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Extension Gardener provides timely, research-based horticultural information. We publish four issues per year. Send comments about *Extension Gardener* to:

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Sustainable Gardening

Sustainable landscape maintenance involves creating a system of continual reuse. For example, often homeowners purchase fertilizer, apply it to the lawn, collect and discard grass clippings, and then purchase more fertilizer. In a sustainable landscape system, the nitrogen from the fertilizer is reused by leaving the grass clippings on the lawn or composting them.

Permaculture is a comprehensive, self-sustaining gardening system (see the article on page 2 of this newsletter), and there are also many individual steps you can take to increase the sustainability of your landscape.

Re-use the nutrients in grass clippings by mowing with a mulching blade that cuts the grass into tiny pieces. The clippings can be left on the lawn to break down quickly and return their nutrients back to the soil. This can reduce fertilizer costs by about 25 percent each year. Grasscycling also helps to build a healthy soil by feeding soil microbes.

Pine straw, pine bark, hardwood mulch, and fallen leaves can be re-used as organic mulches that eventually break down and feed the soil. A 2-inch to 3-inch layer of mulch in flowerbeds and around trees and shrubs will reduce the number of weeds and increase soil moisture retention, both of which will lead to reduced water usage.

Reduce the amount of water needed in the landscape by selecting plants that are well-adapted to the area in which they are planted. Choose the right plant for the right place. This strategy includes putting shade-loving plants in the shade



Mulch feeds the soil and conserves water.

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Vermicomposting recycles organic waste.

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and sun-loving plants in the sun, and putting plants that thrive in wet conditions in moist areas and those that do well in dry conditions in the dry areas. Doing so will result in less need for supplemental watering. Remember, it will take one to three years after planting before the plant has completely established itself and can live on the water provided by rain.

For those lucky enough to have an irrigation system, one way of reducing water usage is to water only when needed rather than on a set cycle. In some weeks, we may receive enough rain that irrigation won't be needed. It's a little thing. But if we use the water we have wisely, the local government won't need to ration water when we have a drought.

Composting is another sustainable activity. Many home gardeners don't produce enough waste to fill a 3-foot by 3-foot compost bin. A worm compost (vermicomposting) bin, however, may be just big enough to recycle the organic waste produced by some households.

It's often easier to make one change at a time. Maybe it's easiest to start with grasscycling and then add reduced irrigation or composting to the sustainable practices you use. Start somewhere, and take it one step at a time.

—Shawn Banks

Extension Showcase

Best Broccoli in the Piedmont

Broccoli can be a difficult crop to grow in the NC piedmont. Roller coaster temperatures in springtime and intense insect populations in the fall are enough to make any gardener call it quits.

Broccoli is a highly nutritious and profitable crop for wholesale and retail markets. Extension agents in Caldwell, Catawba, Davidson, Davie, Forsyth, and Rowan counties partnered with the NC Department of Agriculture & Consumer Services Piedmont Research Station in Salisbury to plant six different varieties of broccoli, which were evaluated for yield and marketability.

The industry standard variety for grocery stores, 'Packman', was used as the control group for a comparison of taste, size, and yield. Other varieties evaluated were 'Luna', 'Gypsy', 'Asteroid', 'Imperial', and 'Green Magic'. Data were collected on size, weight, and overall appearance of the heads at harvest for this first-year broccoli trial. 'Asteroid' and 'Imperial' performed poorly with 15 heads harvested total, whereas 'Luna' and 'Green Magic' consistently yielded more and heavier heads. A workshop was held in late spring with a taste test component. 'Imperial' was rated the best with 'Luna' second. Cooperative Extension will use this information to give better variety recommendations for broccoli in the NC piedmont.—Amy-Lynn Albertson



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Smart Gardening: CoCoRaHS



CoCoRaHS rain gauge
©Henry Reges,
CoCoRaHS HQ, NASA

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) is a volunteer-driven weather reporting program that came about as a result of a devastating flash flood that hit Fort Collins, Colorado, in July 1997. A local severe thunderstorm dumped over a foot of rain in several hours. The ensuing flood caught many by surprise and caused \$200 million in damages. CoCoRaHS was born in 1998 with the intent of doing a better job of mapping and reporting intense storms. As more volunteers participated, rain, hail, and snow maps were produced for every storm, showing fascinating local patterns. Recently, drought reporting has also become an important observation within the CoCoRaHS program across the nation.

North Carolina became the twenty-first state to establish the CoCoRaHS program in 2007, and now has over 1,400 volunteers joining 10,000 participants nationwide. Volunteers may obtain an official rain gauge through the CoCoRaHS website (cocorahs.org) for about \$30 plus shipping. In addition to buying the official 4-inch plastic rain gauge, volunteers are required to take a simple training module online and use the CoCoRaHS website to submit their reports. Observations are immediately available on maps and reports for the public to view. The process takes only a few minutes per day, but the impact to the community is tenfold: By providing high quality, accurate measurements, the observers are able to supplement existing networks and provide useful results to scientists, resource managers, decision makers, and other users. An additional benefit of the program to the National Weather Service is the ability to receive timely reports of significant weather (hail, intense rainfall, localized flooding) from CoCoRaHS observers that can assist forecasters in issuing and verifying warnings for severe thunderstorms. To become a CoCoRaHS observer, go to the CoCoRaHS website: cocorahs.org.

