May 2023-Vol.9, No.5

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Heirloom Vegetables

By mking | May 2023-Vol.9, No.5

What are heirloom vegetables?

Most of us understand that a “family heirloom” refers to something passed down from an earlier generation. Those items, such as a treasured handmade quilt or family Bible, may be personally meaningful because of their sentimental value. The term “heirloom vegetable” is not as clear, and this article helps to explain this concept.

First and foremost, heirloom vegetables are open-pollinated, which means the plants are pollinated by wind, birds, or insects without human intervention. In addition, seeds from heirloom vegetables have been saved, planted year after year, and passed along from one generation to the next, so they are true-to-type, reproducing with the same qualities as the parent plant. Here is an example. Suppose your great-grandmother was an avid gardener who grew great-tasting zucchini. To make sure her family could enjoy this same variety in years to come, she extracted seeds from her zucchini, dried them, and stored those seeds in a container. Later, she gave some of those seeds to your grandmother for planting in her garden. That process repeated itself when your grandmother planted those zucchini seeds in her garden and then gave some of the seeds to your mom, who in turn, planted them in her garden. Later, your mom gathered seeds from her zucchini plants and passed some of them on to you.

Fresh heirloom vegetables. Photo: Pixabay

In a way, heirloom vegetables are "living artifacts" that have withstood the test of time. Some of these cultivars date back to a particular seed-saving family, while others might match a specific type of vegetable growing in its native habitat. Okay, that makes sense, but *how old* do they need to be in order to be called heirloom vegetables? Some heirloom plants can be traced back several hundred years to Asia or Africa; some from Europe are reportedly over 400 years old. Other seeds saved by Native Americans date back to the pre-Colombian era. Sources often say that heirloom plants are 50-100 years old or more, but that's not very precise or definitive.

Bounty from fresh tomato harvest. Photo: Abdril Zastrozhnov; stock.adobe.com

Many in the horticultural world use 1951 as an appropriate year to identify a major change in vegetable gardening practices. Before that time, most gardeners kept a steady supply of their own vegetable seeds from the tastiest, most productive plants in their edible garden beds, which saved money. This economical tradition helped ensure that vegetable plants well-adapted to local conditions and microclimates would continue to be sown, grown, and harvested in future years. Then, in the 1950s, commercial growers began developing and selling hybrid varieties of vegetable plants. They were striving for more uniformity in produce that would ripen and be harvested all-at-once, in order to facilitate shipping and longer storage. Commercial growers favored large-scale production and distribution because those practices generally lead to larger profit margins. That trend tipped the balance, gradually making the use of hybrid cultivars more prevalent among home gardeners.

Why are heirloom vegetables important?

Heirloom seeds from vegetable plants represent a diverse gene pool that reflects a wide variety of distinct colors, shapes, flavors, and growth habits. Over time, backyard gardeners and heirloom seed-savers help to

preserve a rich horticultural heritage. Without their efforts, the availability of many unique and delicious edible crops would be greatly reduced. Those who continue this tradition today are contributing to a valuable set of resources that link the past with the present and future. Just as a family heirloom embodies a significant element of family history, heirloom vegetables characterize important connections with garden cultivation practices, food preparation, and dietary habits across multiple generations.

When modern, hybrid seeds are saved from year to year, the resulting vegetables will not necessarily be like the produce from the parent plants. Therefore, without older heirloom varieties being preserved, the size of the gene pool is likely to decrease over time. An unwanted outcome of that scenario might be more problems with garden pests and plant diseases.

Heirloom vegetables come in assorted shapes, sizes, and colors. Photo: Mircea Costina; stock.adobe.com

How do heirloom vegetables differ from modern, hybrid vegetables?

Exceptional flavor is a main reason that gardeners save heirloom seeds, and outstanding taste is typical of most heirloom vegetables. Each generation of a particular vegetable grown from saved seeds should taste as great as the parent plant. That's very different from modern hybrid vegetables, which are purposefully bred for resilience and durability, often at the expense of flavor.

The "look and feel" of produce is another way that heirloom and hybrid vegetables may differ. Commercial growers aim for standardized appearance with their crops (e.g., perfect-looking cucumbers), which appeals to many consumers, whereas "uncontrolled" heirloom varieties may come in irregular shapes, varied textures, and assorted shades or hues. Buyers might think something is wrong with those strange-looking vegetables and tend to avoid selecting them.

Colorful heirloom tomatoes lack uniformity. Photo: Mircea Costina; stock.adobe.com

Another difference between these two types of plants relates to their productivity. Heirloom varieties, chosen and preserved because of their desirable characteristics and production capacity, may achieve higher output than hybrid plants. Some heirloom plants may also be more productive for a longer period of time during the growing season. However, certain heirloom vegetables, such as tomatoes, might be more fragile or perishable than modern hybrids, so careful handling is required.

On the downside, some heirloom vegetable plants may be less resistant to common soil-borne pathogens. Commercial growers intentionally breed hybrid varieties to be more disease-resistant, and this is important for home gardeners. Those who prefer organic gardening without the use of pesticides or herbicides might lean toward certain hybrid cultivars with stronger resistance to plant diseases. After all, if you invest time and energy in creating a vegetable garden, you don't want your harvest ruined by blight, powdery mildew, Fusarium wilt, or other fungal or viral diseases

which can wreak havoc on crops. Following integrated pest management strategies (IPM) is recommended for gardeners who want to grow heirloom crops but reduce the risks of disease, damage, and loss.

How do you maintain heirloom seed purity?

Irregularity is common with most heirloom vegetables. Photo: Pixabay

If you choose to plant, grow, and save heirloom seeds, then it's important to maintain seed purity. In a small garden, growing only one variety of a particular vegetable at a time is a great way to ensure purity. Or, you can use blossom covers on heirloom vegetable plants to prevent unwanted cross-pollination from non-heirloom plants. Alternatively, you can isolate different varieties of the same crop (e.g., heirloom lettuce vs. hybrid lettuce) with at least 10 feet between them to avoid cross-pollination. However, vegetables that readily cross-pollinate, such as squash, pumpkins, and corn, will require greater distance between different cultivars. When selecting heirloom vegetable seeds to harvest, be sure to choose seeds from healthy, disease-free plants. Seeds must be dried thoroughly and stored in air-tight containers. For long-term storage, a cool, dry location is optimal.

Which heirloom varieties can be grown in this region?

Check out the Southern Exposure Seed Exchange website to find a wealth of heirloom varieties with detailed descriptions. Look for "OP" on the labels, which stands for **open-pollinated** varieties. You may also have heard about "local seed swaps," where gardeners in a community get together to share seeds from their own collections. You can find those events or posted on physical or online bulletin boards in your neighborhood or on Facebook. What a great way to connect with others who are interested in heirloom plants!

For your gardening notebook, here are a few heirloom varieties that grow well in this region.

Lettuce

Deer Tongue – dates to the 1800s; loose heads with pointy leaves and thick mid-ribs; excellent flavor; this variety tolerates heat (slow to bolt)

Tennis Ball Batavian – parent of Boston lettuce that was cultivated in the 18th century; light green leaves on medium sized heads; grows in the gardens at Monticello

Cucumber

Lemon – fast-growing vines that produce yellow, crunchy, lemon-shaped fruit with nutty taste

Marketmore 76 – dark green fruit; dependable plant with high yield but without bitterness

Beans

Cherokee Trail of Tears Beans – heirloom pole bean with purple striped pods and black seeds; this variety dates back to the Cherokee Indians

Jacob's Cattle Bush Dry Beans – large, white, kidney-shaped beans with splashes of maroon color; excellent for stews and soups

Rattlesnake Pole Snap Bean – curly green pods with purple streaks and tan beans with black stripes; rich flavor when steamed

Melons

Hearts of Gold – large melons with salmon-colored fruit and slightly spicy taste

Jenny Lind – originated in New Jersey and named in 1846; lime-green fruit is quite sweet

Tomatoes (many more great choices!)

Brandywine – famous Amish heirloom from Pennsylvania that dates to 1885; dark reddish-pink fruit with outstanding flavor and texture; highly resistant to disease

Cherokee Purple – large, slightly ridged fruit with dark purplish-brown skin and brick-red flesh with great taste; indeterminate vines

Yellow Bell Paste – very productive plant with delectable, pear-shaped fruit; great for making salsa, sauce, preserves or tomato paste

Brandywine tomatoes. Photo: Pixabay

After writing this article, my mouth is watering for fresh veggies. I plan to grow some heirloom varieties this year and look forward to sampling the results!

