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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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Fall Color: The Last Big Hurrah

What does a gardener look for when planning a landscape? Flowers, texture, growth habit, and size (let's hope), growing needs such as sun or shade, deciduous or evergreen plants, and many other characteristics. But many gardeners never consider the fall characteristics of the trees and shrubs they plant. Everyone wants that "wow" look for the spring with hopes that the landscape will continue to be pleasing as the growing season progresses. But by the time fall arrives, gardeners are very often tired of the challenges of the summer and don't give much thought to what a great fall landscape might look like. It's a shame because fall is the last big hurrah of the growing season.

Many great plants are readily available with fall attributes that are truly amazing. A perfectly nice and respectable tree or shrub can all of a sudden become the star of the show when fall arrives. Look at the beautyberry (*Callicarpa americana*), a nice-looking shrub but sort of ordinary until those massive clusters of bright-purple berries appear. Then everyone wants to know what it is and where you got it—the greatest compliment for a gardener! There are as many different viburnums as there are aphids on a rosebud. And aside from their fragrant flowers in the spring, many viburnums take a second bow when fall rolls around. Their fall foliage is striking and bold—an absolute asset to the fall landscape. Many of our maples are fall stars also, as are chokeberry, Virginia sweetspire, oakleaf hydrangea, smoketree, sweet autumn clematis, and fothergilla.



Beautyberry (*Callicarpa americana*).
©Forest and Kim Star, CC BY2.0



Ginkgo tree (*Ginkgo biloba*). ©Maxmaria, CC BY-NC-ND-2.0.



Oakleaf hydrangea (*Hydrangea quercifolia*). ©K M, CC BY-2.0.

Many perennials also wait for the fall to do their best. Let's not forget the gazillion heucheras that have become garden staples with their brightly colored leaves. Russian sage, many of the rudbeckias, lavender, butterfly bush, hardy ferns, perennial sages, cosmos, hardy mums, and countless others give the fall garden a second chance, reveling in the cooler temperatures and gentler rains.

But, perhaps, the king (or queen) of all the fall showoffs is the ginkgo tree (*Ginkgo biloba*). The ginkgo is a massive tree growing up to 80 feet high with brilliant, golden-yellow leaves and not necessarily suited to all home landscapes. But with the introduction of the 'Goldspire' ginkgo, with its columnar growth habit and a mature height of 16 feet with a 5-to-6-foot spread, most anyone can now have a ginkgo in their fall collection.

There are many more plants that will add fall beauty and interest to the home landscape. With a little research the gardener can put some fireworks in the garden before winter arrives.

Extension Showcase

Rhubarb production trial

Strawberry growers have long been interested in growing rhubarb as a companion crop. Rhubarb is traditionally grown as a perennial, but in the NC piedmont's warm climate, it does not perennialize well.

Agents from Alexander, Cabarrus, Caldwell, Catawba, Davidson, Davie, Iredell, and Rowan counties conducted a production trial on rhubarb as an annual at the Piedmont Research Station.

Rhubarb was planted on a plasticulture system to mimic the system used by local strawberry growers. Ten-week-old transplants of the variety 'Victoria' were planted in late September on black, white, silver, and red plastic, with a bare ground row as the control. Four growers were provided 200 rhubarb plants as a trial as well. Harvests were conducted from April through May.

The rhubarb plants were harvested based on U.S. Department of Agriculture grading standards. One-pound bundles were assembled and numbered per row (white, silver, bare, red, and black). Growers were instructed to keep all pertinent cultural management information, harvest weights, and price records.

A workshop was held on May 22 with 30 participants. Some 598 pounds of rhubarb were harvested at the Piedmont Research Station. The average price at farmers markets for rhubarb is \$5 per pound, for a projected profit of \$2,990.

Preparations are underway for a third trial for 2018 through 2019 with plans for testing three additional varieties.

