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NC Extension Gardener
Handbook

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

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Outsmart the Weeds in Vegetable Gardens

With warm weather and rapid weed growth, many vegetable gardeners are reaching for hoes and spading forks. Gardeners can save labor by understanding weed life cycles and eliminating conditions that encourage weed growth (such as bare soil with excess nutrients). To outsmart the weeds in your garden, include practices in three categories of weed management:

1. Exclude weed seeds and propagules. Avoid bringing weeds into your garden by using only finished compost that has reached 140°F for a week or more, by using seed-free straw (rather than hay) for mulch, and by cleaning tools and equipment.

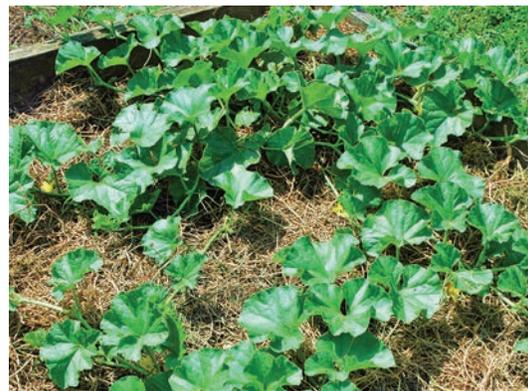
2. Use cultural practices to keep the soil covered and favor crops over weeds. Practice crop rotation. Vary when you till and plant because tillage stimulates weed seeds to germinate. To prevent summer annual weeds, establish an early spring crop. To prevent winter annual weeds, establish a long-season summer crop.

Grow vigorous vegetable crops and manage them to outcompete weeds. Use ideal planting dates and transplants to help crops grow quickly and shade the soil. Test your garden soil and apply only the nutrients you need for healthy crops, as excess nutrients will encourage weed growth. Use drip irrigation or water at the base of your crops. Avoid watering between rows.

Include cover crops in rotations. Cover crops are sown between cropping cycles to enrich the soil and suppress weeds (go.ncsu.edu/FCGHealthySoil). Once cover crops are cut down, the shoots can



To prevent summer annual weeds from germinating, establish an early spring crop and avoid tilling in late spring. ©Alison Hancock, bigstockphoto.com, 68483539



Food crops, such as these melons, can be transplanted through the chopped shoots of a mature cover crop (without tilling). The shoots dry and form a mulch that continues to suppress weeds. ©M. Gregory

be used as mulch around crops. Here are some tips on using cover crops to suppress weeds:

- Plant summer cover crops (such as millet and cowpea) in May or June to outcompete summer annuals and prevent germination of winter annuals.
- Plant overwintering cover crops (such as rye and hairy vetch) in the fall to outcompete winter annuals and to prevent germination of summer annuals the following spring.
- Cover crops can also suppress creeping perennials like bermudagrass or nutsedge. Till the soil to fragment the weed, remove as much as possible, and follow with a thick seeding of the cover crop.

3. Use mechanical practices to block weed growth and kill weeds at critical times. Use mulches to deprive weeds of light. In vegetable beds, straw or cover crop residue can control annual broad-leaf weeds. In paths, landscape fabric topped with wood chips can suppress bermudagrass.

Use hand-weeding, hoeing, or shallow tillage sparingly. Attack weeds when they are small enough to be killed by hoeing or shallow tilling. Avoid deep tillage, which brings weed seeds to the surface and damages soil structure.

For more information on weed identification and management, visit go.ncsu.edu/FCGWeedMgmt. With thoughtful planning, you can outsmart the weeds in your vegetable garden.

—Megan Gregory

Extension Showcase

Vegetable gardening 101 in Harnett County

Earlier this spring, Harnett County Cooperative Extension and Extension Master Gardener Volunteers (EMGVs) taught a “Vegetable Gardening 101” workshop for home gardeners. Nearly 50 participants from Harnett and surrounding counties improved their knowledge of site selection, garden design, soil fertility, planting calendars, pest identification, and integrated pest management strategies.

