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Fertilizing Responsibly

By Susan Martin | July 2016-Vol.2 No.7

The home gardener can choose between organic fertilizers and synthetic, or chemical, fertilizers. But before even considering these decisions, we must first ask a more basic question: does our soil actually need fertilizing? The only way to get that answer is to **test the soil.**

What the Soil Needs

In addition to **nitrogen, phosphorous and potassium (N-P-K)**, there are 13 other elements essential to

plant growth. N-P-K are considered macronutrients because plants usually require them in larger quantities. Calcium, magnesium and sulfur are secondary macronutrients but are usually either present in sufficient quantities in the soil or are added coincidentally with other materials (e.g., lime). The other 7 nutrients are called micronutrients because they are needed in very small quantities and most soils contain sufficient supplies.

Easy-to-use soil testing kits are available from the Piedmont Master Gardeners at the Virginia Cooperative Extension office. A routine soil test will provide results for soil pH plus plant-available levels of P, K, Ca, Mg and various micronutrients. Soil testing for nitrogen has limited use because the nitrogen level constantly changes in response to soil organic matter additions, soil microorganism activity, temperature, moisture levels, leaching, and nitrogen consumption by plants and other soil life. These soil tests will also provide recommendations of what could or should be added to your soil to get it to acceptable levels if needed.

Fertilizer and Compost

There are two important ideas to consider at this point: First, f**ertilizer**, although commonly referred to as plant food, **is not really food.** Fertilizer provides the nutrients necessary for plants to produce their own food. The three macronutrients, N-P-K, all play distinct roles: nitrogen is essential for plant growth; phosphorous helps with root formation, cell division, flowering and other functions; and potassium helps plants regulate water and use sunlight to make food. Second, **compost is not considered to be fertilizer.** Although compost may contain a small amount of nutrients, they are generally not readily available to plants.

If compost is not fertilizer, why is it considered so important?

Compost, along with other organic matter, improves the capacity of soil to hold nutrients. Although compost will add some amount of nutrients, its main function is to condition the soil through a complex process called cation exchange capacity or CEC. Very simplistically put, this process describes the relative ability of soils to store a particular group of nutrients. In addition, compost attracts worms, thus indirectly providing nutrients for plant use; earthworms and other organisms digest the organic matter, producing nutrient-rich castings, or excrement. Compost also increase bacterial and fungal activity, particularly the mycorrhizal fungi, which makes other nutrients more available to plants. (For more information on mycorrhizal fungi, see Mycorrhizae Part I and Mycorrhizae Part II in *The Garden Shed*.) Adding organic material to the soil increases its ability to hold water; improves the physical structure of the soil; reduces erosion from water and wind; decreases compaction and crusting of the soil; and raises soil pH. Organic matter helps soil particles bind together into aggregates, or clumps, which makes it much easier to work the soil. This soil quality is referred to as ***tilth***. Studies have also indicated the possibility of reduced soil-borne pathogens in soil that has been amended with organic matter.

Gardeners often refer to compost as *black gold* because of its contribution to enriching the soil, but this enrichment is not achieved in one application or even several. Compost should be added to the soil on a regular basis as part of a long-term, soil-building program. **The goal in soil management is to increase the organic content to 4-5%, over a period of years.** For those new to composting, or for those who wish to remind themselves of composting guidelines, see an excellent article in *The Garden Shed* on making compost.

If you purchase compost, be aware that the term *compost* is not regulated, so a wide range of products can be marketed under that name and can vary considerably in quality. Purchase from a provider whom you trust. Also, make sure that the compost is mature. If immature compost is added to the garden, its bacteria compete with plants for nitrogen in the soil.

Let’s assume that you have decided to add compost to your garden on a regular basis. How much should you

add? Fortunately (according to guidelines provided by Cornell University), mature composts can be used in most planting situations without serious concern for precise amounts. As a general guideline, to apply 1″ of compost over a 10′ by 10′ area, you'll need about 8 cubic feet or about 300 lbs. of compost. Compost in planting beds for perennials is often applied at a rate of 1-2″ incorporated into the soil about 6-8″ deep. To use compost as a landscape mulch, apply 1-3″ deep over the soil. For top-dressing an established lawn, spread a light layer of about ¼" at a time, so as not to smother the grass. For new lawns, apply 1-2″ of compost, and incorporate into 5-7″ of soil, with a final volume of about 30% compost.

What about organic fertilizers other than compost? The term organic as applied to fertilizers means that the **nutrients contained in the product are derived solely from the remains or by-products of once-living organisms.**

Plant-tone and Hollytone are organic, granular fertilizers. Cottonseed meal is a by-product of cotton manufacturing. Formulas vary slightly but generally contain 7% nitrogen, 3% phosphorus and 2% potash. Cottonseed meal is frequently used for fertilizing acid-loving plants, such as azaleas, camellias and rhododendrons**. Blood meal** is dried, powdered blood collected from cattle slaughterhouses. It is a rich source of nitrogen, and it supplies some of the essential micronutrients, including iron. **Fish emulsion**, a well-rounded fertilizer, is a partially decomposed blend of pulverized fish. The odor is intense but dissipates within a day or two. Although organic, these fertilizers add nutrients but do not condition the soil.

Manure is a complete fertilizer (i.e., it provides nitrogen, phosphorous and potassium) and **also conditions the soil.** Manures differ from each other because of their source (horse, cow, poultry), their age, how they were stored, and animal bedding material which may be mixed in. Manure with straw will have a different nitrogen component than pure manure and the rate of nitrogen release may be slower in manure with bedding due to the higher carbon content of straw. You should inquire about whether the animal bedding was treated with pesticides and/or herbicides. Fresh, raw manure or "hot" manure activates and builds up soil microbial activity to the extent that the nutrients could volatilize or burn up before plants use them. Fresh manure can also damage plant tissue, kill seedlings and contain weed seed. There is also a low chance of pathogenic bacteria such as E.coli, Listeria or Salmonella. It is recommended that composted manure be used rather than raw manure. Composted manure should be applied in the fall or after harvest. Try to leave it on at least 120 days before harvest of a crop.

Using **sewage sludge**, now branded as *biosolids*, as fertilizer on food crops is a hotly debated food safety issue, although most consumers are not aware of the debate. Milorganite is a well-known brand of sewage sludge. One of the main objections is the presence of heavy metals, such as cadmium. Another serious objection is that more study is needed to understand how the contaminants found in sewage sludge, even at low levels, will affect the environment and human health over the long term.