—Lauren Hill

Smart Gardening: Saving seed



Scoop out tomato pulp to save seed for next year.
©Chiot's Run, Flickr.com, CC BY-2.0.

Fall is the perfect time to begin saving seed for next year's garden. This is easy, fun, and can save money. Only save seeds from varieties that breed true to type year after year with little to no variability. These are called "open-pollinated varieties." Do not collect seed from hybrid varieties because the seed may produce fruit that is very different from the fruit you remember eating the previous year.

There are easy crops from which to save seed and those that are more difficult. Peas and beans are easy. These crops self-pollinate but can be cross-pollinated by insects. Therefore, each different variety of pea or bean should be separated by at least 10 feet if you want to save seed. Once the pods begin to dry out, you can collect them and let them further dry for one to two weeks. When the pods have completely dried, remove the shell and collect the seed. It's that easy.

Many individuals like to collect tomato seeds each year. Tomatoes are a little more difficult to collect, but not the most difficult. You'll need to keep 20 to 30 feet between varieties so that cross-pollination does not occur. Harvest the tomato when it is mature, and scoop the pulp out into a cup. Then add some water and let the pulp sit for a few days. Once the seeds have settled, pour out the pulp and place the seed on a paper towel to dry. For more information on saving seed, contact your local Extension center.

—Brad Thompson



Garden groups can construct an inexpensive handwashing station with a water jug that has a spigot (sanitized with a solution of 2 tablespoons bleach to 1 gallon of water), a bucket to catch wastewater, soap, and a paper towel dispenser. ©M. Gregory

Food Production: Food safety

Food safety practices prevent pathogens from entering the garden or contaminating the harvest. School and community gardens should take extra precautions to ensure that it's safe for children to be in the garden and eat the produce it yields. Here are the basics: safe site, safe water, safe soil amendments, clean hands, and no animals. Locate gardens away from or on higher ground than contamination sources such as animals, compost bins, or flood-prone areas. It's best to use a treated water source that meets drinking water standards. If you use another source, such as a rain barrel, test for generic *E. coli* bacteria (see tinyurl.com/GAPNC-WaterTesting). To reduce water and soil splash, water at the base of your plants using drip irrigation or a watering-wand. Legume cover crops, plant-based composts, and commercial organic fertilizers are all good options with very low risk of microbial contamination. Raw manure should not be used in school and community gardens, or put in backyard compost piles, due to the risk of pathogens. Composts made with manure from herbivores (such as cows) can be used safely if the composting process meets state standards, which

ensure that all parts of the pile exceed 130°F for five days. Before harvesting, gardeners should wash their hands with soap and clean running water. Garden groups can construct inexpensive handwashing stations to encourage this practice (see tinyurl.com/HandwashingStations). Be sure to place produce in clean containers. Use fencing to keep out pets and wild animals. All animal manure can carry pathogens, and feces of cats and dogs may have dangerous parasites such as *Toxoplasma* species. Pets can also carry and shed pathogens such as *Salmonella* bacteria, so it's best to keep pets out of contact with food-producing plants.

—Megan Gregory

Pest Alert: Powdery mildew on cucurbits

Fall ushers in not only cooler weather and shorter days, but also some of the season's best cucurbit crops. These crops include squashes such as butternut, patty pan, spaghetti, zucchini, and yellow, as well as cucumbers and, of course, pumpkins. The fall also provides the perfect environment for a devastating disease called powdery mildew. For many, this is not a new disease and one some folks have seen through the summer on squash, cucumber, melons, and watermelons.

Powdery mildew is caused by the fungal pathogens *Podosphaera xanthii* and *Erysiphe cichoracearum*. This mildew affects all cucurbit crops grown in North Carolina. And, like many diseases, it prefers a particular environment. Powdery mildew prefers temperatures that range from 68°F to 80°F, humidity that ranges from 50 to 90 percent, and low light due to a dense foliage canopy. This is the exact environment found in North Carolina during the fall, which is why this disease is such a problem for cucurbits grown now.