You can't beat the taste of fresh heirloom tomatoes with burrata and balsamic vinegar! Photo: Nicole Kandi; stock.adobe.com

Online Resources

Heirloom Vegetables. (Sarah Browning, 2011). University of Nebraska-Lincoln Institute of Agriculture and Natural Resources. https://lancaster.unl.edu/hort/articles/2011/Heirloom.shtml

Heirloom Vegetables. (Karen Delahaut). University of Wisconsin-Madison Extension. https://hort.extension.wisc.edu/articles/heirloom-vegetables

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Integrated Pet Management. U.S. Department of Agriculture. Integrated Pest Management | USDA

Integrated Pet Management Principles. (2022). U.S. Environmental Protection Agency. Integrated Pest Management (IPM) Principles | US EPA

Saving Your Own Seed. (Kate Holt, 2023). North Carolina Cooperative Extension. Saving Your Own Seed | Extension Marketing and Communications (ncsu.edu)

Seed Savers Exchange collects, regenerates, and shares/sells heirloom seeds and plants. https://www.seedsavers.org/

Soil-borne Diseases. UC Davis Global Soil Health Portal. Soil Borne Diseases: Soil Health (ucdavis.edu)

Southern Exposure Seed Exchange sells hundreds of seeds, with emphasis on varieties that do well in the Mid-Atlantic and Southeast. https://www.southernexposure.com/

The Edible Garden in May

By Ralph Morini | May 2023-Vol.9, No.5

In the Virginia Piedmont we have had an early winter-spring transition this year. Gardeners who capitalized and planted spring crops early are likely enjoying fresh produce already. Those who waited for May to arrive can begin planting summer vegetables. With a historical ***average*** last frost date in hardiness zone 7a, of April 15-25, there is still the possibility of a May frost. Best to keep an eye on the forecast and be prepared to cover any tender plants if a late frost arrives. Even with the risks, most of us will be plowing ahead, so to speak.

Soil thermometer. Photo: Colorado State Extension

Some Specifics

Soil temperature plays a major role in seed germination and transplant health. Cool-weather crops like spinach, lettuce, greens, peas, onions, and root crops need soil temperatures in the 35-40° range. Actually, 80° is the optimum temperature for germination but these crops don't grow well in the heat, so we compromise. Starting seeds indoors and transplanting all except root vegetables (which don't transplant well) is the most efficient practice.

Warm-weather crops including tomatoes, corn, and beans need at least 55° soil. Peppers, cucumbers, melons, and sweet potatoes want at least 60° and eggplants need at least 70°. Planting too early risks seed rotting prior to germination as well.

You can test soil with a soil thermometer, available at most garden shops. Poke the thermometer about 2 ½ inches into the soil. Since soil temperature will vary throughout the day and night, a good average is found between 10 and 11 am. It's good to track the incoming weather reports to be sure you are ready to deal with a cold snap if necessary.

Early planters may be harvesting radishes, peas, and a variety of greens. Good for you! Planting cool-weather vegetables now requires looking at ***days to maturity***. There's no sense starting crops now that won't tolerate summer heat. We are at or near the end of spring planting time for beets, carrots, broccoli, cabbage, onions, and many greens.

For a detailed **list of recommended vegetable planting times** in Hardiness Zones 6a through 8a check

out the Virginia Home Garden Vegetable Planting Guide.

New asparagus patch. Photo: R Morini

If you have a mature asparagus patch, you are likely harvesting fresh spears now. If you are installing a new bed, it is too late to plant now in our Hardiness Zone. It is best to start planning for next year. Prep the bed this fall and plant next spring between late March and late April. To be sure you get it right, check out the good advice in Growing Asparagus in Home Gardens from the University of Minnesota Extension. Keep in mind that the Virginia Piedmont is about 2-3 weeks ahead of Minnesota for planting and harvesting, but the rest of the advice is right-on.

Other tips for May vegetable gardening in our area:

Tomato transplants. Photo: R Morini

Tomato transplants are ready to be placed in the garden when they have 5-7 leaves. When transplanting tomatoes, place two-thirds of the plant below the soil surface. Pull leaves off the bottom two-thirds of the plants and either dig the planting hole deep enough to stand the plant up or lay the bottom half on its side in the hole, and gently bend the stem to set the upper half vertically above the soil surface. Tomatoes will add roots underground and build a stronger root system.

When **choosing your tomato varieties** consider determinate types that ripen within a narrow time period if you are a canner and want a single harvest. Indeterminate varieties will provide a steady supply of ripening fruits until frost, if well cared for.

Eggplants like 80-to-90-degree temperatures and plenty of water. It's best to water them thoroughly twice a week during dry periods.

Speaking of moisture, **beans, peas, and other legumes** that fix soil nitrogen produce fewer, smaller root nodules when water stressed. It is important to keep them well-watered.

Extend your harvest season by planting sweet corn and beans every two weeks through the end of June. An alternative with corn is to plant early-, mid-, and late-maturing varieties at the same time.

Missing corn kernels on your corn ears? This may be the result of **poor pollination**. Sweet corn is wind pollinated. Pollen from the corn flower has to reach every strand of silk on each growing ear to develop fully kernelled mature corn ears. **Block planting in short rows** (3-4 rows or more) will pollinate more successfully than 1 or 2 long rows. Find more information on VA Cooperative Extension publication Sweet Corn.

Keep potatoes covered. The skins of potatoes exposed to sunlight will turn green. This green color comes from the pigment chlorophyll which is produced as a response to sunlight. "Green Potatoes" will often develop a bitter taste and may even become toxic. This can be prevented by covering the exposed potatoes with soil, straw or leaf mulch. It is possible to plant potatoes until late May. Find planting and care information at Growing Potatoes in a Home Garden from the U of Maryland Extension.

To control weeds growing alongside crops, **destroy them before they develop seeds**. Don't cultivate deeply; this can cause damage to shallow vegetable roots. Mulch and compost can also reduce weed growth, but be sure to avoid amendments carrying seeds.

Fertilization is an important element in maximizing garden output. There are problems with over- and under-fertilizing, different impacts from synthetic and natural fertilizers, and soil health issues to consider. If you would benefit from more insight into fertilizer use, check out the Garden Shed article "A Fertilization Primer"

When **watermelons, muskmelons, squash, and cucumbers** are planted in a hill, **place a stick** upright in the middle of the hill and leave it there. Later in the summer when the hill becomes hidden by the vines, you will know where to water. You'll save time looking for the main root and save water as well.

When transplanting seedlings in **peat pots**, gently tear off the top inch of the pot; the upper edges of the pot should be covered with soil to avoid wicking water away from the soil surface, reducing the moisture reaching the plant roots.

Cabbage worms on kale. Photo: R Morini

If you are growing Cole crops, including cabbage, broccoli, cauliflower, kale, collards, or other greens, May means the arrival of cabbage worms that can decimate your crop. Options for control include hand-picking, row covers, or using an organic pesticide like Bt (*Bacillus thuringiensis*). I have also had luck hanging decoys of cabbage moths within the crop. The decoys appear to discourage territorial moths from laying their eggs in that location.

Garden sentry. Photo: R Morini

My favorite anti-cabbage moth preventive is of course adding pollinator plants and bluebird houses. Finding a healthy natural balance really works. Baby bluebirds consume several hundred cabbage worms during their two-week stint as nestlings. It makes sense to support them while minimizing pest impact sustainably.

For related information check out Garden Shed articles "OMG What's Eating the Broccoli", "Row Covers: a Gardening Season Extender with Benefits" and Plant a Pollinator Paradise.

To preserve leftover seeds, store them in a sealed container and refrigerate them. Place a desiccant, such as a few layers of paper towels with 2 tablespoons of powdered milk inside the container to absorb moisture.

Triple compost bin at Bread and Roses Ministry. Photo: R Morini

This is a great time to **start a fresh batch of compost**. The warm temperatures will speed up decomposition if you keep the pile moist and aerated. Grass clippings and kitchen scraps become plentiful as we begin mowing lawns and eating seasonal fruits and vegetables. If you've saved some leaves from last fall or chemical free papers and cardboard from home use, you have what you need to create a good compost batch that can be ready for use this fall. VCE publication Backyard Composting offers helpful guidance for several composting approaches.

If you are a fruit grower and want to add native plantings to the orchard, consider pawpaws. There is good advice for growing and eating pawpaws in the Garden Shed articles "Pawpaws: Resilient and Delectable Natives" and "Yummy Recipes With Pawpaws." Go native!

Garden season is in full swing now. Let's get out there and enjoy it!