EMGVs demonstrated vegetable planting and irrigation methods with their newly installed raised demonstration beds. As a result of the workshop, over 75 percent of participants indicated they would start a vegetable garden and produce food for home consumption. The workshop also addressed the history and impact of Victory Gardens in the United States during World Wars I and II, which celebrated their 75th and 100th anniversaries this year, respectively.

For more information about vegetable gardening, see the NC State Gardening Portal (gardening.ces.ncsu.edu/) and the vegetable gardening chapter of the new *NC Extension Gardener Handbook* (content.ces.ncsu.edu/extension-gardener-handbook), or contact your county Extension center.

—Matt Jone

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Smart Gardening: Water-wise gardening



Drip irrigation efficiently targets the root zone.
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Water is one of our most precious natural resources. Here are some ways to conserve water when gardening. Adding a layer of 1 to 2 inches of organic matter and tilling it to a depth of 6 to 8 inches will increase the water-holding capacity of the soil, especially in sandy soils. Organic matter will also improve clay soils by decreasing compaction. Compost is not the only form of organic matter available. You can apply grass clippings if weeds haven't seeded out in them. Old hay, peat moss, and composted manure can also be used as mulches. But be careful as these materials may be contaminated with residual herbicides.

Overhead irrigation is an inefficient way to water, with evaporative losses of up to 40 percent on a hot, sunny day. On a windy day, evaporation losses are even greater. Applying water faster than the soil can absorb causes unnecessary runoff. Soaker or weeping hoses will deliver the water at a slow rate directly to the soil. In addition, using soaker hoses keeps foliage dry, reducing the likelihood of infection by fungal and bacterial pathogens. By grouping plants together with similar water requirements (hydro zones), you can more efficiently target the areas that need irrigation. Weeding reduces competition for water, sunlight, and nutrients, allowing desirable plants to grow more vigorously. Watering plants on an as-needed basis rather than on a regular schedule can prevent overwatering and encourages plants to develop deeper root systems. Applying 2 to 3 inches of mulch over the root zone keeps the soil cooler, retains soil moisture, and reduces weeds. Watering early in the morning or during the cool of the day reduces water loss to evaporation.

—Mack Johnson

Food Production: Pollination of cucurbits

The family Cucurbitaceae includes some of our favorite garden plants: cucumbers, watermelons, squashes, gourds, and pumpkins. Cross-pollination of crops in this family is required because they are monoecious, meaning they have separate male and female flowers on the same plant. The male flowers have slender peduncles (floral stalks), while female flowers have prominent inferior ovaries below the perianth that resemble the shape of the eventual fruit. Cucurbit flowers are short-lived. The flowers open a few hours after sunrise and close by midday, leaving a small window of opportunity for pollination. Cucurbits are primarily pollinated by insects, with bees being the most productive and efficient pollinators. Without insects, the only way to set fruit is by hand pollination.



Female cucurbit blooms must be pollinated to produce fruits.
©Elsa Youngsteadt, CC-BY-NC 4.0

If incomplete pollination occurs, the fruit may turn brown, shrivel up, and abort. In some cases, fruit development will occur but produce stunted, misshapen fruit with incomplete seed formation. There are a few things you can do to help combat poor pollination. Since bees are the main pollinators for cucurbits, try to make a bee-friendly environment. Incorporate some bright native flowers into your garden to help attract the bees. Use pesticides with caution, and avoid application from about 9:00 AM to 4:00 PM, when bees are most likely foraging. Spraying pesticides in the evenings when plants are not flowering is best. Do not overuse nitrogen when fertilizing, which will promote excessive foliage at the expense of blossom formation. If there is a lack of pollinators around the garden, try pollinating the crop by hand. When both male and female flowers are present, cut the male flower from the plant. Remove the petals to expose the pollen on the male flower and simply rub pollen onto the stigma of the female flower. The preferred method, of course, is to let nature pollinate your crops.

—Victoria Neff

Pest Alert: Fall armyworms are marching

Armyworms are caterpillars that are approximately 2 inches long and have dark heads with a pale but distinct inverted “Y” on the head. They typically arrive in North Carolina by mid-June. As juvenile caterpillars mature, feeding damage becomes more noticeable and the caterpillars start to march very quickly across lawns, leaving in their wake dead patches of brown turfgrass.