Another source of organic soil improvement is the **cover crop**, **also called green manure.** Cover crops, such as annual rye, ryegrass, and oats, are planted in the garden in the fall. Sow seed about one month before the first killing frost. Till under in the spring at least two weeks before vegetables are planted. Cover crops provide additional organic matter, hold nutrients that might have been lost over the winter, and help reduce erosion and the loss of topsoil. Legume cover crops can increase the amount of nitrogen in the soil. Deep-rooted cover crops can grow for a season in problem soil to help break up hardpan.

Finally, there are some **cautions to consider when using organic fertilizers.** In general, organic fertilizers release nutrients over a fairly long period. A study at Virginia Tech comparing organic with inorganic fertilizer determined that organic fertilizer is the better choice for conditioning the soil. However, because organic fertilizers are slower acting than synthetics, they may not supply plants with nutrients quickly enough for best growth. Because organic fertilizers depend on soil organisms to break them down to release nutrients, most of them are effective only when soil is moist and soil temperature is warm enough for

the soil organisms to be active. Gathering natural materials, such as seaweed, grass clippings and leaves, to add to the compost pile is labor-intensive and time-consuming. Distribution of nutrients in organic fertilizer varies. Organic materials break down at different rates, so the composition and content of organic fertilizer is never consistent. Cost is also a consideration. If organic materials must be purchased, the total cost of the material, transportation, and labor to apply may be significantly more than buying synthetic fertilizer. However, the regular addition of compost, manure, cover crops and other organic materials can raise the soil nutrient levels and improve physical characteristics so that the need for adding synthetic fertilizers is greatly reduced over time.

Now let's consider **inorganic fertilizers**. Inorganic fertilizers such as ammonium sulfate or ammonium phosphate **are often called commercial, chemical, or synthetic fertilizers,** because they go through some manufacturing process, although many of them come from naturally occurring mineral deposits. Synthetic fertilizers are relatively pure chemicals and offer the advantages of predictability and reliability. Formulations are blended with accuracy and you can buy different blends for different types of plants. Fertilizers are identified by the analysis given on the package, which refers to the amount of an element present in a formulation based on percentage of weight. By law, all analyses provide three numbers giving the percentage by weight of nitrogen (N), Phosphate (P_{25}) and Potash (K_20). Although not entirely accurate, many people simply interpret the numbers as N-P-K, nitrogen, phosphorous and potassium.

There are two kinds of fertilizers: quick release and slow release. Quick-release fertilizers, also known as "fast-acting" fertilizers, are water-soluble chemicals that once applied are readily available to the plant. These materials are easily leached with rain or over-irrigation and require frequent application. They are the least expensive fertilizers and are always synthetic products. Slow-release fertilizers, sometimes called water-insoluble types, release nitrogen over time. These products are a little more expensive and include certain synthetic fertilizer products. All natural organic fertilizers are slow release.

Just as with organic fertilizers, there are pros and cons to using synthetic fertilizers. Synthetic fertilizers may contain ingredients that may be toxic to the skin or respiratory system. They must be mixed and measured accurately. If used in excess, they can kill plants. Chemical fertilizers can build up in the soil, causing long-term imbalances in soil pH and fertility. If applied incorrectly, synthetic fertilizers can be detrimental to earthworms because most synthetics use salt formulations. Always follow label instructions.

A Place For Both Organic and Inorganic Fertilizers

The **organic farming movement**, i.e., gardening without synthetic fertilizers and pesticides, has made us very aware of taking a more responsible approach to both agriculture and home gardening. The movement also seems to promote the idea, or at least is interpreted as such in the popular media, that there is a good way to fertilize (organic) versus a bad way (chemical). We need to be aware that organic gardening is not about adding organic fertilizers in some way that equals bags of chemicals. It is a philosophy of gardening that supports the health of the whole system. In an organically managed yard or vegetable garden, the emphasis is on cultivating an ecosystem that sustains and nourishes plants, soil microbes, and beneficial insects.

So, is there any place for inorganic fertilizers? To answer that question, let's assume that we've had our soil tested and the results show that the pH of 8.0 is outside our acceptable range of 6.5-7.5. The amount of P is acceptable but the results show that K is a little low. The organic content is only at about 1.5% as compared to the long-term desired level of 4-5%. What would be do?

The low organic content is a longer-term problem. We'll need to start adding compost or composted manure on a regular basis to improve the soil tilth. That will take some time. But in the short run, we'll need to address the high pH factor by adding some sulfur to increase the soil acidity. Potassium sulfate contains 50%

potassium and 16% sulfate. Since the results for potassium are also low, potassium sulfate would probably be a good choice, following the recommendations from Virginia Tech based on the soil test.

In summary, there is a place in the garden for both organic and inorganic fertilizers, but care must be taken to make sure that each is used responsibly. Organic materials, such as compost and composted manure, should be added to the garden as part of a regular, long-term, soil-conditioning effort. Chemical fertilizers should be used as supplements in direct response to the requirements of a soil test. Each growing season, we learn more about these complex issues and how to follow best practices as responsible stewards in our own home gardens.

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Coreopsis — A Top 10 Favorite

By Patsy Chadwick | July 2016-Vol.2 No.7

If asked to name the top 10 perennials likely to be found blooming in my mid-summer ornamental garden, my list would include *Coreopsis*. Why? There's something profoundly appealing and upbeat about seeing its masses of yellow blossoms scattered throughout the landscape. Commonly known as tickseed (because the seeds vaguely resemble ticks), this native plant is one of the best-selling perennials in garden centers. Its list of attributes is long: in addition to being very attractive, it tolerates heat, humidity, drought, deer, rabbits, and shallow, rocky soil. Bees and butterflies love its nectar. Goldfinches and other small birds love its seeds. It blooms profusely and has a longer bloom time than most perennials. It makes a great addition to container gardens and is a long-lasting cut flower in floral arrangements.

There's only one drawback to *Coreopsis*: It tends to be short-lived and unreliably perennial. Many gardeners complain that it dies out after just two or three years. Other gardeners note that some selections self-seed all over the garden and pop up in unexpected places every spring. Despite these issues, this old favorite continues to be well loved and is widely planted or replanted year after year.

Recognizing both the merits and drawbacks of *Coreopsis*, renowned plantsman Darryl Probst and others instituted a number of hybridization programs to improve the genus. Results of plant trials, most notably a three-year trial conducted between 2012 and 2014 by the Mt. Cuba Center botanical garden in Delaware, confirm improvements made to the species through these hybridization efforts.

With so many extensively hybridized selections on the market to choose from these days, it helps to step back and gain a basic understanding of Coreopsis types and species.