Resources:

"Vegetable Planting Guide and Recommended Planting Dates." Va. Coop. Ext. Publication No. 426-331, http://pubs.ext.vt.edu/426/426-331/426-331.html

"Sweet Corn," Va. Coop. Ext. Publication No. 426-405, http://pubs.ext.vt.edu/426/426-405/426-405.html

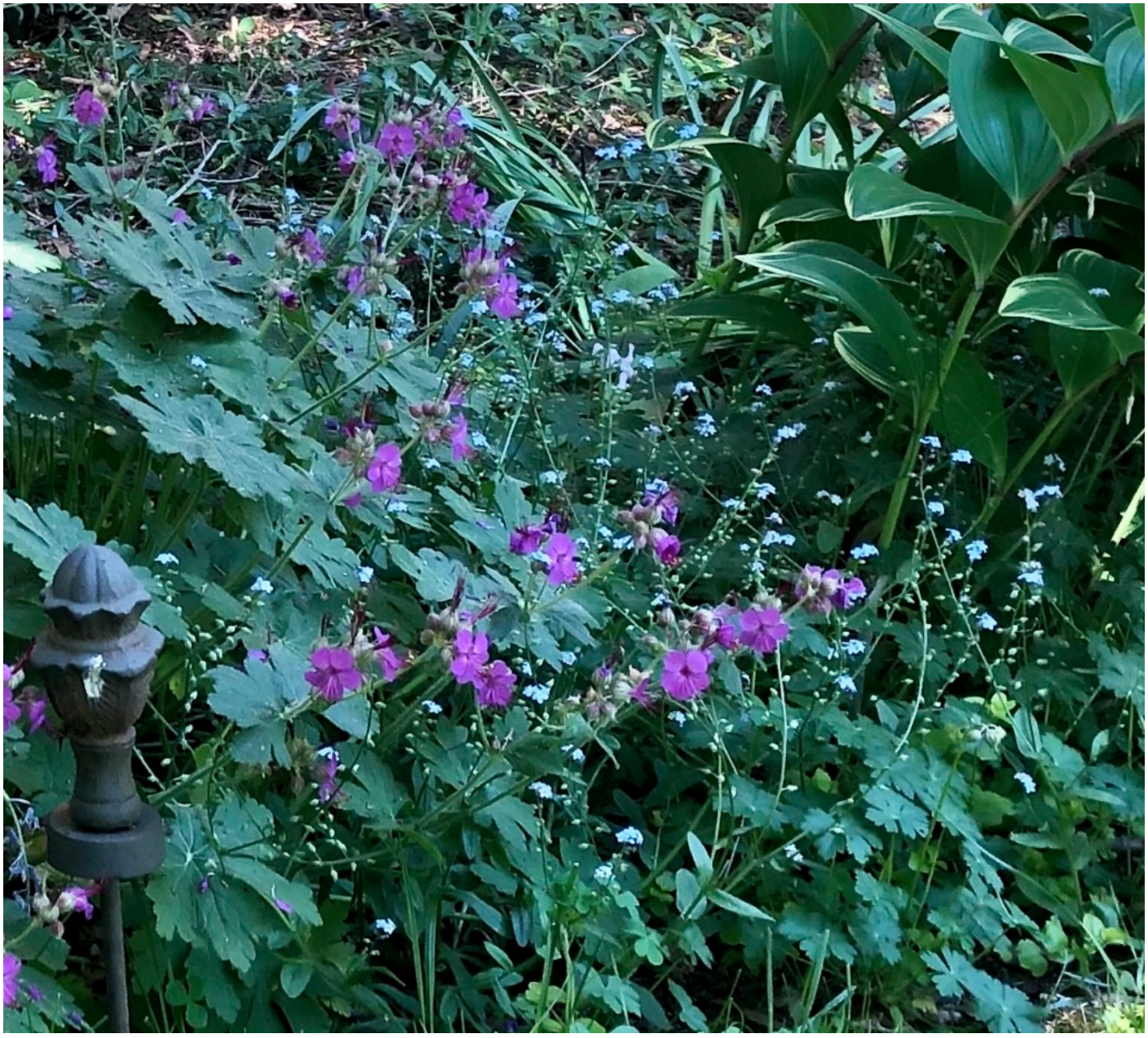
VA Cooperative Extension: May Tips:

Vegetables https://albemarle.ext.vt.edu/content/dam/albemarle_ext_vt_edu/files/hort-tip-sheets/5-14-veg.pdf

Soil Temperatures by Vegetable, K-State Extension: https://enewsletters.k-state.edu/postrockdistrictfcs/2021/02/23/soil-temperatures-and-vegetables/

The Ornamental Garden in May

By Cathy Caldwell | May 2023-Vol.9, No.5



It’s May and frosty nights are now a distant memory! The garden centers are abuzz with plenty of exciting new plant choices to try. Besides planting and transplanting, there’s plenty of weeding, dividing, and general sprucing up to be done in the ornamental garden.

With so many plant choices available to you at this time of year, **look for drought-tolerant selections** that will require less water once hot, humid mid-summer weather arrives. Some potential candidates include black-eyed Susan (*Rudbeckia*), blanket flower (*Gaillardia*), butterfly weed (*Asclepias tuberosa*), catmint (*Nepeta)*, goldenrod (*Solidago*), hyssop (*Agastache*), mountain mint (*Pycnanthemum muticum*), purple coneflower (*Echinacea purpurea*), sneezeweed (Helenium), Stokes' aster (*Stokesia laevis*), and yarrow (*Achillea millefolium*). Important: Although these plants are drought tolerant, they require ample moisture their first year while they are getting established.

Clustered or short-toothed mountain mint (pycnanthemum muticum). Photo courtesy of Missouri Botanical Garden Plantfinder.

With our last average frost date behind us, it's now time to **direct sow seeds of heat-loving annuals** such as cosmos, marigolds, cleome, gomphrena, or zinnias. After the plants reach 4 to 6 inches in height, pinch them back to promote bushier growth. This will ultimately produce more flowers.

Transplant bedding plants on a cool, calm, cloudy day. The cooler temperatures and cloud cover will cause less stress to the plants and will help them settle in sooner. Some common fast-growing annuals that are sold as bedding plants include celosia, dusty miller, geraniums, lantana, lobelia, petunias, portulaca, salvia, and begonias.

Plant tender bulbs such as dahlias, gladioli, or cannas in full sun. If you don't have full sun (at least 6 hours per day), try planting shade-loving caladiums and tuberous begonias. For a touch of drama, try growing elephant ears in part-shade but give them plenty of room. Depending on the variety, they can grow seriously huge!

Install supports for fast-growing plants that tend to flop. Secure tall plants such as delphiniums or foxgloves to a single stake using jute or other soft twine. For mounding plants such as peonies, use "grow-through" ring or grid-style supports.

Protect newly planted seedlings and transplants from drying wind and hot sun for the first few weeks while they establish strong root structures. Keep the soil around the fragile roots moist but not soggy. If the root ball dries out, the plant may not recover from the stress. Too much water is just as bad for seedlings and transplants because soggy soil may cause their roots to rot.

Monitor moisture requirements of newly planted trees. In general, it takes 2 to 3 years or more for a tree to become established in the landscape. Adequate moisture is particularly critical during this period to encourage healthy root development beyond the original root ball. In the absence of good soaking rains, provide supplemental water, particularly as daytime temperatures grow hotter. Cover the entire area under the tree canopy to keep the soil evenly moist but not soggy around the root ball and surrounding soil.

Prune spring-flowering shrubs after they finish blooming. If you put off doing this until later, you run the risk of cutting off the buds for next year's blooms. Virginia Cooperative Extension (Va. Coop. Ext) Publication 426-701, Shrubs: Functions, Planting, and Maintenance, provides guidance on the best time of year to prune shrubs.

Lightly fertilize azaleas and rhododendrons after they finish blooming if a soil test indicates that nutrients in the soil are low. Use a fertilizer that is specially formulated for acid-loving plants and follow the directions carefully. Lightly scatter the fertilizer at the edge of the root zone. Azaleas have delicate roots

that are close to the soil surface and can be easily burned by excess fertilizer. Too much fertilizer may also cause scorched leaf margins.

Finish acclimating your houseplants to the outdoors by gradually increasing their exposure to sunlight. Monitor them carefully so that they don't become sunburned. Make sure each pot has a drainage hole. Lack of good drainage is an invitation for root rot.

Experiment with container gardening if you've never tried it before. For best results, keep in mind the "thriller, filler, spiller" concept: plant something tall as a focal point, something mid-size to fill in around the "thriller," and something low that cascades over the rim of the pot and softens the overall effect. Just remember to keep container gardens well watered over the growing season.

Incorporate pollinator-friendly plant species that attract bees, flies, butterflies and other pollinating insects to your ornamental garden. Flowers with single petals rather than double petals are generally a better choice. Echinacea (cone flower) and zinnias are examples of plants that have undergone significant breeding for fuller, showier flowers. While they offer more variety and pizzazz for the garden, the downside is that such breeding efforts affect the flower's ability to produce pollen. In order to produce double flowers, the stamens (male portion of the flower) are bred to transform into extra petals. Because of this alteration to the basic anatomy of the flower, the blossom may not produce as much pollen as a flower having single petals.

Replace mulch with ground covers in your landscape. Mulch is useful in holding moisture in the soil, moderating soil temperatures, preventing erosion, and controlling weeds. However, in certain situations, such as under trees where grass struggles to grow in the shade, a living ground cover instead of mulch may be a more practical solution. Like mulch, ground covers shade the soil, hold it in place, and smother weeds. On top of the practical aspects of ground covers, they add an attractive layer of color and texture in the landscape. Consider planting native ground covers such as: wild ginger (*Asarum canadense*), green and gold (*Chrysogonum virginianum*), Allegheny spurge (*Pachysandra recumbens*), foamflower (*Tiarella cordifolia*), blue-eyed grass (*Sisyrinchium angustifolium*), and creeping phlox (*Phlox stolonifera*).

