement for relief of menopausal symptoms.

Sage
Photo by University of Illinois Extension

Besides its use as a medicinal or culinary herb, sage is often a commonly used ingredient in soaps, cosmetics, and perfumes. It is believed to be an excellent moth deterrent, when the dried bundles of leaves are hung among wool clothing. The Native American practice of burning sage, or smudging, has become a popular cleansing ritual in homes, with the goal of making "a place clear of lingering energy that is different from what you may be intending for that space," according to Grandmother Wapajea Walks on Water.

Growing and Harvesting Sage

There are over 800 attractive species that come from the genus *Salvia*. (Not all can be used for medicinal or culinary use.) Given the right conditions, common sage is an easy to grow perennial evergreen shrub, with grey-green foliage that will grow to a height from 1 – 3 feet. It will flower from June to August. It has square stems that become woody the second year. It adores full sunshine and dry conditions. A well-drained soil is necessary, especially to ensure winter hardiness.

Since sage grows in a bush-like fashion, it is best to allow 24-36 inches of spacing between plantings. It is difficult to direct seed this herb successfully, therefore my recommendation would be to begin with seedlings, or to propagate them from stem or root cuttings.

Harvest the leaves prior to blooming, by removing individual leaves and drying them in a well ventilated area, on screens that are protected from direct sunlight. Store them in airtight containers. A fun way to use sage blooms (the edible species) is to freeze them in ice cubes, to give beverages a bit of zing.

My gardens are graced with many varieties of sage, which attract magnificent insect pollinators and hummingbirds. It is my favorite herb, planted in abundance on my farm, and used for ornamental, medicinal, and culinary purposes. There is an old saying that where rosemary thrives in the garden, the woman rules the house …. but where sage thrives, the man rules. Hmmm. Let's keep that our secret.

Honey bee on sage flower
Photo by Kathy Keatley Garvey

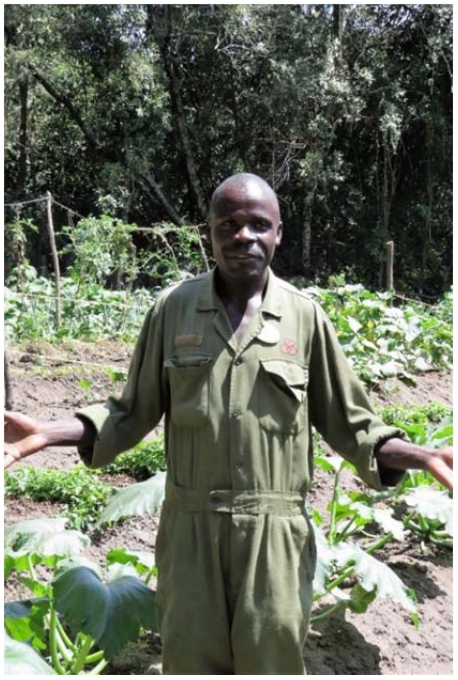
*Note: Sage as well as some other herbs can decrease the flow of milk of a nursing mother.**
* http://www.lalecheleague.org/nb/nbiss56-09p38.html

Karen Olgren, Loudoun County Extension Master Gardener

Sustainable Gardening in the Masai Mara Game Preserve, Kenya

There is a lot of talk lately about "sustainability" and "sustainable agriculture". What does that mean, anyway? The most common definition, in its simplest terms, is "the production of food, fiber, or other plant or animal products using farming techniques that protect the environment, public health, human communities, and animal welfare". Sustainability is not only an American goal, but is even more important to the people of the Masai Mara Game Preserve in Kenya who are trying to live peacefully with the land and protect the environment and the animals of Kenya, including the indigenous people living there.

On a trip to Kenya and Tanzania in the summer of 2016, my husband and I were fortunate enough to stay in the tented Sarova Mara Game Camp. It was a 4-hour drive on extremely rough and dusty roads to get to the Masai Mara from Nairobi. (On our 2 ½ week tour we experienced 2 flat tires and a ruptured brake line, so not easy to get supplies into the Camp.) The "tents" were far from rustic and the food in the dining area at the beginning and the end of long days on game drives was excellent. We found that the Camp had an organic garden on site that, in its first year of production, provided 75% of the vegetables used by the Camp. And the garden was open for tours.