—Seth Nagy

Food Production: Benefiting from permaculture design

As you work toward greater sustainability in the home and garden, think permaculture. This design system guides participants toward learning and applying principles of regeneration and sustainability in homes and workplaces, with the goal being the creation of a "permanent culture." The system relies on three ethics: Earth Care, People Care, and Fair Share. It seeks to provide economic opportunities via practices that build soil and nurture biodiversity, while developing ways to share harvests or profits equitably. It's easier said than done on a national or international scale, but permaculture practice begins at home via sustained observation and "small, slow solutions."

The home is where one has the most opportunity to effect change. From a compost bucket in the kitchen (and a bin or pile just out back), to passive and active solar systems where feasible, the principle of capturing and cycling energy is put to work at all scales and locations. The "agriculture" part of permaculture also begins at home, with as much food production as possible stacked into the zones where the most time is spent: just outside the front door, the immediate yard, and beyond. Diverse plants work together in proximity, creating "guilds." A guild might be a fruit or nut tree, surrounded by strategically chosen shrubs and herbaceous perennials, each of which play roles in outcompeting weeds, accumulating minerals from subsoils, producing mulch, nurturing beneficial insects, and providing edible small fruits, leaves, or roots. A brief article like this can't do the framework justice. NC Cooperative Extension has an excellent resource available: content.ces.ncsu.edu/extension-gardener-handbook/appendix-d-permaculture-design.

—Richard Boylan



Permaculture gardens combine fruit trees, shrubs, cover crops, vegetables, and perennials to build a regenerative system close to home.

©Richard Boylan

Pest Alert: Moles or voles?

This question often comes into the Extension center: “What do I do about these voles that are tearing up my lawn?” I usually respond with, “Is it a vole or a mole?” At this point, an explanation is in order.

Mole begins with an “M,” and so does meat, which is the primary source of a mole’s diet. Earthworms, grubs, ants, mole crickets, and other soil-dwelling insects make up the mole’s diet. Moles often will tear up the grass as they forage for food under the lawn. It’s usually the foraging activity that is so disturbing to homeowners. For management tips, visit turffiles.ncsu.edu/insects/mole.



Eastern mole ©epantha, bigstockphoto.com



Pine vole ©epantha, bigstockphoto.com

Vole begins with a “V,” as does vegetation—the main source of the food for the vole. If you have ever sat on the back porch and watched the carrots in the garden disappear down a hole or noticed a hosta plant get shorter as you admire it, you have probably been witnessing a vole’s feeding. In this case, the cause is the pine vole, which feeds on roots. In contrast, the meadow vole usually feeds on the bark of plants, just above the ground. This feeding activity will often girdle

the plant, causing it to die. For tips on identifying and controlling both vole species, see content.ces.ncsu.edu/voles-in-horticultural-plantings.

Visit ces.ncsu.edu and use the search feature to see Extension updates on moles and voles in NC gardens.

— Shawn Banks

Lawns: Organic lawn management

A groundswell of interest in low-impact turfgrass management has prompted an increase in “organically” managed lawns. Despite that, we do not have a clear consensus on what “organic” lawn management is. For the homeowner, it could mean using as few inputs as possible and letting so-called weeds and grass grow together. Everything is green at 30 mph anyway, right? On the other hand, it could mean actively managing lawn pests with organically approved products.

If you actively manage pests in the lawn, low-impact options are available. Resistant varieties of warm-season turfgrass are available that reduce chinch bug and ground pearl infestations. *Bacillus thuringiensis* (Bt) is an insecticide that will control armyworms, cutworms, chinch bugs, and sod webworm larvae. For Japanese beetle grubs, application of milky spore bacteria is recommended. Products containing spinosad or abamectin baits will help control fire ant infestations. For any type of pest control, integrated pest management (IPM) strategies should be followed, with chemicals being used as a last resort. For more information on sustainable pest management for home lawns, visit ces.ncsu.edu/depts/ent/notes/O&T/lawn/note95/note95.html.

Organic fertilizers such as cow manure or poultry litter can be applied to lawns to optimize plant health. Always take care, however, when applying any fertilizer to apply only at the rate recommended on a soil test.

Opt for plant diversity in lieu of large expanses of turfgrass. Research has shown that a diversity of flowering plants in a lawn or turfgrass area increases the diversity of arthropod fauna living in the yard. Large expanses of one or two types of plants also can be difficult (and costly) to maintain, so employ more trees, shrubs, perennials, and annuals that are low maintenance and do not require heavy pesticide and fertilizer inputs. To preview an Extension publication about organic lawns and their care, visit this link: ipm.ncsu.edu/urban/horticulture/organic_lawn_care/olc.htm.

— Sam Marshall

Tips & Tasks

These tips for a sustainable warm-season lawn will help to protect and preserve water quality.

