ESVMG
Gardening on the Shore
Summer, 2021

Message from the President

Summertime is here! The flowers are in bloom and the pollinators are everywhere. This is in part due to your efforts at home as well as in the Master Gardener gardens. The gardens are all looking great…job well done. Mother Nature is challenging us with the current weather. I can't think of anyone who delights in weeding in the heat and humidity that we have experienced lately. With good planning, though, your garden is thriving because you have planted the right plant in the right location. Weed early or late in the day and remember to hydrate.

I had a sneak peak at the articles in this issue and could have sworn someone was in my backyard taking notes on the creatures that are making my gardens a B&B. Even though we have had training on these topics, it is always good to refresh our knowledge and have a strategy for management of pests.

It is difficult to stay involved with MG this time of the year due to vacations and the weather. We have some volunteer opportunities where you can earn your volunteer hours either partially or totally indoors. For example, design an information board for New Roots pollinator garden, 2022 Poverty Simulation, planning for Farm Tour Day and the Annual Plant Sale.

Stay safe and cool! See you at the next general membership meeting on August 3rd.

Until then, remember that "A weed is a plant that has mastered every survival skill except for learning how to grow in rows." Doug Larson

Joyce Falkinburg

IN THIS ISSUE

Feature Article

Managing Deer in Your Garden

by Jane McKinley, EMG

Eastern Shore gardeners have many challenges, but one of the most difficult to overcome is the presence of browsing deer in our yards and gardens. As the dominant species in Canada and the United States, east of the Rockies, deer are the largest herbivore in most places where we farm and garden. And in our shared environments, deer have few if any predators, other than humans as hunters and automobile drivers.

It has been documented that deer consume hundreds of plant species and adapt their diet seasonally. As green foliage wanes in the fall, they move on to the fruits of shrubs and trees, including acorns and beechnuts, and then to twigs, buds, and bark. Foraging is not the only problem that deer present in the landscape, from August and throughout the fall breeding season, bucks in rut can rub the bark off trees as they remove velvet from their antlers or leave scent marks behind.

If you have seen deer grazing in your gardens, it's a sure bet that they are the problem. However, if not, take a few moments to verify that the nibblers aren't rabbits or woodchucks or other critters that like to nibble on our prized plants.

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Articles of Interest

Dealing with Summertime Pests

It's summertime and the bugs and varmints are at their peak! And so is our determination to rid our garden and vegetable beds of them! Even the most diligent efforts to eliminate these critters won't be 100% effective, especially if one only wants to use cultural or biological controls. However, the wise gardener realizes this and understands that we don't necessarily need full control to keep our plants healthy and productive.

Tomato Hornworm

The tomato hornworm, sometimes confused with the tobacco hornworm, devours sizeable portions of tomato plantings. The name pertains to the black "horn" on its back end and 'V' shaped white markings. The caterpillar can reach lengths of 4 inches and half-inch wide in their last life stage.

For most gardeners, tomato hornworm activity goes unnoticed at first, as the damage from their small chewing mouthparts is easily missed. As they go through their numerous growth stages, however, the feeding intensity increases.

"For tomato hornworms I planted borage with my tomatoes and have found it very effective."

Marianne Francavilla

While insecticides can be effective in controlling hornworms, they are usually not in large enough numbers to warrant an application. Look for signs of their presence (including their droppings which can be plentiful when they are feeding heavily) and start the hunt. Once spotted, pick them off the plant and squish or feed them to the chickens. There are also some tiny wasps that lay their eggs inside the body of the caterpillar and offer some control, typically later in the season.

Japanese Beetles

First reported in North America in 1916, the Japanese beetle now resides in most of the eastern United States. About 1⁄2 inch long, Japanese beetles are a shiny, metallic green with coppery brown wing covers that extend almost to the tip of the abdomen.

The Japanese-beetle grub attacks the roots of turfgrass and many ornamentals. Grub damage is most evident in spring and fall when the grubs are actively feeding in the upper layer of soil.