Monitor your prized plantings for pests of all kinds – creeping, crawling, flying, etc. Here are a few to be on the alert for in May:

- **Aphids** – These voracious insects have mouth parts that are designed to pierce and suck the sap from a plant. They damage plants by causing yellowing, stunted growth, mottled leaves, browning, and even plant death. Ladybugs and lacewing larvae are the natural predators of aphids and may control them for you. If not, then a sharp spray of water is usually sufficient to dislodge aphids from plants. See the University of Maryland extension website for additional information and photos of aphids on a variety of plants.
- **Slugs** – These nocturnal members of the mollusk family can do a lot of damage in just one night – especially to hostas. To eliminate these slimy creatures, take a flashlight outside after dark, hand pick any slugs you find (wearing gardening gloves, of course), and drop them into a container of soapy water. If that approach doesn't appeal to you, sprinkle finely crushed eggshells around vulnerable plants. Slugs don't like crawling over the sharp edges. Another approach is to use a shallow dish filled with beer to entice slugs. Any brand of beer will do. Just nestle the dish into the soil leaving about half an inch of the rim exposed above ground. The slugs crawl into the dish and drown in the beer. End of problem. The University of Minnesota Extension's website offers advice on controlling slugs.
- **Ticks** – Ticks are arachnids rather than insects and are at their most active between May and July. During this time, wear light colors, closed-toe shoes, socks, long pants and long sleeves when working outdoors. Don't forget to tuck pant legs into socks. Check yourself, your children,

and your pets after you or they have spent time outdoors. For a description of the primary types of ticks found in Virginia, see VCE publication 2906-1396 "Common Ticks of Virginia."

- **Eastern Tent Caterpillars** are the larval form of an ordinary looking yellowish-tan to brown moth (*Malacosoma americanum*). The hairy larvae hatch out in spring at which time they spin unsightly "tents" of silk webbing where they spend their nights. They emerge from the tents in the daytime to feed on the host plant, stripping it of its foliage. Insecticides are generally not effective when tent caterpillars are inside their tents. VCE publication 444-274, Eastern Tent Caterpillar offers more information on this insect. While tent caterpillars can be destructive to trees and shrubs, they are also an important food source for some bird species. Before deciding to kill the larvae, check out Entomologist Michael J. Raupp's Bug of the Week website which provides useful information on tent caterpillars. While not many bird species will eat hairy caterpillars, the yellow-billed cuckoo is one bird species that will, according to Cornell University's All About Birds.

Bad bugs get all the press but there are far more good bugs than bad, including:

- **Praying Mantis —** If you spot a praying mantis in your landscape, leave it alone. These large, green or brown, stick-like beneficial insects blend in well with their surroundings and are sometimes hard to spot. Mantid eggs overwinter in a small tan, frothy-looking, hardened case (ootheca) and then hatch out around early May. Young praying mantids eat small insects whereas the mature versions tackle big insects, such as crickets, grasshoppers, cabbage moths, and stink bugs. Unfortunately, mantids make no distinction between bad bugs and beneficial ones and eagerly gobble up both. However, in general, they appear to do more good than harm in the environment.
- **Syrphid Fly (*Sphaerophoria philanthus*)** – Syrphid flies (also called hover flies or flower flies) serve double duty as both pollinators of a wide variety of plants and predators of other insects. These small black and yellow-striped insects measure less than ½ inch long and are often mistaken for bees or wasps. However, Syrphid flies don't have stingers and, like all fly species, they have only one pair of wings, whereas bees and wasps have two pair. In their adult form, syrphid flies feed only on pollen, nectar and aphid honeydew and do not prey on other insects. As larvae, they are highly effective natural enemies of aphids, scales, thrips, and other soft-bodied, slow-moving insect species. Just one larva can consume hundreds of aphids. For photos of both the adult and larval forms of this beneficial insect, see North Carolina State University Extension's publication on Syrphid Flies.

Syrphid fly. Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Take preemptive steps to keep deer out of the garden. As beautiful as deer are, they can do a devastating amount of damage to plants that are just emerging or leafing out. A tall fence or other physical barrier is the most effective way to keep deer out of your garden. If a fence is out of the question, then try growing plants with strong scents (such as herbs), tough or leathery foliage, and spiky or spiny foliage.

Confuse deer by tucking vulnerable plants in among plants they normally shun. Use repellents that either smell or taste bad to deer. Repellents that have a sulphur-based odor of rotten eggs appear to be more effective than taste-based ones but alternate their use so that the deer don't become accustomed to them. To learn more about deer and strategies for living with them, see Garden Shed article Deer, Deer, Deer!, which provides lots of great information on the subject.

Invasive Alert: Spring rains make the soil moist and easy to work in, which makes conditions ideal for homeowners to **hand pull small, young sprouts of invasive plants.** To control these species, it's important to remove all parts of the root so that the plant cannot regrow. Look for the following species: English ivy (*Hedera helix*), climbing euonymous (*Euonymous fortunei*), Japanese honeysuckle (*Lonicera japonica*), Oriental bittersweet (*Celastrus orbiculatus*), Japanese barberry (*Berberis thunbergia*), autumn olive (*Eleagnus umbellata*), wineberry (*Rubus phoenicolasius*), and garlic mustard (*Alliaria petiolata*). Visit the Blue Ridge PRISM (Partnership for Regional Invasive Species Management) website for factsheets on each of these species, including photos and control options.

SOURCES:

Feature Photo: Cathy Caldwell

Monthly Gardening Tips, Piedmont Master Gardeners/Gardening Resources/May

The Japanese Beetle

By Charles D'Aniello | May 2023-Vol.9, No.5

Whenever I think of Japanese beetles – *Popillia japonica* Newman — images from the movie *Starship Troopers* (1997) come to mind. The parallels are not on target: we are not explicitly at war with these "bugs" – they don't fight with humans — but I can't help it.

You Know Something's Bad When So Much is Written About It

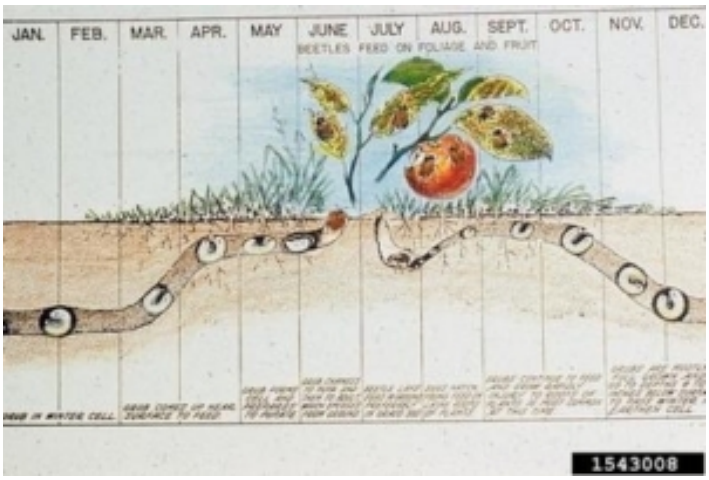
Adult Japanese beetle. Photo: David Cappaert, Bugwood.org, CC BY-NC 3.0 US.

Since their appearance on our lands, these little creatures have caused significant economic expenditures and, especially among some gardeners not to mention farmers, emotional pain. We wage war against them as individuals and as a nation. The importance of the challenge is evident in the volume of excellent literature available that instructs us in how to control them. It seems that every cooperative extension organization, especially from the east coast to the Midwest, as well as the federal government has something to say. If you are a gardener and facing a beetle invasion and need some quick and direct guidance, begin with the Animal and Plant Health Inspection Service's (United States Department of Agriculture) *Managing the Japanese Beetle: A Homeowner's Handbook* and Virginia Cooperative Extension's *Home Grounds & Animals: 2023 Pest Management Guide* (for pesticide application). For a condensed overview see *Japanese Beetle* (especially useful for guidance on types of chemical application) by Theresa A.

Dellinger, Eric Day, Alejandro DelPozo, and Doug Pfeiffer, Virginia Cooperative Extension and *The Japanese Beetle Popillia japonica Newman (Scarabaeidea: Coleoptera)* by Gale R. Ridge, The Connecticut Agricultural Experiment Station, which complements it. There are some very good videos too; see especially *Japanese Beetles* by Dr. Donald Lewis, Iowa State University Extension and Outreach. (These are also the sources from which most of what follows was derived.) Below, I do not replicate or retell the bulk of what is in these and other listed resources. If you find what appears to be a vital or obvious piece of information missing, please consult one or all of the above sources as well as some of those listed at the end of this discussion.

A Beetle's Life

Skeletonozed leaf of a Europe linden. Photo: Steven Katovich, Bugwood.org, CC BY 3.0 US.



The life cycle: from egg to larva to pupa to adult beetle. Photo: Jim Baker, North Carolina State University, Bugwood.org, CC BY-NC 3.0 US.