Powdery mildew is spread by the wind and can travel for long distances. It is identified by white, powdery spores found on the leaves, branches, and stems of cucurbits. Once you see this identifying characteristic, the next step is treatment, which leads to, "How do I control this disease? Consider the old sports saying that "Sometimes the best offense is a great defense." That adage offers a good way to manage this disease. It's best to defend the plant early in the season by using good cultural practices, such as planting resistant cultivars, proper plant spacing, and removing weeds and debris from the field. Fungicide application will be the most effective control method, but fungicide use can be limited by using good cultural practices. For more information on powdery mildew on cucurbits, contact your county Extension center.

—Brad Thompson

Lawns: Understanding turf seed labels

Fall is the perfect time to start thinking about yard renovations. Here are a few hints to help you get the best seed for your money. North Carolina's "seed law" sets minimum standards for labeling, processing, and selling seeds. Not all seeds are equal, however, even if they follow the seed law. Adherence to this law only guarantees the bag or package of seed meets the claim on the label, so shop around and compare labels. Labels MUST include the following:

- Variety: Cultivar name, species and common name
- Lot Number: Letters or numbers for tracking purposes
- Origin: Where seed was grown
- Net Weight: How much material is in the container
- % Pure Seed: Percentage of actual "desired" seed
- % Inert Matter: Percentage of plant debris or other materials that are not seed
- % Other Crop Seeds: Percentage of nonweed seeds
- % Weed Seeds: Percentage of seed from weed species
- Restricted Noxious Weed: Two types of seed—Restricted seeds are listed as number of seeds per pound. Prohibited seeds include species that are not allowed.
- % Germination: Average percentage of seed that will germinate
- Germination Test Date: Should be within 12 months of the planned date for using
- Name and address of the company responsible for analysis

Purchase seed based on the percentage of Pure Live Seed (PLS), which you will use to calculate the amount needed for planting. To determine PLS, multiply % Pure Seed by % Germination and divide by 100. To determine the bulk seed needed per acre, divide the recommended pounds of PLS per acre by the percentage of PLS. Seed inspectors visit dealers regularly to spot-check seeds. During checks, samples are taken and analyzed for accuracy. Discrepancies between samples and labels result in "stop-sale" notices issued until the seed meets label claims. For more information or if you have questions, contact your county Extension agent.

—Jamie D. Warner



Powdery mildew on a cucumber leaf.
©Dr. Lina Quesada-Ocampo, NC State University Vegetable Pathology Lab

Tips & Tasks

Get a jump on fall garden seeding

Due to the dry heat of summer and size of cool-season crop seeds, direct seeding can be a challenge for getting the fall and winter garden planted. Here are a few tips to help you get that early start on fall.

- To beat the heat and stress of late summer, try covering your shallowly sown seeds with a length of board. Soak the ground well, and cover with the wooden board for four to five days; then remove the board. This will shade the seeds, keeping them cooler and retaining moisture.
- Another gardening technique is called "fluid seeding" where seeds are sown in a protective gel. Blend 2 tablespoons of cornstarch into a cup of warm water, then let cool. Add seeds or pre-sprouted seeds to the gel. Put the seed gel in a plastic bag and cut the corner off so you can squeeze the gel into rows or holes in the garden soil.
- Fall and winter gardening requires a bit of patience. That shorter day length affects growing times. So, allow for about twice as much time for germination and maturity than you would for spring plantings.

Don't let the end of summer dampen your gardening plans. Get out there and grow!

—Dustin Adcock

Volunteers seeding a fall vegetable garden.
©NC State University



Helping You Grow

Need tree work done? Call an arborist

We get a lot of questions in our office about trees, everything from why a tree is dying to how it should be pruned. There are times when clients need help pruning a tree or determining if it is a hazard that should be removed. While Cooperative Extension is a great resource for research-based information, there are some things we just can't do. One of them is going out and pruning trees for clients, especially big trees. And even if a tree is in danger of falling, we can't go out to someone's yard and cut the tree down. In Extension, though, we are about finding the answers. If we can't provide the solution, we find someone who can. One of the resources that we rely on when it comes to trees is a list of certified arborists.