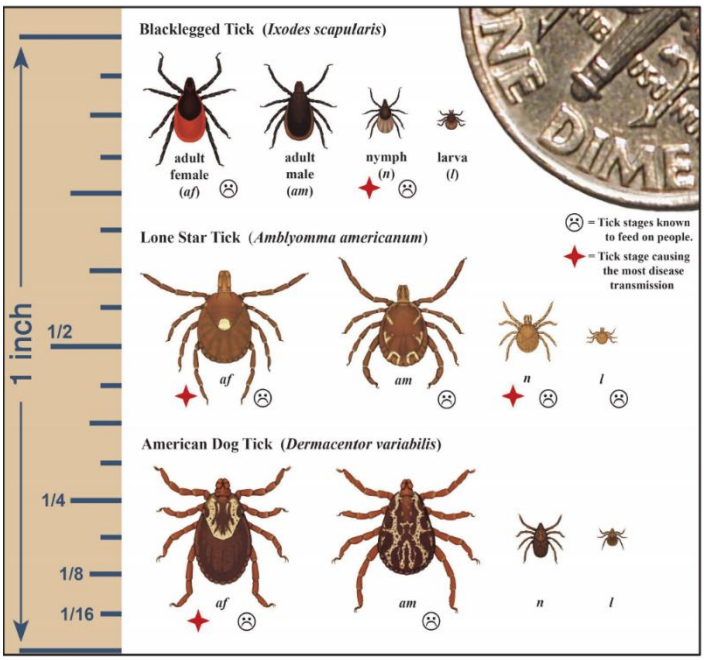
As an adult, the Japanese beetle consumes over 300 types of ornamentals, beginning in midsummer. It releases pheromones as it feeds, resulting in large numbers of adults coming together to "feed and breed" on the same host plant. Heavy congregations of adult beetles can cause rapid defoliation, though they live for only 30 to 45 days.

Early and frequent hand picking, most effectively in the morning, helps prevent massive populations. Knock the adults into soapy water or squash them. Japanese-beetle traps may catch up to 75% of the beetles but beware that they may cause heavier feeding in areas where the traps are located since beetles like to congregate together. Either don't use the traps at all or place them several hundred feet from the garden.

Another control measure is to stop watering the lawn and let it go naturally dormant in summer. This is because the Japanese-beetle grubs cause the biggest problem in lawns that are heavily fertilized and frequently—but shallowly—irrigated. The female beetle needs soft, damp soil to tunnel down and lay its eggs, and the eggs and grubs need moisture to survive.

Ticks

Even though ticks cannot fly or jump, they are particularly astute at sensing body heat, moisture, and vibrations. They may even identify shadows of people and animals! They recognize frequently traveled paths and will hang out there awaiting a passerby. Once the traveler brushes against foliage where the tick is waiting, it latches on, seeking areas of warm, thin skin such as ears, pits, or crotch.



There are three types of ticks in Virginia. Blacklegged, Lone Star and American Dog Tick.

Lyme Disease, the most common tick-borne disease in Virginia, is carried by the Blacklegged Tick, also known as a deer tick, which must feed at least 36 hours for disease transmission. The first sign of this disease is usually a circular or oval rash at least two inches in diameter and occurs at the tick bite site from 3 to 30 days after an infectious

bite. The rash generally does not itch or hurt and may go un-noticed. Symptoms may also include a fever, headaches, joint or muscle aches, swollen glands, and fatigue. When left untreated, Lyme Disease may progress to affect the nervous system or heart, and in some people may cause long lasting arthritis in large joints, and/or nervous system symptoms.

Rocky Mountain Spotted Fever (RMSF) is carried by the American Dog Tick which must feed at least 10 hours for disease transmission. RMSF is a serious illness characterized by a sudden onset of fever 2-14 days after an infectious tick bite. The fever may be accompanied by headache, muscle pain, nausea, vomiting, abdominal pain, and a red spotted rash. The rash typically appears 2 to 5 days after onset of illness, beginning at the wrists and ankles and spreading to the palms, soles of feet and the rest of the body. Treatment should begin as soon as RMSF is suspected. Untreated cases or delay of treatment may result in permanent damage to organs and limbs.

Southern Tick-Associated Rash Illness (STARI) has been associated with the Lone Star Tick. The rash, which can be confused with Lyme Disease, is sometimes accompanied by fatigue, headache, fever, and muscle pains. In rare instances, a bite by the Lone Star tick can result in the development of alpha-gal syndrome. Alpha-gal produces a mild to severe food allergy to red meat and other products made from mammals. It is believed that some people who have frequent, unexplained anaphylactic reactions – and who test negative for other food allergies – may be affected by alpha-gal syndrome.