Meet Eric Wetukha Nzeya. He is the chief gardener at the vegetable and fruit garden. Eric very warmly welcomed all visitors and was enthusiastic in explaining how the garden used natural materials, locally sourced, including a "team" of banded mongoose (more on that later), to produce his beautiful vegetables. Eric has a degree Sustainable Agriculture from the Farajalatia Agricultural College in Kajiado, Kenya. He began working the garden in March of 2016. When we came to tour, Eric was discussing the current harvest with the head chef for the Camp. The garden was just planting its third season of plants, the last for the year.

The garden beds, mounded rows, were created by the double digging method. The top soil was dug out, then the subsoil. The topsoil was then returned to the trench, compost and animal manure were added, and then the subsoil. Kitchen waste is then used as a top dressing mulch and is also layered

into the beds. The manure used is cow manure brought to the garden by the local Maasai who live in the Mara and forage their herds outside the Preserve. The manure is piled and the bottom of the pile, which is about 6 months old, is pulled out to add to the soil. In exchange for their "gift" of manure, the Maasai are given meals from the lodge and are hired to work at the Camp. There are also college scholarships granted to young people of the Maasai by the Camp.

The garden attracts beneficial insects and animals to the garden to help pollinate the plants and uses local animals to help with control of pests. Sunflowers attract pollinating bees as well as birds who can pick worms off the plants. There is a "team" (Eric's term) of about 20 banded Mongoose who visit the garden every day at about 3PM. The mongoose dig in the soil around the plants and feast off worms and grubs while aerating the soil. Frankolins, animals similar to a guinea fowl, eat beetles and worms. The green castor bean is planted to attract lady bugs to the garden.

But there are pests that they cannot control with animals and beneficial insects alone. The garden does not use commercial pesticides of any kind, even the organic pesticides available today. It would be too expensive to transport them to the Mara and they have methods of control that have been developed over time. To control aphids, they sprinkle wood ashes from the campfires onto the affected plants. The next morning the ashes are washed off. (Do NOT try this at home – wood ash can burn the plant) For control of insects with an exoskeleton, Eric will make a mixture of oil of Neem tree leaves and Mexican marigolds which is macerated. Garlic and hot chilis are added and the mixture is fermented for 1 week, then sprayed on the pests. This is probably very similar to our Neem oil with pyrethrin sprays. Eric will also make this mixture without the Neem oil. For soil-born bacterial diseases, Eric will burn Neem nuts and mix this into the soil for protection.

How do they save seeds in the Mara? They mix saved seeds with dung ash. Probably don't need to warn you not to try THIS at home. The dung ash acts as an anti-fungal and protects the saved seeds from weevils.

And with these methods and 3 growing seasons, Eric and his helpers can provide 75% of the vegetables for the Camp and hope to increase that number as the garden matures. What do they grow? Just about anything you can think of and some things you cannot. We saw lettuce, spinach, chard, kale, tree tomatoes, tomatoes, carrots, peas, peppers, eggplants, onions, and sweet potatoes. Eric has plans to expand the orchard to supply more of the fruits the Camp uses.

Barbara Arnold, Loudoun County Extension Master Gardener

Notes from the Help Desk:

Q: What is the difference between leaf mold and leaf mulch?

A: You may have heard people using the terms "leaf mold" and "leaf mulch" interchangeably from time to time. The two certainly sound similar enough that it would not be a reach to assume that they essentially mean the same thing, and perhaps reflect regional differences, or slight variations of the same thing. In fact, they are two very different products, with different uses in your lawn and garden. So, what is leaf mulch, what is leaf mold, and what is the difference between them?

Mulch, in general, is used to improve the appearance of landscape beds, help protect and maintain landscape plants by reducing evaporation, deter the spread of weeds, and maintain even soil temperatures. Mulch can be both organic (leaves, bark, pine needles, wood chips) and inorganic (pebbles, gravel, rubber, landscape fabric). An organic mulch will decompose over time, improving soil structure and adding nutrients to the soil, while inorganic mulch does not decompose so does not offer this additional benefit. Leaf mulch falls under the category of organic mulch, and can be made simply by gathering leaves, shredding them with a lawn mower or shredder, and applying around landscape beds and gardens. Alternately, a light layer of leaves can be mulched in place on the lawn and allowed to decompose, returning nutrients to the soil. This is an inexpensive way to aesthetically improve your landscape, while at the same time improve soil quality over time and reduce the amount of waste sent to the landfill.