TYPES OF *COREOPSIS*

A member of the *Asteraceae* (aster or daisy) family, the *Coreopsis* genus consists of about 100 annual and perennial species. They are either clump forming or rhizomatous. Most *Coreopsis* species fall into the clump forming category. Unfortunately, these tend to be short lived and some members of this group are best treated as annuals. The rhizomatous species have greater longevity and are more reliably perennial.

A sampling of the clump forming and rhizomatous species of *Coreopsis* often found in garden centers throughout the Mid-Atlantic include:

- ***C. auriculata* (Lobed or Mouse-Eared *Coreopsis*)** – This rhizomatous species has orange-yellow blossoms and oval-shaped leaves. It spreads rapidly by rhizomes as well as seeds and forms creeping clumps that are 2 to 3 feet tall when in bloom. 'Nana', a dwarf cultivar, is half that size and considered one of the best of the genus. Two popular *C. auriculata* cultivars, 'Jethro Tull' and 'Zamphir', have open-ended, fluted ray flowers.
- ***C. grandiflora* (Large-flowered *Coreopsis*)** – This clump-forming species blooms early in the season and repeat blooms throughout the summer. Although not reliably perennial, lasting only 2 or 3 years on average, it has a strong tendency to self-seed and may pop up throughout your gardens as a happy surprise.
  Great for cottage-style gardens, it pairs well with *Echinacea*, *Gaillardia*, *Liatris*, and other "informal" perennials. Some hybrid selections with *C. grandiflora* as one of the parents include 'Early Sunrise' (which is an All-America Selections Winner), 'Sunray', 'Baby Sun', and 'Sundancer'.

Coreopsis grandiflora 'Baby Sun'

- ***C. lanceolata* (Lanceleaf *Coreopsis*)** – This clump-forming species is very similar to *C. grandiflora* with its large 2-1/2" golden-yellow flowers, but it is a little shorter and has lance-shaped leaves that appear mostly just at the base of

the plant. Although it doesn't produce as many flowers as *C. grandiflora*, it is a longer lived species. It blooms in late spring, is more reliably perennial than some of its cousins, and is the most common *Coreopsis* species found growing wild along roadsides. It readily self-seeds and can form sizable colonies.

Coreopsis lanceolata

- ***C. rosea* (Pink *Coreopsis*)** – This is the oddball of the *Coreopsis* family. Whereas its cousins are predominately yellow and prefer average to dry soil, this species has pink flowers with yellow centers and prefers moist soil. Also, it has a rhizomatous growth habit and is reliably perennial in clay-based soils. Like its cousins, it is prone to powdery mildew but the disease is not so obvious on its narrow, ferny leaves. Because of its pink coloration and reliability as a perennial, *C .rosea* is used extensively by hybridizers to broaden the *Coreopsis* color palette.
- ***C. tripteris* (Tall *Coreopsis*)** – Just as its common name suggests, this rhizomatous species is much taller than other members of the genus. Ranging from 4 to 8 feet in height, it produces clear yellow flowers from mid-summer through early fall. It tolerates dry soil but grows taller in moist soil. This aggressive seed sower has a tendency to sprawl and is best used in a wildflower or prairie-style garden setting.
- ***C. verticillata* (Threadleaf *Coreopsis*)** — Referred to in *Armitage's Garden Perennials* as "the tough guy of the group," this rhizomatous species, also called whorled tickseed, has very fine, ferny-looking foliage and strong stems and sports profuse clusters of delicately hued flowers. It typically grows in a dense, bushy 1 to 3 foot tall clump and is reliably perennial even in our clay soils. Award-winning 'Moonbeam', 'Crème Brulee', and 'Zagreb' are included in the long list of cultivars with *C. verticillata* as a parent.

Coreopsis verticillata 'Zagreb'

If you go into any garden center in pursuit of *Coreopsis*, you'll likely be confronted with a huge array of hybridized plants that belong to series or sets. A few of the series are described below. Coincidentally, these four were all developed by master *Coreopsis* breeder Darryl Probst:

- **'Big Bang' Series** — The 'Big Bang' series sets little, if any, seed. They put all of their energy into producing flowers. Some of the plants belonging to this series grow to 24" or taller,

including: ‘Cosmic Evolution’ (creamy white flowers suffused with magenta), ‘Cosmic Eye’ (deep red with golden yellow edges), ‘Mercury Rising’ (large single red flowers), and ‘Galaxy’ (semi-double yellow).

‘Li’l Bang’ Series – This is a sub-series of the Big Bang series and expands the color palette with hues ranging from brilliant white to rosy pink. Members of this series bloom earlier than the Big Bang series.

Coreopsis Li’l Bang ‘Daybreak’

- **‘Ka-Pow’ series** – This series is similar in appearance to the Big Bang series but more compact (up to 20” tall). The large 2-1/2” flowers change colors with the seasons. ‘Ivory’ (cream color flowers blush with magenta in cooler temperatures), ‘Lemon’ (yellow flowers blush red in fall), and ‘Cerise’ (burgundy flowers with paler edges). All have good resistance to powdery mildew.
- **‘Leading Lady’ Series** – This mildew-resistant series consists of three cultivars: ‘Charlize’, ‘Sophia’, and ‘Lauren’. The blossoms are sterile, which means the plants will bloom all summer on 10” to 12” stems and don’t need to be deadheaded. All three bloom in a color that is more true yellow than the species.

In addition to the perennial form of *Coreopsis*, there’s an annual form, *C. tinctoria*, which is commonly known as plains coreopsis or golden tickseed. This is a charming wildflower with yellow and red bicolor flowers. Originally native to the Great Plains and the southern U.S., it has naturalized throughout much of the eastern U.S. and is frequently included in wild flower seed mixes.

Coreopsis tinctoria

Like its perennial cousins, the annual form of *Coreopsis* has also been hybridized to produce plants that are more compact, floriferous, and colorful than its wild parent. Two particularly charming hybrids are ‘Salsa’, a compact 15” tall selection with yellow and red bicolor flowers, and ‘Jive’, a compact selection with bicolor blossoms that have dark red centers and white edges on the petals.

USES FOR *COREOPSIS* IN THE LANDSCAPE

Coreopsis is a versatile plant suited to beds and borders, cottage gardens, and naturalized areas.