Ticks have a variety of natural predators including ants, spiders, and birds, although most only occasionally feed on ticks. As such, these predators tend to be ineffective at significantly reducing tick populations. Guinea fowl and chickens are commonly promoted as tick controls, although research indicates that, like most other birds, their tick consumption is minimal and not effective in reducing tick populations. Additionally, as these fowl wander around a property, they can become hosts to ticks themselves, further reducing their value as a biological control.

Take Precautions

It is not possible to remove ticks from all areas where you may contact them. Therefore, it is advisable to take the following precautions to avoid serious tick bites:

- Recognize tick habitats such as leaf litter and vegetation in forested areas.
- When in the woods, walk in the center of trails.
- Wear light colored clothing to easily spot when a tick is present.
- Tuck pant legs into socks or boots, tuck shirts into pants, and wear long sleeved shirts.
- Apply repellents to exposed skin containing up to 50% DEET for adults or less than 30% DEET for children. Repellents containing other active ingredients such as bioUID, oil of lemon eucalyptus, IR3535, picaridin, or 2-undecanone may also be effective. Apply repellent containing 0.5% permethrin to shoes, socks, and clothing. Follow directions carefully and do not apply this repellant to skin. Clothing repellents are very effective.
- Thoroughly check for ticks after having been in tick habitat and remove them promptly.

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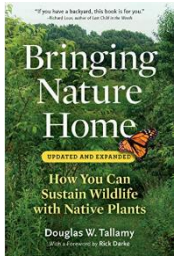
Reading for Continuing Education Credits



In April, our Vice-President, Jocelyn Grover, sent all members a link to the "Reference and Reading Recommendations for a Master Gardener Bookshelf." The books on this list are worth up to three hours of CE per book. Books are listed in categories which makes it easier to find one that fits your interest.

Below is a sample list of these books. The full list can be found here.*

- *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses*, Michael A. Dirr (Stipes Publishing, 2009)
- *Herbaceous Perennial Plants: A Treatise on Their Identification, Culture and Garden Attributes*, Allan M. Armitage (Stipes Publishing, 2020)
- *Attracting Beneficial Bugs to Your Garden: A Natural Approach to Pest Control*, Jessica Walliser (Timber Press, 2014)
- *Essential Pruning Techniques: Trees, Shrubs and Conifers*, George E. Brown and Tony Kirkham (Timber Press, 2017)
- *Bringing Nature Home: How You Can Sustain Wildlife and Native Plants*, Douglas W. Tallamy (Timber Press, 2009)
- *Gardening with Grains: Bring the Versatile Beauty of Grains into Your Landscape*, Brie Arthur (St. Lynn's Press, 2019) Note: Brie spoke at our 2019 Garden Symposium!
- *The Lifelong Gardener: Garden with Ease & Joy at Any Age*, Tony Gattone (Timber Press, 2019)
- *Planting in a Post-Wild World: Designing Plant Communities for Resilient Landscapes*, Thomas Rainer & Claudia West (Timber Press, 2015)
- *The Living Landscape: Designing for Beauty and Biodiversity in the Home Garden*, Rick Darke & Doug Tallamy (Timber Press, 2014)
- *Beautiful No-Mow Yards: 50 Amazing Lawn Alternatives*, Evelyn J. Hadden (Timber Press, 2012)

*https://docs.google.com/document/d/11GcvQr_wm_oH2BaNCLZuXzY6POD2f0FXD0TgY5DlBs8/edit

If you have a garden and a library,
you have everything you need.

Cicero

Gardeners' Tips

Excerpt from Master Gardener Handbook: Benefits and Value of Insects

Not all insects are harmful or destructive. People have often gone to great trouble or expense to destroy insects only to learn that the insects were actually helpful by eating other insects. A good rule of thumb is that pest insects will usually be abundant and associated with plant damage. Beneficial insects, or those that are harmless, are generally less abundant and not associated with plant damage. If all else fails, make note of the insects you see in your yard. If you are unsure if they are pests or not, monitor and revisit areas where you saw them. Take action against them only if you find plant damage.

Insects aid in the production of fruit, seeds, vegetables, and flowers by pollinating the blooms.