The gregarious Japanese beetle. More Japanese beetles attract more Japanese beetles. You might say they're "party animals." Photo: Melissa Schreiner, Colorado State University, Bugwood.org, CC BY-NC 3.0 US.

From egg to larva (white grub) to pupa to adult beetle, the life cycl

e of the Japanese beetle is an example of complete metamorphosis. Depending on your perspective, it’s a beautiful process. The stages of development present their own horticultural challenges. The life cycl

e is annual, although there can be some exceptions. The terminal form, the adult beetle, lives for only about 2 months. Prior to this, in late June to mid-July the adults emerge in waves, not all

at once. The female is a little larger than the male (otherwise they look alike, except the female has an elongated spur on the fore tibia). The females emit pheromones to attract mates, and they

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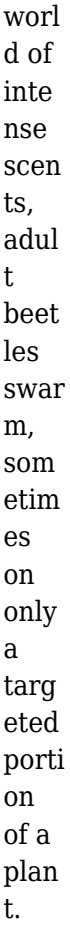

They rest at night and are most active during the day. They like sunny weather, warm temperatures, and still air. Energy and time are at a premium. Adult beetles devour the tissue on a leaf's upper surface between the veins, skeletonizing them in a lace-like pattern.. They generally attack a plant from the top down and feed on buds, flowers, fruits, and leaves. The remains of leaves turn brown presenting an image of gloom and doom, death and despair. Most healthy plants will weather the onslaught. Once the beetles retreat, new leaves and flowers will be grown. Ultimately, they will deposit 40-60 eggs, although only 4 eggs will be laid at a time. In 8-9 days, eggs hatch, but require moist soil to develop. If drought conditions prevail, their numbers are depleted and the following year will exhibit a decrease in adult beetles. In fact, if breaking the beetle cycle is a goal, consider watering less often in hot weather. Of course, beetles can fly in from elsewhere, so this may not have the impact desired. Ironically, an irrigated and well-fed lawn can be their best nursery. The young grubs (the larva stage) gorge themselves on rootlets of increasing diameter until fall brings cooling soil. They then burrow down between 4 and 8 inches. Spring brings increasingly warm soil and they travel upward and begin feeding again. Between May and early June, the grubs mature and pupate. This is the stage between larva and adult. The emergence of adults occurs some weeks later. The cycle completed, a new one begins with the depositing of eggs.

Japanese beetle grubs (larva) probably entered the United States in 1916 arriving at a nursery near Riverton, New Jersey, presumably in imported rhizomes of the Japanese iris. Today considerable effort is made to prevent their transport by aircraft from the eastern to the western states, where they would endanger agriculture and natural resources. At first, they were isolated in southern New Jersey. Although originating in Japan, the island's climate and predators were not conducive to their spread. This was not the case in America. Fortunately, mountains stopped them and topography, temperature, rainfall, and even winds can be factors. Early infestations were in Pennsylvania in

1920, New York in 1932, Massachusetts in 1942, and North Carolina and Ohio in 1952. They appeared in Nova Scotia in 1939. Infestations were recorded in Virginia in 1941. Today Japanese beetles are established in 28 states and 5 Canadian provinces and partially established in 6 states. Their spread is analogous to an invasion – and after all, that's what invasive species are, invaders – and this occurred at a time of heightened anti-Asian passions and opposition to Asian immigrants and Americans of Asian descent. Regrettably, references were made to the "Jap beetle."

"The larvae of the Japanese beetle are called white grubs. These white, c-shaped grubs feed on the roots of grasses . . . " They have yellow-brown heads and v-shaped hairs on their abdomen's underside. Photo: John A. Weidhass, Virginia Polytechnic and State University, Bugwood.org, CC BY 3.0 US.

What's on the Menu?

Japanese beetles voraciously attack vegetable crops, the leaves of various trees, fruit trees and fruit, buds, flowers, shrubs ,and grass roots. Commercial crops and ornamental plants suffer. It is safe to say that over 300 plants are vulnerable, although one source suggests 435. Some of the most heavily damaged species include Japanese maple, asparagus, raspberry, soybean, crab apple, apple, apricot, plum, sweet cherry, sour cherry, peach, nectarine, poison ivy, roses, American linden, American and English elm, sassafras, grapes, and corn. One can readily see why lawns and roses are only a small part of the horticultural nightmare.

Control

A gardener's responses can take various forms, and nature responds as well. Birds and skunks, opossums, raccoons, shrews, and moles try to help (themselves), but the number of beetles and grubs is simply too large for them to turn the tide. Starlings and grackles eat larvae and adults; meadowlarks, cardinals and catbirds eat adult beetles; and crows and gulls eat beetles as do chickens and ducks. If you repeatedly see these animals on the same part of your lawn, it may signal a grub problem. The female wasp ***Tiphia vernalis*** digs into the ground, where she finds a grub, paralyzes it, and deposits an egg, which hatches, eating the grub. Adult beetles are attacked by the fly parasite ***Istocheta aldrichi*** in the Northeast. In two weeks, the female fly can lay as many as 100 eggs on a female beetle's thorax. Hatched maggots drill into the adult beetle killing her. In addition to these seemingly specialized insects, spiders, assassin bugs, praying mantises, and predatory stink bugs dine on beetles and grubs.

Some plants, of course, are not susceptible to Japanese beetle damage. These include the shrubs forsythia, hydrangea, juniper, holly, lilac and yew; the perennials columbine, foxglove, lily and poppy; and the trees fir, red maple, silver maple, white ash, tulip tree, magnolia, pine and arborvitae. These plants are not attractive to Japanese beetles. Also, grow susceptible plants away from turf (the place grubs call home), thus possibly challenging an easy replay of the beetle's life cycle at that location. What are Japanese beetles good for? Well, as noted above, they are a snack or meal for some animals. Incidentally, there is literature on human consumption of Japanese beetles — definitely not a recommendation — see *Put the Bite on Bugs* by the Maine Organic Farmers and Gardeners Association.

To be effectively controlled or even eliminated, a Japanese beetle infestation ideally should be addressed at all of the beetle's life stages. Responses can be mechanical or include biological warfare, chemical warfare, trickery, or the introduction of assassins. A response may include one or more of these approaches. An Integrated Pest Management (IPM) approach seeks to control the problem, but not cause unpredictable collateral environmental damage — killing bees and other beneficial insects in an ultimately doomed attempt to eradicate the beetle with a chemical onslaught. Beware of unintended consequences; scientists continue to discover them. For instance, under certain conditions blue orchard mason bee populations can be seriously impacted by soil-based exposure to imidacloprid, a systemic preventive. These wild bees are prodigious pollinators. In general, across the spectrum of chemicals treatments, if one insect species is affected, it is unlikely that under certain conditions and toxicity levels, others are not as well. Monitor your property and be mindful that pesticides are both dangerous and expensive. Remember, your yard is not a multi-million dollar agricultural enterprise. For now — anyway — Japanese beetles are here to stay.

Skeletonized Buckeye tree. Feeding generally starts at the top. Photo: David Cappaert. Bugwood.org, CC BY-NC 3.0 US.

Mechanical Approach: If you have only a few beetles in a very contained area, try removing them by hand and dropping them in a jar of soapy water. Soapy water will suffocate the beetle. If the beetle who landed on your plant was a "stray," this may solve the problem. Alternatively, you can spray the infested plant with a soapy-water solution to provide temporary protection against adults. Morning or evening is best for this approach — this is when they are still or least active.

Trickery: This is actually a combination of approaches, but the goal is to make the beetle think it is flying into a good place – not into entrapment and eventual death. Japanese beetle traps (yellow fins with a suspended bag), unfortunately, can play a trick on you. They work as a lure and can bring beetles to your property who might otherwise have flown by. They use sex pheromones or floral scents or their combination. The beetle's two weaknesses are food and lust. Traps may ensnare about 75% of beetles that fly by them; however, there is controversy about the advisability of their use. The Virginia Department of Forestry (*Tree and Forest Health Guide*) advises: "Pheromone traps are not recommended because they attract large populations of beetles and could increase damage levels instead of reducing them." In fact, more beetles may be attracted than the trap can hold. While Japanese beetles are said to be weak and clumsy fliers, to travel a couple of miles at once is normal, and 10 to 15 miles from the place of their grub-life is possible. Place traps as far away from target area – your yard – as possible and deploy them June through late August or during the mating season. Empty into a pail of soapy water daily. Traps are most effective when used is cooperation and coordination with neighbors. The impact they will have on next year's brood, however, is highly uncertain. Although emotionally rewarding, the general use of traps is not recommended by experts.

Biological Warfare: Although once again not a good parallel, this sort of reminds me of H.G. Wells' *The War of the Worlds* (1895-1897). The approach here is to give only beetles a deadly disease. This is a longer term approach. Milky spore disease — ***Paenibacillus popilliae,*** formerly ***Bacillus popilliae*** **Dutky** — needs time to build up in the soil to lethal levels. Grubs ingest the spores**,** die, and more spores are dispersed into the surrounding soil by their carcasses. The spores persist for 2-10 years and in a treated area perhaps as long as 30 years. Refrain from insecticide application for grubs if pursuing this course. ***Bacillus thuringiensis*** **(Bt),** another bacteria species, can be used at the grub stage, but also affects adults. It too is

safe for mammals, and has very little toxicity to bees. It takes only minutes after its consumption for an insect to cease feeding. Efficacy, however, may be inconsistent.