- Scatter them throughout the ornamental garden for bright punctuations of color.
- Team them with the spikier shapes of *Veronica*, *Liatris*, and *Salvia* to add texture to your landscape.
- Pair the bright, cheerful yellow selections with contrasting blues or purples for a classic color

combination.
- Combine with *Echinacea* (coneflower), *Hemerocallis* (daylily), *Monarda* (beebalm), *Achillea* (yarrow), and *Gaillardia* (blanket flower) in an informal meadow setting.
- Plant in masses or drifts for blocks of color.
- Use the airy threadleaf species to soften the appearance of bold-leaved plants.
- Combine the annual species with tall spiky accent plants and trailing "spillers" in a seasonal container garden.
- Plant in butterfly gardens to attract skippers, buckeyes, painted ladies and the occasional monarch.

CARE AND MAINTENANCE OF *COREOPSIS*

- **Light**: *Coreopsis* prefers full sun (six or more hours of direct sun per day). While it can thrive in part shade, it won't flower as well.
- **Water requirements**: Keep newly planted *Coreopsis* watered while it is getting established. Once established, it is drought tolerant although it will appreciate a drink of water during really hot, dry weather. *C. rosea* is an exception, preferring consistently moist soil.
- **Fertilizer**: Fertilizer is generally not required and, in fact, may cause the plant to look spindly. If you fertilize at all, apply a light application of a balanced granular 10-10-10 formula in early spring.
- **Soil Preparation**: Research indicates that a sandy, well-drained soil is ideal for *Coreopsis*. However, it will tolerate most soil conditions as long as the soil is well drained. This is absolutely critical in winter when our heavy, clay-based Virginia soils retains moisture. To solve the problem, add compost to flower beds to improve drainage and slightly mound the planting site so that the soil will drain faster.
- **Deadheading**: Deadheading may not be your preferred way to spend your spare time, but the practice does promote more *Coreopsis* blooms well into the growing season. It also helps prevent the plant from expending all its energy into setting seeds. As you deadhead, remove both the spent flower and the flower stalk. By cutting the stalks back to the foliage, you will have a much tidier looking plant.
- **Shearing**: As flowering slows down in mid-summer, shear the plants by 25% to 50% to encourage re-blooming. Shearing will sacrifice some of the flowers and buds in addition to spent blooms, but the plant should be in full bloom again within a couple of weeks.
- **Dividing**: To maintain vigor, divide every two or three years in spring or early fall. Water newly transplanted specimens regularly until they become established.
- **Late Summer Care**: *Coreopsis* produces so many flowers that it simply wears itself out. To help prevent this, cut the plants back by half or more in late summer. This may help improve its chances of surviving winter.
- **End of Season Care**: The lazy gardener will be glad to know that it's not necessary to cut *Coreopsis* back in the fall. In fact, the stems help protect the crowns in the winter. If, on the other hand, you like your garden nice and tidy, then cut the stems back part way, but leave 6 to 8 inches of stems in place. Clean dead leaves and other debris that can harbor pests away from the crown and apply a layer of compost around the plant. A light layer of mulch applied in late fall around but not over the crown will help protect the roots from extremes in winter temperature.

PROPAGATION

Coreopsis may be propagated by seed, division and cuttings.

- **Seed** — Most species *Coreopsis* may be grown easily from seed, which germinates quickly and results in plants that are generally true to type. Many of the hybrids are sterile and do not produce seed. *Coreopsis* selections with sterile flowers must be propagated vegetatively (either by division or by cuttings) in order to obtain plants that are true to type.
- **Division** — Divide plants in early spring before the foliage emerges. This method works for both the straight species and for cultivars.
- **Cuttings** — *C. grandiflora* selections may be propagated vegetatively by stem cuttings. They are easy to root, provided you can get enough of the plant material to do a stem cutting.

PESTS AND DISEASES

In ideal growing conditions (full sun and well-drained soil), *Coreopsis* is mostly trouble free. Powdery mildew is its biggest problem, though it is often not serious enough to warrant treatment. Consistently damp weather may cause a variety of problems for this plant, including slug or snail damage and fungal spots in addition to powdery mildew. Poor drainage can cause crown and root rot.

SUMMARY

Accept the fact that, for the most part, *Coreopsis* tends to be a short-lived species. This is particularly true of *C. grandiflora*. However, many promising new hybrids have been developed with the goal of improving its reliability. Also, changing the conditions under which we grow this plant can prolong its life and prepare it for winter survivability. These include amending and slightly mounding soil to improve drainage, deadheading regularly, dividing the plant every two or three years, and leaving the foliage in place over winter to protect the crown from freezing temperatures. In addition, keep in mind that rhizomatous species are generally better adapted to withstand extremes in soil moisture than clumping species.

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Planning the Fall Vegetable Garden

By Cleve Campbell | July 2016-Vol.2 No.7

WOW, what a gardening season! April was dry. May was wet and cool, with near record amounts of rainfall. June arrived with 90º+ temperatures. With summer just getting underway and the dog days of summer just around the corner, it hardly seems logical to discuss planting a fall garden. But July is indeed the month to start filling garden space vacated by spring crops with succession plantings of summer vegetables, and it's the time to plant fall vegetables that will keep your garden productive well into the late fall and early winter.

When I first began vegetable gardening, I asked an experienced gardening neighbor when he usually started a fall vegetable garden. His advice: "The first week or two in August." Well, the result of heeding his advice was disappointing; several of my fall growing seasons were cut short. After a number of years, I have come to the conclusion that it is very difficult to define an exact "starting time for a fall garden." Typically a fall garden is associated with cold weather crops such as spinach, kale, broccoli, cauliflower, turnips and brussel sprouts. I once heard a fall garden defined as a "mirrored" spring garden. I took that to mean that many of the "early" vegetables we plant in spring are what we plant in the fall: lettuce, peas, beets, cabbage, cauliflower and broccoli. Being a bit of a slow learner, it took me a while to realize that a fall garden is not just for cold season crops, but also an extension of summer crops. **If the gardener takes a little time to do the proper planning, the vegetable garden will be productive into the late fall and early winter**.

One of the most important things to know when planting late summer crops and planning your fall garden is the **date the average killing frost pays a visit** to your vegetable garden. In our area of central Virginia it is October 10th-October 15th.

The next important bit of information is how tolerant the various vegetables are to frost. **Vegetables can be classified into three categories of by their tolerance of cold temperatures**: **tender** vegetables (damaged by a light frost), **semi-hardy** vegetables (tolerate light frost) and **hardy** vegetables (tolerate hard frost). The following chart depicts examples of vegetables with different frost tolerances.