Insects are beneficial to the gardener in many ways. Insects aid in the production of fruit, seeds, vegetables, and flowers by pollinating the blooms. Many of our common fruits and vegetables are pollinated by insects. Squash, tomatoes, beans, okra, peppers, apples, peaches, citrus, berries, and grapes all require insect activity to set fruit. Insects also pollinate many ornamental plants. The lack of insect activity in greenhouses can be a problem if the plant requires an insect pollinator to produce fruits or seeds. Insects can attack undesirable weeds in the same way they injure crop plants. Insects improve the physical condition of the soil and promote soil fertility by burrowing through the surface layers. Their droppings and dead bodies fertilize the soil. Insects scavenge and consume dead plants, dead animals, and dung.

The greatest service offered by insects is the control of plant-feeding insects by insect predators and parasitoids. Predators are insects (or other animals) that catch and eat other animals (their prey), usually in a single meal. Prey animals are usually small and weaker than the predator. Ladybugs, lacewings, assassin bugs, and dragonflies are good examples of predators. In contrast, parasitoids are insects that live on or in the bodies of another living animal (the host), from which they get their food for at least one stage of their development. The hosts of parasites are usually larger and stronger than the parasitoid, but parasitoids eventually kill their host. Most parasitoids are found in the orders Hymenoptera and Diptera. These are important natural enemies of many plant-feeding pests.

Excerpt from Master Gardener Handbook,
Chapter 5, "Basics of Entomology"

Know Your Natives

As interest in native plants and how to incorporate them into one's landscape grows, with each issue, this series introduces the reader to a select variety of native plant. The plant featured will be at its most attractive during the current season. For the summer, the Yaupon deserves recognition with its showy red berries that persist during our coldest months.

Buttonbush, *Cephalanthus occidentalis*

Described by the Lady Bird Johnson Wildflower Center as a "handsome ornamental," Buttonbush is a 6 – 12 ft. spreading, multi-branched semi-evergreen shrub or small tree. This native shrub sports long lasting white or pale pink flowers resembling pincushions and button-like balls of fruit from June through September. Subsequent rounded masses of nutlets persist through the winter. Its branches are often crooked and leaning. Although it will grow in shady conditions, flowering is better in full to partial sun. It is not picky about the soil type but prefers moist soil and can withstand poor drainage and up to 3 feet of standing water.

Buttonbush has exceptional wildlife benefits, attracting many types of pollinators along with ducks and other water birds that consume its seeds.

Pruning Buttonbush is not necessary but may be done in early spring if you want to manage its size and shape. The plant may also be cut back near to the ground in early spring to revitalize.

Summer "To Do" List

Water and pull weeds, water and pull weeds, water and pull weeds – that's the summertime mantra. But there are a few other things that the gardener can do to keep things looking in top shape. Below are a few tips for the hot summer months while, of course, when in the garden be sure to stay well hydrated and work primarily in the early morning or evening.

Keep It Cool

Think of ways to keep your garden cool by creating shady spots. Areas under trees can be up to 20 degrees cooler than adjacent sunny spots, so consider planting a tree in the fall to shade your favorite spot. You can also build an arbor over a seating area and plant climbing vines to create shade. Place a fountain, pool or small portable water feature near your patio for a cooling evaporation effect and bring in the soothing sound of moving water.

Bring In the Color

Keep annual containers looking their best with regular watering, fertilizing, and deadheading. Containers can be located in areas close to the house or along walkways where they can be enjoyed close up. Consider replacing tired looking mid-summer plants with healthy new ones (if you can find them, that is!) that will do a better job of riding out the remainder of the season.

Freshen Up the Outdoor "Room"

Hosing down the deck, patio or porch to wash off spiderwebs and dust will bring it back to life. Spray or wipe off dust from furniture, keep glass surfaces shining, and consider replacing faded cushions. Move containers around for an updated look.

Assess the Situation

Now that the garden is filled in with blooms and foliage, it's an opportune time to make a list of what needs to be divided or replaced. Take a few pictures to remind you of the problem areas that present themselves this time of year. Like in the winter months when it's hard to get outside, search the catalogs for ideas of what new things to bring into the garden once the weather gets more mild.

Work on the Hardscape Projects

Building patios, ponds, pathways and other permanent fixtures should always be done before the plants go in. Completing these projects in the summer months will get them ready for fall planting and will give you a better idea of what will grow best around the newly installed hardscapes.