Monitor lawns in early morning and late evening and inspect outer margins of the green areas of turf where you will likely find caterpillars feeding. Even though this pest can be destructive, preventive applications of pesticides are not recommended. Detected early enough, established lawns will recover without intervention.

Organic products can effectively treat and control early populations of armyworm. Insecticides with the active ingredient spinosad, azadirachtin, or *Bt* (*Bacillus thuringiensis* subsp. *kurstaki*) are effective when armyworms are small. *Bt* is most effective when applied in late evening.

Synthetic insecticides may be necessary if the problem is not caught early enough or the armyworms have escaped natural controls. Pesticide applications are more effective if you mow the lawn and irrigate lightly just before treatment. Rain just before treatment also increases effectiveness. To minimize harm to pollinators, never apply insecticides when plants (including weeds) are in flower. Once armyworms have reached 1-inch to 1.5-inch long, no insecticides will successfully treat these pests.

—Sam Marshall



Fall armyworms leave behind patches of dead turfgrass. @Sam Marshall

Lawns: Good cultural practices

According to a 2014 U.S. Bureau of Labor and Statistics poll, the average American spends almost three hours per weekend caring for a lawn. Some people take pride in their lawns and enjoy the work, but many consider lawn work a despised chore. Twenty percent of those surveyed said that mowing the lawn was their least-liked chore. One of the best ways to streamline lawn care is often one of the most overlooked—cultural practices. Cultural practices are methods used to enhance lawn health to prevent or mitigate weed, pest, and disease problems without using chemicals. Research has demonstrated that a vigorous and healthy lawn has fewer weeds, diseases, and pests, which means less time spent on lawn care.

Sample lawn soils every two to three years to ensure proper pH and that fertility needs are being met. Apply lime and fertilizer at recommended rates and times. Fertilize centipede grass in June. Apply split applications of fertilizer on bermudagrass in May, June, July, and August. Zoysiagrass should have split applications made in April, June, and August. Do not overfertilize, as this could lead to grass injury and weed encroachment. If soil test results recommend lime, apply in the fall because the lime treats the soil, not the grass, and takes time to raise soil pH to appropriate levels.

Mow at the recommended height for each turf species to assist with weed and disease control. Mow centipede to 1 inch. Mow bermudagrass and zoysiagrass to 0.75 inch to 1 inch. Keep grass cut close, but don't scalp the soil. Irrigate in the morning hours to supplement a lack of rainfall. Applying half an inch of water every third day will help the lawn establish a deep root system that will withstand the summer heat and drought periods.

By implementing these cultural practices, you should have a healthier lawn, and spend less time on the weekend tending to lawn chores. For more information, ask your county Extension agent about species-specific lawn maintenance calendars.

—Brad Hardison

Tips & Tasks

Summer food production tips

- Keep your vegetable garden well-watered in the heat of the summer. Vegetable crops need the equivalent of 1 inch of water per week, provided by rain or supplemental irrigation. Apply about a third of an inch every third day in sandy soils. Water heavier soils once or twice per week. Water enough to wet the top 6 inches of the soil.
- Blossom-end rot is a common physiological disorder of tomatoes. While the observed tissue collapse at the end of the fruit is nominally caused by insufficient calcium in the developing fruit, the disorder is ultimately brought about by fluctuations in the water supplied to the plant. Therefore, consistent watering is the key to preventing blossom-end rot.
- Rabbiteye blueberries ripen from about mid-June to mid-August. Pick berries every 7 to 10 days. Remove all ripe berries, but to reduce the chance of fruit rot, avoid picking if the berries are wet.
- Blackberries are ripe once they turn their characteristic purple-black color. If you prefer sweet berries, wait to pick until the berries lose their waxy luster. But if you prefer tart berries or wish to store them in the refrigerator, pick them when they are black but still shiny. Prune and remove all fruiting canes after harvest is complete.