Certified arborists get their credentials through the International Society of Arboriculture (ISA) and are qualified professionals who can do everything from fertilizing to applying pesticides, to pruning or taking down a tree, to testing the integrity of the heartwood to see if the tree is in danger of falling unexpectedly. You can call your county Extension center for a list of arborists, or you can find them using the search function on the ISA website: treesaregood.org/findanarborist.

How to Hire a Tree Care Professional (NC State Extension publication AG-691) provides more information.

—Hanna Smith

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Plant Watch: Butternut squash

What welcomes cool days more than a savory soup? One delectable soup base you can grow in the garden is butternut squash, which can be planted in the spring and again in midsummer for a fall harvest. This squash is considered a healthy powerhouse option, loaded with vitamin C, beta-carotene, and fiber. It grows easily when seeded directly in the ground with two to three seeds per hill. One plant can yield four to five fruits, each weighing up to 5 pounds, in just 90 to 100 days. This winter squash stores well but should not be harvested until it has become a dull-tan and you cannot indent the rind with your fingernail. Storage temperatures around 50°F and low humidity will increase shelf life up to three months. You can also enjoy butternut squash roasted or pureed.



Butternut squash makes a delectable soup.
©Veronique, CC BY-SA-2.0.

—Mack Johnson



Crunchy kohlrabi tastes sweet. ©Anita Martinz, Klagenfurt, Austria, CC BY-2.0

Incredible Edibles: Kohlrabi

Sometimes called "stem turnip," this old-time vegetable is unfamiliar to many gardeners. A fast-growing member of the Brassica family, kohlrabi can be grown in the spring and fall. Its unusual growth habit makes this vegetable an eye-catching specimen for the kitchen garden. The edible portions of the plant are the swollen stem just above the soil level and the small leaves with long petioles that sprout out of the top of the bulb. Harvest bulbs that are 2 to 3 inches in diameter while the flesh is tender and sweet. The crunch of raw kohlrabi is a great addition to a crudité plate or salad. Kohlrabi tastes similar to cabbage and can also be enjoyed lightly steamed or roasted.

Use transplants for spring gardens and direct-seed eight weeks before the first frost for fall gardens. Kohlrabi benefits from a rich organic soil. Keep the soil moist over the growing period to ensure tender flesh development. Plant four to five plants per person to supply plenty of delicious and nutritious kohlrabi for your table.

—Mary Jac Brennan

Sustainability: Herbicide residue

If your tomatoes and beans have curling, cupped, and stiff leaves, they may have been exposed to tiny amounts of residual herbicide from the compost, manure, or straw you added to your garden. Certain herbicides used to kill broadleaf weeds in pastures can break down slowly and cause problems for home vegetable growers. Laboratory analyses for herbicides are expensive, but you can do your own "bioassay" to determine if your compost contains any residual herbicides. Take six 4-inch pots and fill three with commercial potting soil. Fill the other three with half potting soil and half compost (or manure). Make sure your compost or manure is a mix from random places within the pile to ensure a representative sample. Plant bean seeds if it's summer time or pea seeds if it's cool weather. Three seeds per pot is sufficient. Water and let them grow until they have at least three sets of true leaves. If you see abnormal leaves on the plants grown in the compost mix but those grown in the potting soil are normal, you are likely to have trace amounts of herbicide in the compost. If both groups are normal, other causes for leaf curl and cupping can include herbicide drift, insect damage, or viral infections. For more information on this bioassay and what to do if you have residual herbicide in your compost, see content.ces.ncsu.edu/herbicide-carryover.



Curling leaves? Bioassay for herbicides.
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—Jeanna Myers