Seek Inspiration

Visit botanical gardens and parks to see what is thriving during this time of year. Take pictures of areas that you like so that, when at home, you are reminded of the plant combinations and hardscape materials. You may even want to visit some of the ESVMG supported gardens for ideas!

Tips inspired by Garden Design online.

What We've Been Up To

In addition to all the hard work done by volunteers to keep the ESVMG sponsored gardens in tip top shape this summer, a few special events have been held. Thanks to all volunteers who work in the gardens and helped to make the events below a big success.

- On April 24 and May 8, ESVMG held a **Plant Clinic and Sale** in Cape Charles in conjunction with Peach Street Books. The event was well attended with volunteers

fielding a number of gardening questions from passersby and a robust sale of annuals that resulted in $335 in profits. These funds were donated to the Cape Charles Memorial Library for the purchase of gardening books.

- ESVMG hosted a **Garden Tour of the Cape Charles Historic District** for Master Gardeners and the public on Sunday, June 6. The tour, which was visited by up to 150 people, began at New Roots Youth Garden (NRYG) where visitors picked up a map and learned about the NRYG mission and plantings. Five residential gardens were featured, three owned by Master Gardeners Phil Goetkin & Diane D'Amico, Kim Fehrer, and Jane McKinley. Although a free event, $300 in donations were collected which will go to supporting the NRYG.

- The **annual picnic**, held at Julie Cardinale's lovely home on June 8, had 39 gardeners in attendance who each brought a covered dish or drinks. We were proud to have held a plastic- and Styrofoam-free lunch! Our speaker, Ellen Stromdall who is a retired epidemiologist for the US Army, gave an informative and *a little scary* 40-minute talk on ticks. The event also included the annual plant exchange.

UPCOMING EVENTS

Aug 3, 9:30 -11:00 am	General Membership Meeting Agricultural Research & Extension Center, Painter
Aug 17, 8:30 – 11:30 am	Poverty Simulation Arcadia Middle School
Sept 17-21	International Master Gardening Conference
Sept 28	Farm Tour Day, help needed at compost demo display & lunch

Managing Deer in Your Garden
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Rabbits and woodchucks generally browse lower on the plant up to about 2 feet and leave a smooth bite out of a leaf. Deer, however, browse up to around 6 feet, feeding on shrubs from the top down or from the sides, and they tend to tear the leaves.

Once you determine that deer are causing the problem, assess the extent of damage. Is it "mild pressure" which means that plants suffer only occasional damage? Or does the garden experience consistent damage to certain plants (moderate) or consistent damage to many plants with substantial loss (high). Understanding the amount of pressure to which the deer are subjecting the garden will help to identify the best approach for deterring them.

Understanding the amount of pressure to which the deer are subjecting the garden will help to identify the best approach for deterring them.

It is advisable to take the "toolbox approach" which involves mixing one or more strategies to deter your deer. The greatest success comes from knowing each tool's limits and employing those best suited to your conditions. But even then, the key is staying alert and being ready to reassess the situation as the deer habituate to your efforts.

Here is a description of each of the tools available to the gardener for deterrence of deer.

Accept the Damage
If your plants are experiencing only mild pressure, this may be acceptable. Considering the cost and vigilance required to tackle your deer problem, you may decide that you can live with mild damage. This and employing strategies described in the Other Strategies section below may suit your situation best.

An example of accepting the damage is an instance that occurred at my prior house in Chesterfield County. This wooded suburban neighborhood was inundated with deer. Although they stayed away from my yard, there was one particularly sparce winter when they arrived to nibble on my healthy golden euonymus shrubs. I tried using a repellent which worked for a short time but was too busy to keep up timely applications, so the deer pretty much had a heyday. I discovered, however, as spring arrived the shrubs put out new leaves and were able to recover nicely as the deer moved on to a tastier cuisine.

It is also worthwhile to note that because deer only graze up to about 6' from the ground, browsing at the base of a mature tree is not very harmful to the tree.

Apply Repellents
Repellents work by smelling bad, tasting bad, or both and can be an effective option in small areas where there is low to

moderate deer pressure. However, they can be costly, require repeat applications (*my problem!*) after periods of rainfall or on new growth, may have a strong odor, are not appropriate on edibles, and are not effective on highly motivated animals. It must also be kept in mind that deer become used to repellents after two or three applications, so rotating them prolongs their effectiveness. If you know you are going to be faced with a problem, it is advisable to begin using repellents as a preventative measure before the deer appear.