—Matt Jones

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Helping You Grow

NC Extension Gardener Handbook

go.ncsu.edu/eg-handbook

Used as a textbook in the Extension Master Gardener Volunteer course, the *North Carolina Extension Gardener Handbook* is a national-award-winning, authoritative resource on gardens and landscapes in the Southeast.

The wealth of information will benefit new and experienced gardeners alike and covers an array of topics—from soils and composting to managing diseases, pests, and weeds.

Advice on garden design, preparation, and maintenance encompasses all types of plantings, including lawns, ornamentals, fruits, trees, and containers.

High-quality color photographs and graphics, case studies, and frequently asked questions augment the information.

Written by a team of the state's leading agriculture and life sciences researchers and educators, this is an essential book for serious gardeners in North Carolina and the Southeast.

The information contained in this book is available in an open access format at go.ncsu.edu/eg-handbook.

A printed copy will soon be published by NC State Extension (ces.ncsu.edu) and distributed by the University of North Carolina Press (uncpress.org).

—Lucy Bradley

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Plant Watch: Ninebark—a native alternative to barberry



Physocarpus opulifolius
'Little Devil'
©Paige Patterson

Many landscapes include cultivars of barberry for its purple, maroon, and gold foliage colors. Barberry is being spread by birds into natural areas such as national forests, pastures, and unmanaged urban areas. You may not notice the plants at first because the colored foliage characteristic is not passed on when barberry is grown from seed. It must be vegetatively propagated to maintain foliage color. Cultivars of the native ninebark (*Physocarpus opulifolius*) offer great alternatives for USDA Zones 2 through 8. Ninebark is tolerant of wet and dry soil conditions. Plant in full sun for best foliage color and in afternoon shade in Zones 7b through 8.

—Paige Patterson

Cultivar	Height (ft)	Width (ft)	Foliage Color
'Summer Wine'	5 to 6	5 to 6	deep burgundy
'Coppertina'	8 to 10	6 to 8	copper tinted
'Center Glow'	7 to 8	8 to 9	red wine, lime accents
'Diablo'	8 to 10	8 to 10	reddish purple
'Little Devil'	3 to 4	3 to 4	deep burgundy

Incredible Edibles: Okra offers taste *and* beauty

Abelmoschus esculentus, also known as okra, is best known for its wonderful taste. But okra can also be grown for its beauty. Okra pods can be green, purple, or red. The leaves, flowers, and seeds are all edible. Many chefs are creating innovative ways to use okra. The younger or newer okra greens can be cooked for consumption similar to beet or dandelion greens. Seeds can be ground and used as a naturally caffeine-free coffee substitute. The beautiful creamy-yellow flowers should not go to waste. The flower is similar to that of hibiscus. Gardeners can mix okra flowers with okra fruits for gorgeous floral arrangements.

—Cyndi Lauderdale, Skylar Pinno, Madison Barnes



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Sustainability: Managing the forest in your yard

The trees on your lot are less demanding than a bed of roses, but trees will definitely benefit from time and attention. Tending your trees will allow you to continue enjoying their many benefits (including shade and bird habitat) for many years to come. A good starting point is to make a thorough assessment. If you live on a wooded lot, for example, there is a good chance that the

trees would benefit from thinning. As with the seedlings in your garden, this is a process of removing weaker trees so the stronger ones have more room to grow. Be on the lookout for non-native invasive plants, such as English ivy, Chinese privet, paulownia, and ailanthus, and make plans to eliminate them. It's also wise to make at least a cursory inspection of each tree's health. Look for mushrooms on the trunk, dead limbs, rotting wood, and leaning trunks. If you notice any of these conditions, or others that raise a question, consider hiring a certified arborist to conduct an assessment. In fact, for trees close to the house, a routine assessment is wise because hazardous defects in the trunk and root system can be hidden from view. If space allows, consider enhancing your urban forest by adding native understory trees and shrubs that will benefit birds and pollinator insects. Good candidates include redbuds, fringetree, dogwoods, native azaleas, native viburnums, serviceberry, and New Jersey tea.

Visit ncsu.edu/goingnative for more details.

—Paul McKenzie



Enhancing your urban forest will improve the habitat for birds, such as this summer tanager.
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