Leaf mold (or mould, outside of the US) is a soil amendment made up of composted leaves. The distinction between the two is that while compost would be made by maintaining a balance between carbon and nitrogen added to the pile, leaf mold is just the leaves, absent all the other materials you might add to your traditional compost pile. The time for carbon-heavy leaves to break down to leaf mold is at least six months and can be as much as a year. The benefit of using leaf mold is that it improves soil structure and provides favorable conditions for earthworms and beneficial bacteria, and dramatically increases the ability of soil to retain water. In some studies, the addition of leaf mold increased water retention in soils by over 50% (NC Cooperative Extension). This is not to say that leaf mold is a replacement for compost or fertilizer, because while it is an effective soil amendment, it does not provide any nutrition.

In summary, leaf mulch is a product applied to the surface of your landscape that adds aesthetics and has beneficial properties to the plants and soil. Leaf mold is an additive that is worked into the soil to improve structure, water and nutrient retention, and habitat for micro-organisms.

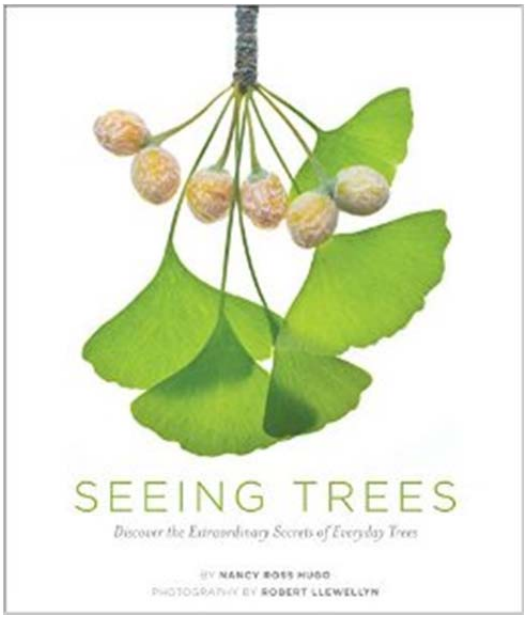
Sources:

VCE Publication 426-716
VCE Publication 430-521
Clemson University Cooperative Extension HGIC 1604 Mulch
NC State University Cooperative Extension

Jennie Grossi, Loudoun County Extension Master Gardener

Book Review:

Seeing Trees: Discover the Extraordinary Secrets of Everyday Trees



by Nancy Ross Hugo, photographs by Robert Llewellyn. Timber Press, 2011.

When we look at a tree we usually notice its size, its leaf color and shape, and maybe its bark. But there is much more to a tree, and this book shows the reader the wonders of trees that are right before our eyes.

This book discusses the leaves, twigs, bark, flowers and seeds produced by various common trees, accompanied by marvelous photographs of these structures, magnified many times over. The structures of the leaves and flowers, such as stipules, petioles, pistils, stigmas, and stamens, are easy to understand when Mrs. Hugo explains them in plain English, and you see them in full color photographs.

Identifying trees in winter isn't so hard if you look at the bark, the twigs, and the scars left by fallen leaves-each species has distinct characteristics, and many are shown in the book.

The first section of the book covers the various parts of trees: leaves, flowers, seeds, twigs, bark, buds and leaf scars. The second section discusses ten trees in detail: Southern magnolia, white pine, white oak, ginkgo, tulip poplar, red maple, common cedar, black walnut, sycamore, and beech. All of these are common in yards and parks. Examples of some of the facts about these trees are: if you see a cedar tree without berries, it is because cedar trees are either male or female, and only the female trees bear berries (actually a miniature cone). Magnolias have existed for over 90 million years. The sperm of a gingko tree swims as it fertilizes the egg.