Table 1. Cold Temperature Tolerance of Vegetables

Tender Vegetables	**Semi-Hardy Vegetables**	**Hardy Vegetables**
(damaged by light frost)	**(tolerates light frost)**	**(tolerates hard frost)**
Beans	Beets	Broccoli
Cucumber	Carrot	Brussels Sprouts
Eggplant	Cauliflower	Cabbage
Muskmelon	Celery	Collards
New Zealand Spinach	Chard	Kale
Okra	Chinese Cabbage	Kohlrabi
Pepper	Endive	Mustard Greens
Pumpkin	Lettuce	Onion
Squash	Parsnip	Parsley
Sweet Corn	Potato	Peas
Sweet Potato	Salsify	Radish
Tomato		Spinach
Watermelon		Turnip

Chart adapted from "The Fall Vegetable Garden," Purdue University Consumer Horticulture.

And the final piece of the puzzle is the **number of days to maturity** or harvest of the particular vegetables that you select to plant. Start by looking at the "days to maturity" on the seed packet. The general definition for "days to maturity" is the average number of days from the time the seed is sown (or a seedling is transplanted) to the first harvest. Remember, this is an average, depending on location, temperature, soil

and all those environmental factors that affect plant growth. The days to maturity is only an average; your plants could be longer or shorter depending on the specific location where they are planted. However, the days to harvest usually paints a pretty accurate picture when you're comparing cultivars. For example, two cucumber cultivars recommended for Virginia are 'County Fair' with an average of 83 days to maturity and 'Bush Whopper' (96 days). The 80 days or 96 days can vary several days one way or the other, but the difference between the two — 13 days — will be about right. So the cultivars selected and the planting date in the fall can mean the difference between a successful crop and unsuccessful crop.

So considering all the variables together — frost date, frost tolerance of various vegetable varieties and days to maturity — **how do we decide when to plant?** Unfortunately, this is going to take some good old-fashioned arithmetic! It's simply a matter of determining the first frost date and counting backwards. Here's how the model works: days to maturity plus fall factor (14 days) plus frost tender factor (14 days)=number of days to count back from first frost date. If the vegetable is not frost sensitive, the 14 days for the frost factor is omitted.

We know the **first average frost date in our area is around October 10th-October 15th**, so to be on the safe side, let's choose **October 10th**.

Just for fun, **let's apply the formula** to the two cucumber examples — 'County Fair' (55) and 'Bush Whopper' (68 days) — we talked about above. Cucumbers are frost-sensitive, so we need to plant and harvest before the first frost. For frost-sensitive crops, it is recommended that we add 14 days, as the crop must mature at least 2 weeks before frost in order to produce a reasonable harvest. It is also recommended that we add 14 days as the "fall factor" because the days to maturity or harvest number is based on optimum conditions. **The fall factor takes into consideration that conditions are less than optimum in fall**, resulting in slower growth rates due to cooler weather and shorter days. So putting the model to use, here are the planting dates:

For the cucumber cultivar called 'County Fair' we add 55 days (55 day to maturity) plus 14 days (Frost Factor) plus 14 days (Fall Factor) for a total of 83 days. Next, we count back 83 days from our first frost day of October 10th and that gives us a drop-dead planting date of July 17. Thus, we would be safe to plant 'County Fair' cucumbers in central Virginia up until July 17th.

Looking at the cucumber cultivar 'Bush Whopper'(68 days to maturity) plus 14 days Frost Factor, plus 14 days Fall Factor equals 96 days. Counting back from October 10th gives us a drop dead planting date of July 4th, meaning according to the formula, we would be safe to plant 'Bush Whopper' up until July 4th.

Now let's look at a couple of examples for bush beans: 'Roma II' (59 days to maturity) and 'Slenderette' (55 days to maturity).

'Roma II' needs 59 days to maturity plus 14 days Frost Factor plus 14 days Fall Factor, for a total of 87 days. Counting back from the October 10 frost date gives us a last date to plant of July 14th.

'Slenderette' needs 55 days to maturity, plus 14 days Frost Factor, plus 14 days Fall Factor for a total of 83 days, so the last date to plant 'Slenderette' is July 17th.

Bush beans and cucumbers are just two vegetables we can plant in July for a late fall harvest; others include beets, carrots, lettuce, mustard, and spinach. If you plan on growing your own broccoli and cauliflower seedlings, July is also the time to start them from seed so they are ready for transplanting in August.

As we move though the month of July and into the late summer months, timely planting is the key to success. Crops need sufficient time to grow and mature before the weather becomes too cold for continued growth.

As the calendar moves closer to the first frost date, the selection of short-days-to-maturity cultivars becomes more and more important if you wish to have a successful fall harvest. Seed companies will sometimes helpfully label short-days-to-maturity varieties as “early season,”so always read the days to maturity on the seed packets, as shorter-days-to-maturity cultivars often have a greater chance of success for those frost sensitive crops.

Preparing the ground for planting

Before preparing the soil for the fall garden, first salvage any usable vegetables from existing crops. Since weeds often take over a garden as summer progresses, starting fresh with a fall garden is one way to get ahead of the weed problem. Remove any remaining spent crops and weeds, along with any insect-infested and diseased plants. Weeds that have seed heads should not be tilled into the garden or composted; this will prevent the spreading of pathogens and repopulating the garden with fresh weed seed.

Prepare the soil by restoring nutrients removed by spring and summer crops. A light layer of compost over the planting area will boost the soil nutrients and improve the soil texture. If compost is not added, a small application of a complete chemical or organic fertilizer may be added. Avoid deep tilling as this will break down the soil texture and increase surface soil crusting, which creates a barrier to young seedlings. Deep tilling may also cause moisture to be lost from the subsoil.

Soil in the late summer is often hot and dry, and this heat may inhibit seed germination. Germination rates may be improved by planting the seeds when the soil is moist — either after a rain or after watering the area thoroughly the day before planting. A light layer of organic mulch such as straw on top of the planted seeds will help keep the soil moist and cool. The mulch layer should not be thick enough to interfere with the germination of the seeds. Once the young seedlings emerge, that light mulch layer will help keep the soil moist and cool. It is important that the young seedlings get as much sunlight as possible, so the mulch should only be covering the soil and not engulfing the young plants. Once the plants are established, a heavier mulch may be used to hold moisture and control weeds. Keep the plants well-watered. Most vegetables need an inch of water per week to grow well. Less frequent, deep watering is preferable to light watering.

In central Virginia the first autumn frost is often followed by couple of weeks of warmer weather or Indian summer. With a little help, frost tender plants can grow throughout those weeks. Sheets, newspapers, floating row covers and buckets all can be used to protect tender plants when that first freeze is predicted. Usually the frost hits on a cloudless night (clouds tend to reflect heat back to the earth’s surface). Covering plants helps hold warmth near the ground. Following a freeze, uncover the plants after the temperature rises above 32º F.