Hired Assassins: This approach requires the introduction of hired killers in the form of organisms that prey on Japanese beetles. The entomopathogenic nematodes (***Steinernema carpocapsae*** and ***Heterorhabditis bacteriophora***) attack white grubs. The former targets insects near the soil's surface, and the latter searches for insect larva deeper in the soil. They burrow into a grub and release a bacterium, which kills it. Unfortunately, scientific study shows that they kill bees exposed to soil containing them. These nematodes can be purchased as a mix; apply with a watering can or sprayer.

Chemical Warfare Against Adults (some are the so-called Nuclear Option): Toxicity levels have been checked in the *2023 Pest Management Guide*. I have also consulted The Connecticut Agricultural Experiment Station's *The Japanese Beetle* and Virginia Cooperative Extension's *Japanese Beetle*. When considering an application, check the *Pest Management Guide* and read the product's label very carefully. Do not violate the label's stipulations or applicable laws. For elaboration as well as other options: see the insecticide list in *Managing the Japanese Beetle: A Homeowner's Handbook*, review Clemson Cooperative Extension's *White Grub Management in Turfgrass* (for grubs and mentioned again below), consider visiting a trusted garden shop, or call or visit a Virginia Cooperative Extension help desk (Piedmont Master Gardeners). For a list of certified Virginia pesticide applicators visit the website of the Virginia Department of Agriculture and Consumer Services.

While highly effective, **Carbaryl** (brand name Sevin, a contact insecticide) is highly toxic to bees, extremely toxic to earthworms, and a moderate hazard to humans and mammals. **Pyrethrins** have become a favorite. They are toxic to the insect nervous system. Toxicity is generally low for humans and other animals, but they are highly toxic to honey bees. **Rotenone** is derived from plants, but is highly toxic to fish and some species of birds**,** but is considered relatively nontoxic to honey bees and is safest when applied in the evening or early morning. **Azadirachtin** is also a botanical insecticide, derived from Neem, and is relatively nontoxic to honey bees and is safest when applied evening and early morning. It repels insects, acts as a direct toxin, and inhibits growth and reproduction. **Neem oil** can kill by suffocation on direct contact, especially on soft bodied insects, but this is not a likely consequence of its use on adult beetles. The ingestion of treated material, depending on the product's formulation, reduces feeding and inhibits growth and reproduction, but it is most effective as a temporary deterrent. It poses a low risk for beneficial insects and might be a first response for low density infestations, but requires repeat application. **Imidacloprid**, discussed below, can be applied to foliage, but is usually applied to the soil.

Turf damage. Photo: M.G. Klein, USDA Agricultural Research Service, Bugwood.org, CC BY-NC 3.0 US.

It's All About the Lawn: More chemical warfare! This is about destroying them while they're young, before they grow up and become even more destructive. At this point, they are just wrecking the grass! They feast primarily on grass roots, but also on other tender roots. Home lawns are generally not so severely impacted that treatment is mandatory; however, grubs do grow up to become beetles. *White Grub Management in Turfgrass* by Clemson University Cooperative Extension is an overall excellent piece and offers detailed guidance on insecticide application. It gives brand and product, active ingredients, and form, sizes and rates of application. Application is by soil treatment. Two formerly widely used insecticides are no longer available: **Diazinon** and **Dursban.** The former is banned by the Environmental Protection Agency (EPA) for residential use.

The latter is banned for endangering humans and wildlife. **Imidacloprid** is 90% effective against young grubs, but it has a high hazard rating for honey bees, harms other pollinators, and is a moderate hazard for humans and mammals. It is a systemic neonicotinoid, absorbed by the treated plant, making all or part of it toxic. It can impact other insects as well. The toxicity via skin exposure is very low, but it is moderately toxic if ingested. **Trichlorfon** is more than 75% effective. It is relatively nontoxic to honey bees, and is safest when applied in the evening or early morning. It has low toxicity for people and pets. Applied at egg-hatch, beginning around mid-July, the growth regulator **Halofenpzide** is about 75% effective. Unfortunately, killing the grubs under your lawn will not prevent adult beetles flying in from other lands to eat your plants. See also **Hired Assassins** above.

To wisely and appropriately treat a Japanese beetle problem (adults as well as grubs) — at any stage — you need to know their number and location. We've already noted the significance of the lingering of birds and some mammals on specific patches of lawn. Also, look for irregular brown spots on the turf. If a grub infestation is bad enough, you'll be able to literally peal or roll back the lawn. This is because the turf's root system will have been consumed. Grasses will no longer be securely anchored to the ground. If there is not an infestation and roots remain viable, you will be able to pat in place the portion pulled up; water it and no harm will have been done. Survey methods and guidelines are explained in *Managing Japanese Beetles: A Homeowner's Handbook.*

PESTICIDE WARNING

Pesticides (which include herbicides, insecticides, rotenticides, etc.) are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock. Consult the pesticide label to determine active ingredients, signal words, and proper protective equipment.Pesticides applied in your home and landscape can move and contaminate creeks, lakes, and rivers. Confine chemicals to the property being treated and never allow them to get into drains or creeks. Avoid drift onto neighboring properties and untargeted areas.

Sources

Featured image: Adult Japanese beetle. Photo: Clemson University-USDA Cooperative Extension Slide Series, Bugwood.org, CC BY 3.0 US.

If you'd like to create your own personal or featured image of a Japanese beetle – not just a photograph or a memory – try drawing one. See *How to Draw a Japanese Beetle.*

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Natural Products for Managing Landscape and Garden Pests in Florida. By Matthew A. Borden, Eileen A. Buss, Sydney G. Park Brown, and Adam G. Dale. University of Florida, Institute of Food and Agricultural Sciences, University of Florida Extension.

"A new threat to bees? Entomopathogenic nematodes used in biological pest control cause rapid mortality in *Bombus terrestris*." By Alexandria Dutka, Alison McNulty, and Sally M. Williamson. *Peer J*, vol. 3 (2015).

"The Ornamental Garden in June." By Susan Martin. *The Garden Shed*, vol. 4, no. 6 (June 2018). Piedmont Master Gardeners.

Popillia japonica (Japanese beetle). By M. Klein. CABI Digital Library, CABI Compendium. CABI (Centre for Agriculture and Bioscience International) is an international note-for-profit working in over 40 countries.

Put the Bite on Bugs. By Sue Smith-Heavenrich. Maine Organic Farmers and Gardeners Association.

Tachinid Flies and Other Natural Enemies of Japanese Beetles. By Paula Shrewsbury. University of Maryland Extension.

Tree and Forest Health Guide: A Handbook for the Diagnosis of Urban and Rural Forest Disturbances. Virginia Department of Forestry.

White Grub Management in Turfgrass. By Gary Forrester. Clemson University Cooperative Extension Service.

Upcoming Events

By Cathy Caldwell | May 2023-Vol.9, No.5

Saturday, May 6 @ 10:00 am – 2:00 pm*

The Piedmont Master Gardeners' 20th Annual Spring Plant Sale

Albemarle Square Shopping Center, Charlottesville, VA
** If extreme weather causes a change in schedule, we will announce it on our Facebook page.*

Join us for our 20th Annual Spring Plant and Green Elephant Sale. The sale offers something for all gardens:

- plants for sun, shade, or something in between
- annuals, perennials, native and pollinator plants
- herbs
- vegetables
- houseplants
- trees
- shrubs
- fruit

New this year: Native plant combination trays for sun and shade.

Also available: The Virginia Native Plant Society Wildflower of the Year, *Eutrochium fistulosum*, (Tall Joe Pye Weed). Grows eight feet tall, adapts to average garden conditions but loves sunny moist sites. The shorter cultivar *Eutrochium dubium* ('Little Joe') will also be for sale.

Plus, have your tools and knives sharpened.

Cash, credit cards, and checks accepted. Sale happens rain or shine.* Wagons or carts are welcome to load up your plants.

Master Gardeners will offer demonstrations, educational displays, and a **Horticultural Help Desk** to answer your questions about problem plants, insects and more. Plan to pick up a soil test kit.

Thursday, May 11 @ 6:00 pm – 7:00 pm

Rain Barrel Workshop at Pen Park

Pen Park, Shelter 2, 1400 Pen Park Road, Charlottesville, VA

Rain barrels can reduce stormwater runoff from your property while providing water you can use for irrigating landscaped beds, watering potted plants, or outdoor chores like bike or car washing. In collaboration with the City of Charlottesville, the Rivanna Stormwater Education Partnership, the Albemarle County Service Authority, and the James River Association, the Piedmont Master Gardeners will participate in a workshop on how to set up your own rain barrel at 6 p.m. May 11 at Pen Park Shelter 2. Registration. For the registration fee, you will receive a plastic barrel and a DIY assembly kit.