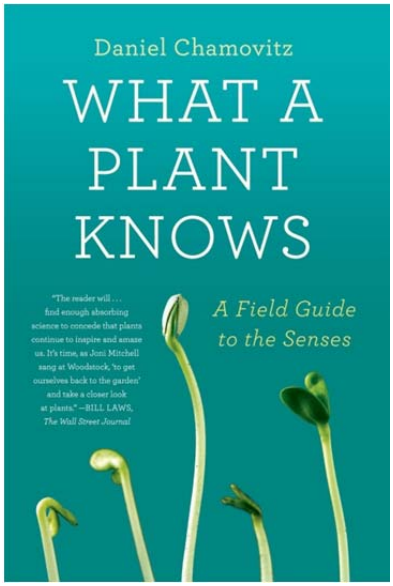
Mrs. Hugo lives near Richmond and works at the Lewis Ginter Botanical Garden. She writes for newspapers and magazines, and has previously collaborated with Mr. Llewellyn on the book *Remarkable Trees of Virginia.* She was a speaker at the Loudoun County Master Gardener Symposium a few years ago. Her writing is very easy to read, yet she is very knowledgeable about trees and botany in general.

This book can be enjoyed by a wide audience for its fascinating photographs of emerging flowers and leaves, while it educates the gardener and provides encouragement for going out in the garden with a magnifying glass to enjoy the marvels of the natural world.

I hope Mrs. Hugo and Mr. Llewellyn can produce many more collaborations on the plants in our world, which will deepen our appreciation of the beauty and complexity of nature.

Betty Hedges, Loudoun County Extension Master Gardener

Book Review: *What A Plant Knows*



by Daniel Chamovitz, *Scientific American* / Farrar, Straus and Giroux, 2012

After reading the book What a Plant Knows, *A Field Guide to the Senses* by Daniel Chamovitz, I started to look at plants in a different way. Because I have been educated as a Master Gardener, I already knew a lot about the biology of the plants. What I didn't think about when being taught this information was how it could be perceived as correlating to one of my own senses. The book's chapters go through what a plant sees, smells, feels, hears, knows where it is and remembers. I was skeptical when first opening the book, but it turned out to be a very interesting read.

Most people do not look at plants as complex living organisms, but they can be more so than many animals. They contain immensely sophisticated sensory machinery. What we don't believe in is the terminology used, as in a plant doesn't have a nose to smell, ears to hear and so on. But the plant does produce chemical reactions to situations that end in similar results that mimic smelling and hearing and feeling. This book compares a human sense and draws a parallel to what it is to a plant.

The author, Dr. Chamovitz, draws from a wide variety of sources, from all over the world, from past to present. The scientific evidence is truly undeniable. It comes down to how we perceive the various reactions of a plant to its environment. A good example of this would be phototropism and the idea that this demonstrates rudimentary sight in a plant. Through experimentation, scientists have found out that plants have photo receptors which measure how much light they take in which in the end dictates when they flower, and what direction they tend to grow.

What a plant "smells" is a little harder to perceive. We know plants emit orders, but they also sense odors around them. Their range of "smell" is limited, but they know when their neighboring plants have been cut or attacked by insects. Plants respond to many kinds of chemicals in the air around them. In an animal, the olfactory nerves send signals into the brain which interprets what it has smelled. Plants detect volatile chemicals in the air and covert these signals (albeit nerve free) into physiological responses. So if the dictionary definitions of smell were to be tweaked to add "the ability to perceive odor or scent through stimuli" instead of with just olfactory nerves, then a plant smells its surroundings also.

The definition of "feel" is also tied to nerves transmitting information to a brain. It might be surprising to find out that plants know when they are being touched, or can differentiate between hot and cold and "feel" the wind. Of course plants don't have feelings such as happy or sad, for they do not have intuitive awareness of a mental or emotional state, again because they have no brain. Yet research has shown that plants mechanically stimulated show electrical signals in their cells which initiate a change or response to different types of stimulation in unique ways.

Do plants hear? The scientific evidence tells us that they seem indeed to be deaf. Surprisingly, the information used to prove this is that plants contain some of the same genes known to cause deafness in humans.

How do plants know where they are? How does it tell the root to grow down and the stem to grow up? There are two major factors, sunlight and gravity. Is this *knowledge*? Or can a plant remember what happened to it before? How does a tree know to bloom in the spring, or start its leaves to turn color in the fall? The author goes into the stimuli needed for changes, but the idea of a plant remembering what that next step will be is an interesting read.

I thought this was a fascinating book. It is chocked full of science and facts so if that is not your cup of tea, you might not find it captivating. I thought the parallels drawn from the research cited very intriguing. It made me think more about my place in the natural world. Am I superior because I have the ability to move from place to place? Maybe not, just different!

Cathy Anderson, Loudoun County Extension Master Gardener