Everything in the garden — including weeds — are growing like mad right now, but don’t let that fool you; this too shall come to an end unless you plant a fall or succession garden. With a little planning, the vegetable gardening season can be extended well into the late fall and even early winter. And in a few short months when you are sitting around the Thanksgiving table, be sure to let your family and friends know that those beets — well, they didn’t come out of a can; they were pulled just last night, and the broccoli and carrots are also fresh from the garden! Bet you never tasted sweeter carrots!

Thanks for stopping by The Garden Shed; we hope to see you again next month. In the meantime, happy gardening!

Sources:

“Vegetable Planting Guide and Recommended Planting Dates,” Virginia Cooperative Extension Publication

No. 426-331, http://pubs.ext.vt.edu/426/426-331/426-331.html

“Fall Vegetable Gardening,” Virginia Cooperative Extension Publication No.426-334, http://pubs.ext.vt.edu/426/426-334/426-334.html

“Vegetables Recommended For Virginia,” Virginia Cooperative Extension Publication No. 426-480, https://pubs.ext.vt.edu/426/426-480/426-480.html

“The Fall Vegetable Garden,”Purdue University Consumer Horticulture, hort.purdue.edu/ext/fallgarden

The Ornamental Garden in July

By Patsy Chadwick | July 2016-Vol.2 No.7

July is the month when our ornamental gardens are usually at their peak. It's also the month that we feel the full force of summer heat and humidity. As you tackle your gardening chores, take precautions to avoid heat stroke and sunburn. Work in your garden early in the day — the earlier, the better. Drink plenty of water to stay hydrated, wear a hat and sunglasses, and use plenty of sunscreen. Give yourself an occasional break from your labors to enjoy your garden.

Maintain Your Ornamental Beds

- **Deadheading** – Spend a few minutes each week deadheading spent blossoms. Yes, I know it's hot outside and the humidity makes your hair do weird things. But you'll congratulate yourself later when your garden continues to bloom while more complacent neighbors' gardens fizzle out.
- **Watering** — As temperatures soar this month, it's particularly important to monitor moisture levels in the garden, especially for newly planted trees, shrubs, and perennials.
- **Weeding** – This is one of those never-ending chores that most ornamental gardeners detest. But here's why it's important: Weeds have an amazing capacity for self-preservation. For example:
    - **Oxalis (Yellow wood sorrel)** – This particularly prolific annual weed is highly successful at reproducing itself. It looks innocent enough with its cute little yellow flowers and clover-leaf shaped foliage. But when those flowers give way to seed capsules, that's when this bad boy literally springs into action. As the seed capsules dry, they explode, throwing the seed several feet away.
    - **Ragweed** – This summer annual produces an amazing quantity of seeds in late August through September. One plant can have between 30,000 and 62,000 seeds. Should any of those seeds become buried in the soil, they can remain viable for decades.
    - **Horse Nettle** – This perennial weed reproduces by seed as well as by an extensive root system. If you dig it out of your garden (rather than use an herbicide), it's important to remove all of the roots. Any root fragments left in the soil can remain viable for years and will wait patiently to sprout until growing conditions are ideal.
    - **Crabgrass** – A summer annual, this weed certainly qualifies as one of the top ten nuisances in both the lawn and the ornamental garden. It germinates from mid-spring to mid-summer and reproduces by setting seeds and by rooting at the lower joints. To control it, dig it out by the roots and make sure you get every bit of the plant.

Tackle these and other weeds when they are small, easy to pull, and less likely to require an herbicide to control them.

Dry Flowers for Arrangements

Consider preserving some of your flowers for dried flower arrangements. Air drying is the easiest and cheapest method for preserving plant materials. For best results:

- Cut the stems when the blossoms are either still in bud or are partially open. They will continue to open as they dry. If you've never dried flowers before, you may need to experiment to determine the optimal time to cut them.
- Cut the flowers close to the base of the plant so that the stems will be as long as possible.
- Remove the foliage from the stems.
- Loosely gather the stems into small bunches and secure them with twine, ribbon, or a rubber band.
- Suspend the bunches upside down from a coat hanger, hook, or clothesline in a warm, dry place out of direct sunlight with plenty of space between them for air circulation.
- Allow the bunches to dry for two to six weeks, depending on what is being dried.

Drying flowers successfully is easy but requires patience while you learn which technique works best for your specific needs. In addition to being air dried, plant materials may be pressed, embedded in desiccants of various kinds, and even dried in a microwave oven. For a good description of the methods that can be used to dry flowers, see Clemson Cooperative Extension publication HGIC 1151, "Drying Flowers," clemson.edu/extension/hgic1151.

Control Potential Mosquito Breeding Sites

With escalating concerns these days about mosquito-borne diseases, it's more important than ever to eliminate potential mosquito breeding habitats in the landscape. Inspect your property, including house gutters, for standing water, and drain any you find. Don't forget to check for water in saucers under house plants. If you have a birdbath, wading pool, or outdoor pet water bowls, replace the water in them every other day or so. In addition to breeding in standing water, mosquitoes may also lay their eggs in soil that frequently floods or stays moist, such as ditches or low areas in meadows. They need only a tablespoon or so of water in which to lay their eggs.

Consider using plants around your home that naturally repel mosquitoes. Some suggested plants include rose-scented geranium, lemon balm, catnip, southernwood, allium, nicotiana, marigold, lemon thyme, peppermint and lavender.

Encourage Fireflies in Your Garden

Consider yourself fortunate if you have fireflies (lightning bugs) in your yard. They are some of the good guys of the insect world. Their larvae eat mites, slugs, snails and soft-bodied insects, including their larvae. But firefly populations are dwindling, possibly due to the use of chemicals on lawns, pesticide use, light pollution, and habitat destruction. If you want to attract more fireflies to your garden, here's how:

- Tackle the light pollution problem by either dimming exterior lights or turning them off when they are not needed. Fireflies communicate with one another via light signals. Porch lights, street lamps, and garden lights can interfere with those signals.
- Incorporate a good variety of shrubs, grasses, and perennials into your landscape to provide habitat for insects.
- Leave an area of high grass around the perimeter of your yard. Male fireflies fly but the females generally do not. Female fireflies rest on tall blades of grass and shrubs and wait for the males to come to them.
- Use pesticides judiciously. Keep in mind that chemicals intended to destroy insect pests are sometimes non-selective and make no distinction between good bugs and bad bugs.