Install Scare Devices

Scare devices use the element of surprise and variability to be most effective. Examples of scare devices include lights, whistles, loud noisemakers, and scarecrows. Unfortunately, this strategy may work initially, but deer adjust rapidly to them, so they need to be changed regularly and moved around. Motion-controlled sprinklers are a good choice because their placement and jet height are changeable.

Erect Fences

A high fence is the most effective option for keeping deer out of the garden. Fences can be of varying heights and materials, electrified (where local code allows) or not, and permanent or seasonal. Deer can jump fences up to 8' high, so the best physical barrier is a fence at least this high made from woven-wire material, or even heavy-duty polypropylene mesh reinforced with wire and flagged at intervals with streamers or reflective material to alert the deer not to bound into it.

Around smaller garden areas, a solid stockade or mesh fence of perhaps five feet may suffice. Deer hesitate to jump into areas they cannot see into, or into confined areas where they fear they may be trapped.

Choose Deer Resistant Plants

As we know, under duress deer will try eating anything, so no plant is totally deer resistant. That understood, there are some general attributes that render a plant less appetizing to deer. Plants that are aromatic such as mint or *Artemisia*, plants that have latex sap such as milkweed and annual poppies, or those containing "toxic" compounds such as narcissus and foxglove are a good bet in the garden. Plants with fuzzy leaves such as lamb's ear or spiny plants such as roses are also not a deer's first choice. Herbs are one of the most deer-resistant of all plant families. Many native plants seem to resist wildlife pressure compared to cultivated ornamentals.

Rutgers University has provided a list of landscape plants rated according to their resistance to deer pressure. Realizing that no plant is deer proof, plants categorized as Rarely Damaged (including Arrowwood Viburnum, American Holly, and Bayberry) and Seldom Severely Damaged (including Beautyberry, Black-Eyed Susan, and Blackhaw Viburnum) are recommended as the best for landscapes prone to low or moderate deer pressure. Plants Occasionally Severely Damaged (including Bigleaf Hydrangea, Caladium, and Eastern Redbud) and Frequently Severely Damaged (including American Arborvitae, Evergreen and Pinxterbloom Azaleas, and Hosta) should only be planted with additional protection such as fencing and repellents.

Check the link listed in the "Sources" section below to visit this site.

Other Strategies

- Locate plants at higher risk of deer pressure closer to areas with a lot of human activity such as a protected deck. Plants next to your house are less likely to be bothered by deer. Planting your prized specimens in pots enables you to keep a close eye on them and move them around, as needed, in a protected space.
- Don't feed deer. They will become acclimated to foraging near homes and in gardens and will more readily discover the delectable goodies growing in the garden.
- Keep dogs in the area. Especially big barking ones!
- Create a barrier of undesirable plants around the desirable ones.
- Surrounding seedlings or saplings with tree tubes and individual wire cages can help minimize rutting damage.

Sources:
"The Elusive Deer-Proof Garden," New York Times article, May 5, 2021
Landscape Plants Rated by Deer Resistance, Rutgers University's New Jersey Agricultural Experiment Station
Deer-Resistant Plants & Fencing: Resource Lists for Gardeners, awaytogarden.com
Nuisance Wildlife Repellent Handbook, Minnesota Department of Natural Resources
"Deer: A Garden Pest," VCE Publication HORT-62NP (out of print)

Dealing with Summertime Pests
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Additionally, parasitic wasps (*Ixodiphagus hookeri*) and nematodes have shown limited success in controlling tick populations.

The use of pathogenic fungi is perhaps the most promising biological control for ticks. These fungi penetrate the tick's cuticle, or outer covering, move into the body, and ultimately kill both nymphal and adult stages of the tick. The fungi *Metarhizium anisopliae,* known as Met F52, is available commercially and is not proven to harm to humans or the environment when used according to label instructions.

Environmental controls can help reduce the tick population. These include keeping grass short, cleaning up lawn clippings, creating a barrier of mulch around the yard, and pulling and trimming any tall weeds or plants.