REGISTER HERE

Saturday, May 20 @ 2:00 pm – 4:00 pm

Garden Basics: Vermicomposting to Enrich Your Soil

Trinity Episcopal Church 1118 Preston Avenue, Charlottesville
FREE

Composting with earthworms (vermicomposting) in an enclosed container can turn food waste into a nutrient-rich soil amendment. Vermicomposting is an excellent alternative for people who lack the space for traditional composting. It can be done indoors in a garage, a…

Find out more and REGISTER»

Charlottesville Area Tree Stewards: Late Spring's Glorious Forest Understory Plants

Saturday, May 6 at 10:00 a.m. — 12:00 p.m. 15 participants allowed
REGISTER HERE
Join Tree Steward guide and property owner Phil Stokes for this spring walk in a pristine remarkably diverse 30-acre mature woodland as trees, wildflowers, and ferns announce spring's arrival. Located in western Albemarle County, it's an easy and scenic drive of less than 30 min. from Charlottesville on mostly interstate and Route 250. Directions will be sent after registration is complete. No restroom at site.

Charlottesville Area Tree Stewards: Trees and Wildlife Talk

Tuesday, May 9 @ 7:00 — 8:30 p.m. on **Zoom** – REGISTER HERE
Join Tree Steward Kathy Nepote for this enlightening presentation illustrating the various ways in which our native trees provide habitat for our native fauna with an emphasis on protection and food.

Boxwood Blight, Mites, and other Frights

By Chris Stroupe | May 2023-Vol.9, No.5

I was a novice volunteer at the Piedmont Master Gardeners' Horticultural Help Desk when a "client" came in, clutching a boxwood branch with brown, desiccated leaves. "Is this boxwood blight?" she asked. Yvette, a Help Desk veteran, glanced at the sorry-looking twig. "Do you have dogs?" "Yes, we just adopted two Lhasa apsos," the client replied.

Unfortunately, not all boxwood problems are so easy to solve. Many fungal diseases have similar signs and symptoms. Some diseases are merely opportunistic, taking advantage of weaknesses caused by hidden problems. Root damage usually manifests as foliage issues. Non-living causes, like road salt and cold weather, can damage foliage as badly as fungal infections.

This article discusses common diseases, pests, and environmental problems facing boxwoods in Virginia. It starts with diagnosis and possible treatment. More importantly, it then covers how to prevent these issues from arising in the first place. Finally, this article covers how to get professional diagnoses and treatment recommendations from the plant disease, nematode, and insect identification clinics at Virginia Tech.

The main source for this article is the Boxwood Blight Task Force at the Virginia Cooperative Extension. Never let it be said that we don't take boxwoods seriously in Virginia! References cited below offer in-depth descriptions and recommendations.

Boxwood Blight

Diagnosis The first sign of boxwood blight is brown spots ringed with darker brown areas (see picture). The spots are followed by (1) sudden defoliation and (2) black streaks on stems (see pictures below). Fluffy white clusters of spores may appear, but not always, and they can be difficult to see even if present.

Treatment There is no cure for boxwood blight. You might, however, prevent it from spreading to other plants. Remove the infected plant entirely. Thoroughly rake up all fallen leaves and twigs. Throw this debris away, burn it if legal, or bury it as far from other boxwoods as possible. Spread 2 inches of mulch under remaining plants to help prevent spores from splashing up onto foliage. Wash dirt off tools, then disinfect with 70% ethanol, bleach, or hydrogen peroxide (consult the "Sanitizers" section of the Boxwood Blight Task Force website). Wash clothes, gloves, and footwear with soap and hot water. Finally, consider a preventative fungicide spray on neighboring plants, as described in the "Fungicides" section of the Boxwood Blight Task Force website (PDF version).

Leaf spots on a boxwood suffering from blight. Note the dark rings surrounding the tan spots. Image: Boxwood Blight Task Force

Sudden defoliation is one key diagnostic symptom of boxwood blight. Image: [Boxwood Blight Task Force]

Black streaks on stems are the second defining characteristic of boxwood blight. Image: Boxwood Blight Task Force

Prevention

• Avoid introducing blight to your area via infected plants. Only buy plants from growers that participate (PDF link) in Virginia's Boxwood Blight Cleanliness Program.

• Several boxwood cultivars are tolerant of boxwood blight, according to the Virginia Cooperative Extension (PDF link). Note that none are resistant.

Table 1. Boxwood Blight-Tolerant Cultivars

Species	**Cultivar**
Buxus microphylla var. *japonica*	Green Beauty
B. microphylla	Northern Emerald
B. microphylla	Wedding Ring
B. microphylla	Wintergreen
B. microphylla	Golden Dream
B. microphylla	Winter Gem
B. sinica var. *insularis*	Nana

B. sinica var. *insularis*	Franklin's Gem
B. sinica var. *insularis*	Wee Willie
B. harlandii	Richard

Avoid the following cultivars, which are particularly susceptible to blight:

Table 2. Cultivars Quite Susceptible to Boxwood Blight

Species	**Cultivar**
Buxus sempervirens	Suffruticosa
B. mycrophylla var. *japonica*	Morris Midget
B. sempervirens	Justin Brouwers
B. sempervirens	American
B. sempervirens	Halifax American
B. sempervirens	Fineline
B. sempervirens	Black American
B. sempervirens	Arborescens
B. sempervirens	Aurea Pendula
B. sempervirens	Latifolia Maculata

Other plants in the same family as boxwoods can be hosts for boxwood blight. The most common of these are: Japanese spurge (*Pachysandra terminalis*), Allegheny spurge (*P. procumbens*), fragrant spurge (*P. axillaris*), and sweetbox (*Sarcococca* species). Try not to grow these plants near your boxwoods.

• Use proper cultural practices to promote plant health. Healthy boxwoods are less susceptible to blight. Have your soil tested every 2-3 years and follow the amendment recommendations that come from the lab. The PMG Horticultural Help Desks can help interpret these recommendations. Keep roots healthy by amending heavy clay soil with compost to improve drainage.

Prune boxwood plants to promote airflow, keep leaves dry, and minimize fungal growth. Try not to work on plants when leaves are wet, which can increase the spread of spores. Avoid overhead irrigation. Mulch under the plants to avoid splashing spores onto leaves. This also conserves water and reduces the need for irrigation in the first place. Rake up any fallen leaves and branches. Finally, sanitize tools, clothes, and footwear after working on boxwoods.

Other Boxwood Fungal Diseases

• Colletotrichum

Diagnosis Dieback of branches without leaf drop, randomly distributed around the plant, is the most notable symptom of Colletotrichum (see picture). Black discoloration can be found under the bark of the dead wood. Sometimes black "fruiting bodies" (the structures that produce spores) will appear on leaves. Roots will be healthy, that is, they will be brown, and the outer layer will be firmly attached to the core.

In Colletotrichum dieback, dead leaves remain attached to the the affected branches. Image: Boxwood Blight Task Force

Treatment Like blight, there is no treatment for Colletotrichum. The only surefire way to stop it from spreading is to remove and dispose of the infected plant as described above. Thoroughly clean up plant debris and sanitize clothes and tools. There is no preventative spray recommended by the Virginia Cooperative Extension.

Prevention At present, the only recommended preventative measures are general cultural practices like those described above.

• Volutella:

Diagnosis Volutella also causes dieback without leaf drop. The best way to distinguish Volutella from Colletotrichum is by looking at the fruiting bodies: Volutella's are orange or pink (see picture), whereas Colletotrichum's are black. For diagnostic purposes, encourage fruiting bodies to grow by placing an infected branch in a sealed plastic bag with a few drops of water.

Treatment There is no treatment for Volutella, but in general it is not as serious as Colletotrichum. Usually it's an opportunistic infection that indicates an underlying issue, such as root problems (see below). Prune infected branches a few inches below the lowest affected leaves and dispose as described above. Clean up plant debris and sanitize tools, footwear, and clothes. If a plant is seriously infected, remove it completely.

Prevention As for the above fungal diseases, prevent Volutella by keeping plants healthy and dry. If there's an infected plant nearby, consider a preventative fungicide spray as described in the Virginia Cooperative Extension Pest Management Guide (PDF link) (page 4-9 in the 2023 guide).

Volutella fruiting bodies appear as small pink masses. Image: Boxwood Blight Task Force

• Root rot, e.g. Phytophthora and Pythium (though technically these two pathogens are oomycetes, not fungi):

Diagnosis Root damage first manifests as subtle yellowing or bronzing of a section of leaves. It then progresses to stunting, and eventually sectional dieback (see pictures). Leaves will remain attached. Unlike Colletotrichum, there will be no discoloration under the bark of dying wood. The fibrous roots will be blackened and weak, and the outer layer will detach easily from the core.