Monitor Perennials for Disease

A highly contagious viral-like plant disease to be on the alert for is **aster yellows**. It is caused by a phytoplasma, a tiny organism that is spread from plant to plant by sucking insects such as leaf hoppers. This disease affects more than 300 ornamentals, vegetables, and weeds. It is characterized by chlorosis (yellowing of the leaves while the veins remain green), extreme leafy growth, and deformed flowers that often remain green or sometimes exhibit tufts of green foliage within a blossom or in place of a blossom. Some annuals and perennials affected by aster yellows include aster, coneflower, coreopsis, cosmos, chrysanthemum, petunia, snapdragon, marigold, and zinnia. Other than selecting plants that are immune to the disease, there is no effective cure for it. Remove the entire plant to prevent this disease from infecting other plants in your garden. The aster yellows phytoplasma organism will not survive once the plant dies.

Cut off the first flowers of lavender

After lavender finishes blooming, the flower stems may be cut back to tidy the plant and encourage re-blooming. The easiest way to do this is to gather a clump of the spent blossoms in one hand and snip them off with the other hand. This is much faster and less tedious than trimming one blossom at a time. Just avoid cutting down into the woody part of the stem.

Lift and Divide Irises

July through September is the best time to divide irises. First, cut back the foliage to about one-third of its height. Using a spade or digging fork, lift the entire clump out of the ground. Carefully snap off the younger rhizomes from the original one. You may need to use a sharp knife for this purpose, in which case, dip the knife in a 10% bleach solution between cuts. Each rhizome should have roots and a fan of leaves. Plant the rhizomes at or just below the soil level about 18 to 24 inches apart. Discard the old rhizome.

Pinch Back Chrysanthemums and Asters

If you've been pinching back your chrysanthemums and asters, do it one last time, **no later than** mid-July. Do not pinch them back after that point. Otherwise, the plant will not have time to set buds for this growing season. Pinching these plants back helps keep them from splaying open in the middle and also delays bloom time until later in the growing season.

Root Cuttings of Houseplants

July is a good time to root cuttings of non-woody house plants, such as geraniums, coleus, and fuchsia. Make cuttings about 4 inches long. Trim off the bottom leaves and insert the cuttings about a third of their length into moist potting medium. Roots should develop in about four weeks.

Repot or Stabilize Large Houseplants

If they are not planted in the right pot, tall, leafy houseplants such as Ficus trees have a tendency to blow over when subjected to windy or stormy weather conditions. A heavier pot with a wide base provides better stability than a pot that tapers toward the bottom. Another trick is to put a brick or rock in the bottom of the pot for extra weight. Be careful not to make the pot so heavy that you have trouble moving it back indoors at the end of summer.

The Vegetable Garden In July

By Cleve Campbell | July 2016-Vol.2 No.7

The weather in central Virginia is often unpredictable, ranging from an unseasonable 75-80º in February to snow in April, but we can say with certainty that in July, it is going to get **HOT**! The heat brings many challenges, not only to the garden but also to the gardeners, who must somehow protect themselves from the hot summer sun with clothing and sunscreen while remembering to maintain hydration.

July in the vegetable garden is primarily a month of maintenance: watering, applying additional mulch, weeding, and harvesting. The ambitious gardener may take on additional tasks, such as sequential planting of select vegetables, planning and preparing for the planting of fall crops.

July is a good month for filling in those empty spaces left from those early-spent spring crops such as lettuce, English peas, potatoes and radishes. July planting may include beans and squash and a host of other vegetables. Take a look at the handy-dandy chart below, which was developed using the Virginia Cooperative Extension Publication 426-331 "Vegetable Planting Guide and Recommended Planting Dates."

July 1-6	July 7-13
Bush Beans	Bush Beans
Pole Beans	Pole Beans
Lima beans	Lima beans
Wax Beans	Wax Beans
Cucumbers	Cucumbers
Egg Plant*	Egg Plant*
Muskmelons	Muskmelons
Okra	Okra
Peppers	Peppers
Pumpkins	Pumpkins
Southern Peas	Southern Peas
Sweet Corn	Sweet Corn
Summer Squash	Summer Squash
Winter Squash	Winter Squash
Sweet Potato	Sweet Potato
Tomatoes*	Tomatoes*

July 14-20	July 21-31
Bush Beans	Bush Beans
Pole Beans	Pole Beans
Lima beans	Lima beans
Wax Beans	Wax Beans
Cucumbers	Cucumbers
Egg Plant*	Egg Plant*
Muskmelons	Okra
Okra	Peppers
Peppers	Pumpkins
Pumpkins	Southern Peas
Southern Peas	Sweet Corn
Sweet Corn	Summer Squash
Summer Squash	Winter Squash
Winter Squash	Tomatoes*
Tomatoes*	
*** Denotes Transplants**	
The suggested dates may vary for different areas.	

Not sure of what varieties or cultivars of vegetables to plant? A comprehensive list of recommended vegetables for Virginia can be found in the Virginia Cooperative Extension Publication, titled "Vegetables Recommended for Virginia."

Weeding

It's important to control weeds around vegetables, as weeds will out-compete vegetable plants for nutrients, water and sunlight. The best method to control weeds is by mechanical extraction, meaning good old-fashioned weed-pulling or the use of a hoe. For small weeds, the "**hoop" or "stirrup" hoe** is highly recommended because it allows for shallow cultivation. Another plus for the hoop hoe: it does not bring weed seeds to the surface of the soil! Many weed seeds require sunlight to germinate, so deep cultivation or utilizing a tiller often brings seeds to the surface of the soil, facilitating seed germination for a new crop of unwanted weeds.