Voles

With favorable conditions, voles are perhaps the most prolific of all rodents. Voles are compact 3-8" long rodents with stocky bodies, short legs, and short tails that feed on stems and leaves of grasses, forbs, fruits, shrubs and trees. There are two types of voles: meadow voles and pine voles. Meadow voles live most of their lives above ground and chew the base of plants and fruit trees, whereas pine voles destroy the root systems of plants from underground. Voles are active throughout the year with forays occurring at dawn and dusk. Fortunately, predatory birds, coyotes, foxes, snakes, skunks, and other wild animals can keep vole populations in check. Because cats cannot reach their deep holes in the ground, they do very little to deter the more common pine voles.

Most people realize they have voles only from the damage. Methods for control and damage prevention include eliminating weeds, ground cover, and litter around the vegetable garden and in lawns. Controlling moles, whose tunnels are used by voles, by eliminating the grubs can be effective if a systemic treatment containing imidacloprid, such as Milky Spore, is applied to the lawn. Frightening, repellents, toxicants, fumigants, trapping, and shooting are also methods used.

Mouse snap traps can be used to control a small population by placing the trap perpendicular to the vole's hole opening. A peanut butter-oatmeal mixture or apple slices make good baits. The trap should be covered by a shingle to prevent pets and birds from injury. Voles are easiest to trap in fall and late winter. Unfortunately, trapping is not effective in controlling large vole populations.

I have found the most effective way to minimize the damage created by voles is to create an armor around the plant or the garden bed. In my yard, it was impossible to eliminate the voles who ran rampant throughout. I would frequently encounter a hosta or other delectable treat showing decline and, ultimately, listing to one side. When inspected, I could easily pull the plant out of the ground where I discovered no remaining roots and prominent bite marks.

After giving up on traps, I tried an alternate method which had a high degree of success. Instead of trying to remove the voles, I remove their access to the plants. This is done in one of two ways. If planting a large plant such as a shrub (I lost a gorgeous mahonia one year!), I wrap chicken wire around the root ball, creating several layers of wire where the animal cannot slip through. In the instance of the lost mahonia, I also added a collar of wire reaching up the bottom of the trunk since it appeared to have been eaten by a meadow vole.

For a garden bed, I dig a trench about 8" deep and insert broken flowerpots, gravel, or other obstructive material that the vole cannot dig through. I outline the bed with large rocks to identify where the trench is buried. And it voila! It works!!

Slugs

Slugs are leaf-munching mollusks that live on land and are more closely related to clams than beetles or caterpillars. Slugs will leave slimy trails, damage leaves, and consume seedlings. Unlike snails, slugs don't carry a shell on their backs and, because they lack this protection, they tend to feed primarily at night or on rainy days, when protected from the sun. This makes them hard to identify as the damaging pest.

To identify slugs as the cause of the damage, there are a few sure-fire signs. First, the damage is apparent in the morning with nothing left but mid-ribs and stumps. Slugs leave round holes in tomatoes, strawberries, and other soft fruits. They leave ragged holes in leaf edges and centers. And, of course, there are the slime trails!

Slug damage can be pretty well controlled using cultural practices. These include avoiding loose mulch such as straw and shredded wood, opting for compost or leaf mold instead; avoiding late-day watering and switching to drip irrigation; and including heavily fragranced plants, such as herbs, and those with fuzzy or furry foliage in the garden. Allow wildlife such as birds, snakes, lizards, and frogs to set up residence in your garden.

Other cultural controls include avoiding using pesticides on the lawn (which kill firefly larvae who eat newly hatched slugs), trapping slugs under boards which can be lifted in the day to expose the hiding offenders, and placing wool and copper in the garden. Diatomaceous earth sprinkled on dry soil and salt placed directly on a slug's body will kill it. Everyone's favorite method, however, is to set out beer-bait traps. The yeast in the beer attracts slugs who fall in and drown. It works really well but is also incredibly gross!

Biological Controls

Although the use of cultural controls has been primarily mentioned earlier in this article, the use of biological controls can also be an effective means of controlling unwanted pests in the garden. These controls include the use of beneficial insects, nematodes, and bacteria such as milky spore.

The first step to using beneficial insects in your garden is identifying what is eating your plants. Once you know your pests, you can select the proper control, keeping in mind that there may be more than one appropriate choice and a multi-pronged approach can be most effective. Beneficial insects must be purchased from a mail-order source, so be sure to make arrangements for the package to be left in a protected area if you will not be at home. A box of living organisms left on the doorstep in direct sunlight can quickly overheat, killing its occupants.