A patch of yellowing foliage (center) is the only sign of early-stage root disease in this boxwood. Image: Boxwood Blight Task Force

Root disease can progress to sectional dieback. Dead leaves remain attached. Image: Boxwood Blight Task Force

Treatment The Virginia Cooperative Extension Pest Management Guide (PDF link) (page 4-8 in the 2023 guide) has one recommendation for treating Phytophthora and Pythium root rots: potassium salts of phosphorous, applied as a soil drench or foliar spray. (Note: these products don't act as fertilizers, because they contain phosphorous in a different form than that used by plants.) Remember, it's always better to prevent diseases than to treat them (see below).

Prevention Prevent root rots by not over-watering plants. When planting boxwoods, avoid low-lying areas and poorly drained soil, such as heavy clay. Amend clay with compost to improve drainage. However, don't add compost to the hole where the boxwood will be planted; instead add it to the soil around the planting hole.

Insects, Mites, and Nematodes

• Boxwood psyllids:

Diagnosis Leaf cupping near the ends of branches is the signature of boxwood psyllids (see picture). This is noticeable in the spring, when nymphs hatch and begin feeding on the plants' sap. Adults appear in late spring or early summer, but they cause minimal damage apart from laying eggs in buds. Fortunately, boxwood psyllids have only one generation per year.

Treatment Trim and dispose of affected branches. Insecticides are needed only for severe infestations. Consult the Virginia Cooperative Extension Pest Management Guide (PDF link) (page 4-52 of 2023 guide) for more information.

Prevention Halt the life cycle by removing affected branches. Unless there is severe infestation, preventative insecticide use is not recommended.

Cupped leaves are the signature of the boxwood psyllid. Image: Penn State Department of Plant Pathology & Environmental Microbiology Archives , Penn State University, Bugwood.org

• Boxwood leaf-miners:

Diagnosis Look for small yellowish blisters in leaves (see picture) where leaf-miner larvae live between the upper and lower tissue layers.

Treatment Most infestations can be halted by removing branches with affected leaves. Dispose of the waste as described previously. For severe infestations, consult the Virginia Cooperative Extension Pest Management Guide (PDF link) (page 4-49 of 2023 guide) for more information on insecticide treatments.

Light-colored raised spots containing boxwood leafminer larvae. Image: Boxwood Blight Task Force

Prevention As for psyllids, prevent future infestations

by removing affected branches.

• Mites, primarily boxwood mites and spider mites:

Diagnosis Mite damage appears as tiny pale dots, termed “stipples,” on leaves. Despite the name, spider mite webbing is apparent only during heavy infestations. Heavy feeding can also cause leaf yellowing and death.

Stippling caused by mites. Image: David L. Clement, University of Maryland, Bugwood.org

Treatment Knock mites off plants with a strong stream of water. (This conflicts with the advice to avoid wetting leaves. Do this only in dry weather, and keep plants well-pruned.) Conventional miticides are not recommended because they can harm beneficial mites that feed on harmful mites. Some garden stores and catalogs sell beneficial predatory mites, e.g. phytoseiid mites.

Prevention Horticultural oils, applied early in the spring, can kill mite eggs. Consult the Virginia Cooperative Extension Pest Management Guide (PDF link) (page 4-51 of 2023 guide) for more information. Note that horticultural oils can harm predatory mites and insects, so only use them if there was a severe infestation the previous year.

• Nematodes

Diagnosis Nematodes – microscopic worms – attack roots, so nematode damage looks like root disease (see pictures above): leaf yellowing or bronzing, stunting, and dieback. As detailed below, the Virginia Tech Nematode Clinic can check boxwoods for harmful nematodes. Root-knot nematodes may cause nodules to form on roots, but in general, nematode damage is hard to distinguish from root disease without using a microscope.

Treatment The best treatment is to promote the health of the infected plant with fertilization (guided by a soil test), watering, and pruning. Nematicides are not recommended because they kill beneficial nematodes that feed on harmful nematodes.

Prevention Nematodes cannot be eliminated from the environment. Help your boxwoods to fight off nematode damage by promoting general health as described above. If you are planting new boxwoods, American boxwoods are somewhat resistant to nematode damage.

Non-biological Issues

• Water (too much or too little):

Excessive watering can promote root rot, as described above. On the other hand, drought stress can also cause leaves to turn yellow and die. Drought stress is a particular problem for newly planted boxwoods, so monitor new plantings carefully, especially during hot weather. One inch of rain or irrigation per week is recommended for new boxwoods. (This works out to 2.5 quarts per square foot, or 5 gallons in a 3-foot diameter circle.) Established boxwoods do not need irrigation, except in times of extreme heat and/or drought.

• Salt

Salt (e.g. for melting ice) can desiccate plants and cause leaf yellowing and/or death. If boxwoods near a sidewalk or driveway show this kind of damage, particularly in the spring, consider salt as a cause. Salt can harm boxwoods in two ways: through direct contact with leaves, and by leaching into the soil.

• Winter/cold damage

Winter injury is very common for boxwoods. It begins as leaf browning or bronzing in the spring, possibly followed by death of the affected area (see picture). *If the leaves of a boxwood turn dark red or bronze, particularly in the spring, winter damage is the likely cause.* A good diagnostic for cold injury is that the damage only appears on the upper part of a plant, where it is not protected by snow. Simply cut off the affected parts; the rest of the plant will grow and fill in the missing area.

Winter injury often appears at the top of the bushes. Image: Boxwood Blight Task Force

Avoid winter damage by planting boxwoods in areas protected from wind. Northern and eastern exposure are better than southern or western because cold injury takes place when cold plants suddenly warm up. Do not fertilize plants in late summer or fall; this may spur new growth that is not winter-hardy.

Plant Disease Clinic at Virginia Tech

Needless to say, not all boxwood problems look like the descriptions and pictures in this article. The Plant Disease Clinic at Virginia Tech is a fantastic resource for professional diagnosis of plant diseases. Moreover, if the disease clinic suspects that a problem is actually caused by insects or nematodes, they will send a sample directly to Virginia Tech clinics that specialize in those organisms.

Collecting a proper sample is critical to achieving an accurate diagnosis. The clinic will reject insufficient samples. The optimal sample is a whole plant, including roots; be sure to leave a pint of soil around the roots to keep them moist. If a whole plant isn't feasible, the sample should include branches or twigs (more than one) that contain both living and dead or dying tissue. This helps ensure that the disease-causing organism, if there is one, will be actively growing somewhere on the sample. The sample must also include fibrous roots in a pint of soil. Read the clinic's sampling instructions carefully before collecting a sample.

"Digital samples," i.e. pictures, are a useful addition to physical samples because they help the diagnostician examine the overall health of the plant and the distribution of any diseased portions. Read the disease clinic's guide to good digital samples (PDF link) for tips on how to take the most useful pictures.

The cost to send a sample to the Plant Disease Clinic is $35. Contact your local Virginia Cooperative Extension office for instructions on where to deliver samples. In the Albemarle-Charlottesville area, bring samples to the Horticultural Help Desk in the Virginia Cooperative Extension office at 460 Stagecoach Rd., Charlottesville. Go to the back entrance of the Albemarle County Office Building off 5th Street Extended. The help desk is open 9 AM – noon, Monday – Friday from April to October, and Monday/Wednesday/Friday the rest of the year. Try to bring samples on Monday to allow them to reach the clinic before the weekend. Email pictures to albemarlevcehelpdesk@gmail.com. The Help Desk phone number is 434-872-4583.

Closing Thoughts

Boxwoods are popular for many good reasons. Personally, I am very fond of the smell. But boxwoods can be difficult to grow, particularly in hot, humid places like Virginia. The cultural practices described here will help prevent diseases, pests (and pets), and the environment from damaging your boxwoods. If something does go wrong, hopefully this article – and the Plant Disease Clinic – will help diagnose and halt any problems to get you back on track with beautiful, fragrant boxwoods.

References and further reading

featured image: Johannes Bergsma, CC BY-SA 3.0

Agromyzid Leafminers (Virginia Cooperative Extension)

Best Management Practices for Boxwood Blight in the Virginia Home Landscape (Virginia Cooperative Extension)

Boxwood Blight Cleanliness Program (Virginia Department of Agriculture and Consumer Services)

Boxwood Blight Task Force (Virginia Cooperative Extension)

Boxwood Diseases and Insect Pests (Clemson Cooperative Extension)

Boxwoods: Identify and Manage Common Problems (University of Maryland Extension)

Boxwood Psyllid (University of Kentucky)

Boxwood Psyllid Insects on Shrubs (University of Maryland Extension)

Browning of Boxwood: Is it Boxwood Blight? (Michigan State University Extension)

Home Grounds and Animals 2023 Pest Management Guide (PDF link) (Virginia Cooperative Extension)

Plant Health Alert: Improving Clay Soils for Better Gardens (Henderson County Center, North Carolina Cooperative Extension)

Reddish-brown Boxwood Leaves Usually Caused by Winter (University of Georgia Extension)

Spider Mites on Trees and Shrubs (University of Maryland Extension)

Types of Boxwood (New York Botanic Garden)

Virginia Tech Plant Disease Clinic

Virginia Tech Soil Testing Laboratory

Volutella Stem and Leaf Blight on Boxwoods (University of Missouri)