Planning

- Research and contact your county Extension agent for the best warm-season grasses for the NC piedmont, such as bermudagrass, zoysia, and St. Augustine.
- Perform a soil sample to get individual recommendations for your lawn and yard. This is the first step to take for a healthy lawn.
- Choose the right grass based on the conditions in your yard, such as sun or shade and type of soil, irrigation, and topography. Right plant, right place.
- Consider other landscaping options that are not as dependent on regular watering.

Preparation

- Make sure the soil is properly prepared when planting new warm-season seed or laying sod for grass establishment.
- Remove debris, weeds, and existing plant material, and grade the soil to have a level surface.

Maintenance

- Sharpen blades on your lawn mower, maintain your equipment, and mow at the correct height to keep your grass growing vigorously.
- Water early in the morning and deeply to create a healthy and deep root system that will sustain the lawn in times of drought.

Please join our state in the 40-gallon challenge to conserve water: 40gallonchallenge.org/about.cfm.

For more information, see ipm.ncsu.edu/urban/horticulture/carolina_lawns/text.html.

— Lauren Duncan

Helping You Grow

What's wrong with my plant? is the title of a webpage from the University of Minnesota Extension Pest Management Garden website. Though this tool is created for Minnesotans, it provides plenty of information that can be helpful to those of us who want to figure out what might be wrong with a plant.

The page is organized by host categories, including vegetables; fruit; turf; annuals and perennials; deciduous trees, shrubs, vines; and evergreen trees and shrubs. After selecting a category, users see a list of plants. After selecting the appropriate plant, one can then select from a list of symptoms. When selecting a symptom, users are offered one or more possibilities for what the problem could be. Each possibility includes detailed information and color photos, and most options offer links to additional information to help with diagnosis.

There are similar pages on insects, plant diseases, weeds, and wildlife. Under the commercial horticulture heading, you can find information on protecting pollinators via the links **Plant & Nursery Health** and **Honey Bees**. This is another useful tool gardeners can add to their resources in the quest to answer a frequent question: "What's wrong with my plant?"

—Debbie Dillion

extension.umn.edu/garden/diagnose/plant/

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Plant Watch: Mexican bush sage (*Salvia leucantha*)



Mexican bush sage ©Jeana Myers

The Mexican bush sage is a true specimen plant that grows 4 feet tall and wide in a season. This salvia blooms in the fall with long, drooping blue flower spikes that last until frost. It loves sunny, well-drained locations and will tolerate dry conditions. For the lushest foliage and flowers, however, provide adequate moisture and mulch. This salvia is not winter hardy, so plan to purchase a new plant each spring and plant when the ground has warmed. Pinch back the silvery soft foliage several times over the season to increase branching, stopping in late July or August to allow formation of flower heads. Mexican bush sage is one of 900 or more species of the genus *Salvia*. All sages are *Salvia* species. But the word "sage" is most often used when talking about culinary

or medicinal species. Ornamentals are usually referred to as "salias." The genus name *Salvia* comes from the Latin word *salvere*, which means "to feel healthy, or to heal."

—Jeana Myers

Incredible Edibles: Buttercup squash

Buttercup squash is a new favorite, but don't confuse it with butternut squash. Buttercup squash is a squat green squash that looks like an upside-down acorn. Buttercup squash grows 7 inches in diameter and weighs 3 pounds. Buttercup's dense flesh is dark-yellow-orange, approaching red. One serving has 50 calories and is loaded with vitamins A, B, and C, as well as calcium, magnesium, phosphorus, and potassium. The flavor of buttercup is sweet and nutty, with a creamy consistency like a baked sweet potato. Steaming and baking bring out the sweetness and add moistness. Buttercup squash is not hard to cultivate in the home garden. It produces best in rich, well-drained soil and full sun. It is susceptible to pests such as squash vine borers. Harvest when the rind has hardened, and cut leaving a 2-inch stem. Buttercup squash is so yummy you will want to grow it this summer!

—Cyndi Lauderdale



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Sustainability: Sustainable gardening with beneficial insects

When gardeners see an insect, especially if it's on a favorite plant, they assume that it is going to eat the entire plant and leave little to nothing to show for the gardener's hard work. Although there are some "bad" bugs out there, the majority, actually 99 percent, are either harmless or beneficial. These good guys, such as lady beetles, assassin bugs, wasps, and spiders, are considered natural enemies to other various insects. These natural enemies feed on other organisms, thereby becoming a natural approach to pest control. Gardeners should create environments that encourage populations of these beneficial insects, thus reducing the amount of insecticides needed to keep plants healthy. This is only one step in what is called integrated pest management (IPM).

This approach, along with other techniques, manages pests in an economically viable and environmentally sound way.

Another aspect of IPM is knowing the economic threshold—the amount of damage or insects that must be present before you need to take other measures, such as using chemicals. This threshold is essential in making decisions about pest control. Encouraging beneficial insects in your garden can help to keep pests below the economic threshold, allowing you to have a healthy, happy garden all year long. Visit Extension for links to IPM resources: gardening.ces.ncsu.edu/integrated-pest-management/.

—Hanna Pettus



Lady beetle
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