How and when to apply beneficial insects depends on the type of bug you are using, so be sure to follow the recommendations that come with the source. In general, you will want to let them go in a protected location out of direct sunlight and early in the morning or on an overcast day. Many arrive as active, mobile immature insects or adults ready for immediate release. Place a

small number of them (1 to 10, depending on the pest density) on an infested plant. Be sure to distribute them evenly throughout the garden. Insects released this way include green lacewings, lady bugs, leaf miner parasites, mealybug parasites and minute pirate bugs.

Praying mantis, spined soldier bugs, Trichogramma wasps and Whitefly parasites arrive in their egg case which should be secured to a piece of wire, twine, or fishing line, threading it with a needle right through the case, if possible. Tie it to a branch or a plant 3 to 4 feet off the ground in a sheltered location hidden by foliage.

Some beneficial insects arrive in containers mixed with a material like rice hulls, bran hulls, or vermiculite to keep them separated and to help disperse them evenly. Sprinkle a small amount of the mixture onto infested plants, distributing it evenly over the targeted garden space. Others come in a powder or as a liquid concentrate that must be mixed with water and applied according to the package directions.

Nematodes are microscopic enemies of the beetle grubs. Applied in late spring, when the soil temperature is above 60°F, these smooth, wormlike creatures seek out and kill host insects throughout the growing season. Again, because they are living organisms, be sure to receive them and store them according to label instructions. Nematodes are not winter hardy and should be reapplied on an annual basis.

Milky spore is a bacterium that only affects Japanese beetle grubs – but it does a great job at doing it! The beetle grub consumes the spores which reproduce within its body, eventually killing it and releasing more spores. It will take at least two consecutive years to inoculate the soil and can last for up to 20 years. Spring and autumn applications are most effective because the grubs are more active at that time.

Biological Pesticides

Biological pesticides, also known as biopesticides, are certain types of pesticides derived from natural materials from animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda can be used to control some pests and are, subsequently, considered biopesticides. Although a biological control is more environmentally desirable, biopesticides have advantages over chemical controls which have a higher toxicity, are broad-spectrum (less able to target a specific pest), are not effective in very small quantities and decompose slowly, resulting in higher exposures and more pollution side effects. Biopesticides include neem, Spinosad, and Bacillus thuringiensis (Bt). As with all pesticides, be sure to follow label instructions and be aware that they may be harmful to beneficial insects.

Neem is derived from the tropical neem tree and has proven to disrupt the feeding of adult Japanese and Oriental beetles. Applied to foliage in a liquid form, neem-based products should not be used when pollinators are actively foraging as it might also kill these beneficial insects. Biopesticides made from Spinosad are great at targeting leaf-munching beetles of all types, including members of the scarab beetle family. Effective against any chewing

insect (including many types of caterpillars), Spinosad-based products are created by fermenting a species of bacterium. When the pest consumes or comes in contact with the product, it disrupts the insect's nervous system, eventually causing death.

The most widely used microbial pesticides are made from a common soil bacteria called Bacillus thuringiensis, or Bt. Each strain of this bacterium kills one specific or a few related species of insect larvae, so be sure to know what type of insect you want to target. Depending on strain, Bt can control caterpillars, mosquitoes, flies, beetles and gnats. Mosquito dunks contain Bti and are a very popular product for use in water gardens, birdbaths, and rain barrels.

Further Reading / CE Credits

- *IPM for Gardeners: A Guide to Integrated Pest Management*, Raymond A. Cloyd, Philip L. Nixon, Nancy R. Pataky (Timber Press, 2004)
- *Insects and Gardens: In Pursuit of Garden Ecology*, Eric Grissell (Timber Press, 2001)
- *Attracting Beneficial Bugs to Your Garden: A Natural Approach to Pest Control*, Jessica Walliser (Timber Press, 2014)

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"Voles in Turf," NC State Extension
"Tick borne Disease Flyer," Virginia Department of Health
Cooperative Extension: Tick Lab, University of Maine
Metharhizium anispoliae strain F52, Biopesticide Fact Sheet, EPA
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What are Biopesticides, EPA
"How to Get Rid of Slugs in the Garden," Savvy Gardening

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Eastern Shore of Virginia Master Gardeners
Newsletter Editor: Jane McKinley
23303 Front St., PO Box 60, Accomack, VA 23301.
Phone: 757-787-1361/Hotline: 757-678-7946. E-mail esmgv@gmail.com.