Hoop or Stirrup Hoe

Additional information on controlling weeds in the vegetable garden may found in the Virginia Cooperative Extension Publication, “Weeds in the Home Garden,” pubs.ext.vt.edu/426/426-364

More Tips and Tasks for July:

- To **save space** in your garden, you can construct temporary or permanent woven wire fences, which will provide vertical support for runner varieties of beans, as well as for cucumbers. Plants can be trained to climb the fence, saving not only space but also making harvesting easier as the vegetables will be hanging at a convenient height.
- **A Threat to Basil** Watch out for a fungal disease specific to sweet basil called fusarium wilt of basil. The fungus attacks the water-conducting tissue (xylem) within the stem. Infected plants will grow normally until they are six to twelve inches tall. Then the plants become stunted and will suddenly wilt. Symptoms include wilting and brown streaks along the stems. The stem may become curved — often referred to as a shepherd’s crook. Once established, the fungus can over-winter and survive many years in the form of spores, ready to cause new infections if basil or other members of the mint family are replanted in the same area. Currently, there is no fungicide approved for the treatment of this fungal disease, but it can be controlled somewhat by removing all diseased plants, by avoid planting basil in the same location, and by planting disease-resistant varieties. Additional information on fusarium wilt of basil is available at : ncsu.edu/-fusariumbasil

Fusarium wilt of basil (Fusarium oxysporum, f. sp. basilicum). Photo: Debbie Roos, NCSU Agricultural Extension Agent

- **Pepper plants** are more productive if given appropriate moisture. Placing mulch (such as wood chips or leaf mulch) around plants will help retain soil moisture and reduce the need for frequent watering. In addition to conserving water, mulch provides the extra benefit of becoming a weed barrier.
- **Continue to monitor water moisture levels around plants**. The rule of thumb is that plants need one inch of water per week to maintain productivity. Mulching reduces the need for frequent watering and improves yields. **Early morning is the best time to water**. Evening water is less desirable because leaves that remain wet through the night are more susceptible to fungal diseases.
- **Okra blossoms** — one of the showiest blooms in the vegetable garden — only last one day. Keep your eyes peeled if you don't want to miss them. If the flower has been pollinated, a miniature okra pod can be seen beneath the wilted flower.
- Wondering if your **blueberries are ripe enough to pick?** Just try pulling a few berries from the stems. If they come off easily, they are ready to harvest. If not, they need to ripen more. **Cover with netting** or the birds will beat you to the fruit.
- Dry weather causes **Swiss chard to bolt**—or prematurely go to seed. Water your plants to extend the season.
- **Cucumbers** develop a **bitter taste** if the soil is not kept **consistently moist.** Leaf mulch works great to help maintain soil moisture.
- **Harvest cucumbers** for pickling when they reach 2-4 inches in length; for table use, harvest when no longer than 5-6 inches. Remove any over-ripe cucumbers to encourage continuous production.
- **Withhold water on potatoes when the plants begin to die down,** as water and fertilizer may disturb the dormancy stage and cause regrowth; it can also cause potatoes to crack.
- If **potatoes** are visible along the soil surface, they probably look **green.** This coloration is caused by exposure to light. Green-skinned potatoes will taste bitter. How to avoid this problem: **make sure potatoes are protected from the light by covering them with soil or mulch.**
- **Pumpkin and squash** blossoms are both beautiful and **edible**. To prepare squash or pumpkin blossoms for an appetizer, pick them after they open. To remove insects and dirt, wash and drain the blossoms, dip them in a flour or beer batter, and fry until golden.
- Although **tomatoes** are self-pollinating, they **need movement to transfer pollen**. If it is hot and calm for several days, **gently shake plants to transfer pollen** and assure fruit set. Hot temperatures can also interfere with blossom set.
- Shredded **Chinese cabbage** is a good hot weather substitute for lettuce in salads and sandwiches. A second crop may be started now for fall harvesting.
- In the summer**, dry soil** may become hard, making it difficult to work and inhibiting seed germination. Plant your succession and fall vegetables when the soil is moist — either after a rain or after watering the area thoroughly the day before you plant. Seeds may be planted in a

shallow trench to conserve moisture.

- **Did you know**? Daytime temperatures above 90º F. prevent snap bean flowers from developing.
- **Too many** cucumbers, zucchini, or tomatoes? Think pickles, relishes, and tomato sauces.
- **Don't forget the County Fair!** Show off you gardening abilities by exhibiting fresh vegetables, flowers, and fruits.

Thanks for stopping by The Garden Shed. We hope to see you again next month!

Sources:

" Vegetable Planting Guide and Recommended Planting Dates," Virginia Cooperative Extension Publication No. 426-331, http://pubs.ext.vt.edu/426/426-331/426-331.html

"Vegetables Recommended For Virginia," Virginia Cooperative Extension Publication No. 426-480, https://pubs.ext.vt.edu/426/426-480/426-480.html

"Weeds in the Home Garden," Virginia Cooperative Extension Publication No. 426-364, http://pubs.ext.vt.edu/426/426-364/426-364.html

"Basil Problem," NC Cooperative Extension, https://growingsmallfarms.ces.ncsu.edu/growingsmallfarms-fusariumbasil/

Tips and Tasks adopted from "July Vegetable Tip Sheets," Albemarle Cooperative Extension, http://offices.ext.vt.edu/albemarle/programs/anr/tip-sheets/7-14-veg.pdf

Carrot Top Pesto

By Cate Whittington | July 2016-Vol.2 No.7

For years, the tops of my carrots have either been tossed into soups or relegated to the compost bin. Not any more!

One day this past spring, I was helping out in the garden of an elementary school in Charlottesville. The garden coordinator, employed by City Schoolyard Garden, was harvesting carrots with the children. A subsequent cooking lesson involved using all parts of the carrots for their snack: roasted carrots with carrot top pesto.

I have made pesto with a variety of herbs, but why, I asked myself, hadn't it ever occurred to me to use the tops of the carrots? What a great idea! A Google search uncovered a plethora of recipes, of which Rachel Ray's was my favorite.

The recipe printed below is a slightly modified version of Rachel Ray's recipe. She uses her pesto as a coating for pasta, but it is equally good drizzled over roasted carrots (pictured) or slathered on a baked potato. Serve the pesto as a garnish for hard-boiled eggs, spread it on a chicken sandwich, or toss it into carrot soup. Or, enjoy this delectable sauce as a wonderfully nutty accompaniment to your favorite dishes. You'll never toss those carrot tops into the compost again!

Ingredients

- 2 cups leafy carrot tops
- 1/4 cup fresh herbs (e.g. tarragon and parsley), optional
- 2 small cloves garlic
- 1/3 cup toasted nuts (almonds, pine nuts, macadamia, or combination of these)
- Juice and zest of 1 lemon
- Salt and pepper to taste
- ½ cup grated Parmigiano Reggiano cheese
- 5-6 tablespoons extra virgin olive oil

Directions

1. Cut the tops from one bunch of carrots (6-8 medium carrots). Trim the stems and soak the greens in cold water. Drain well.
2. Place the drained carrot tops in a food processor, together with herbs, garlic, nuts, lemon juice and zest, cheese, and garlic.
3. Pulse into finely chopped mixture. Then, stream in olive oil until the pesto begins to pull away from the sides of the food processor.

Resource: http://yum-o.org/recipe/carrot-top-pesto-with-whole-grain-penne/