North Florida Vegetable Gardening Guide

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LEON

Who We Are

UF/IFAS Leon County Extension serves the citizens of Leon County, Florida. Every county in Florida has an Extension office full of professionals to help answer your questions and provides many programs focusing on gardening, agriculture, 4-H, family and consumer sciences, natural resources, and more. We are here to serve you.

If you have questions while reading this guide, you can contact us by phone or email, or visit the office and gardens in person. UF/IFAS Leon County Extension is located at 615 Paul Russell Road, Tallahassee, FL 32301. Phone: (850) 606-5200 Email: askamastergardener@ifas.ufl.edu

Our seven Demonstration Gardens, Orchard, and Vegetable Garden follow the University of Florida's Florida-Friendly™ Landscaping principles, a science-based program for sustainable landscapes. They are maintained by Leon County Master Gardener Volunteers (MGVs) and Horticulture staff. In addition, Extension has a wildlife pond, rain garden, chicken coop, and an adjacent Longleaf Pine Pocket Preserve. The Demonstration Gardens are open daylight hours 365 days a year for visitors.

Our extensive vegetable gardens, created and tended weekly by a dedicated group of MGV's known as VegHeadz, contain many different types of experimental beds, from keyhole to aluminum corrugated knee-high, a food forest, hugelkultur, and more. The 4-H Horticulture Club garden beds are also located within this area and are maintained by Extension staff, MGV's, and our enthusiastic 4-H club members.

This North Florida Vegetable Gardening Guide is a compilation of many resources from UF/IFAS, MGVs, and our local partner organizations. We hope that it will help beginning and advanced vegetable gardeners alike.

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Introduction

Vegetable gardening in North Florida can be a year-round adventure. Growing vegetables in Leon County has its joys and challenges. As you continue to grow in Leon County, you may come to face problems from pests and disease, to the relentless summer heat. You may also find yourself overloaded with harvests and getting to know your neighbors in your own garden or in a local community garden. We have compiled these resources for beginner and advanced gardeners alike to learn more about practices that can grant them better yields and ease the workload of a vegetable garden in a sustainable way.

We have a very different planting and harvesting calendar than the rest of the country and even the rest of Florida. This means that we can have a harvest at any time of year, but it also comes with challenges of heat and pest pressure. Use the calendars in this guide to help you plan for the best harvest.

We are located in USDA Plant Hardiness Zone 8b, which means our winter temperatures can reach as low as 15 to 20°F. Our average first frost is November 15th and the average last frost is March 15th. Our growing seasons follow the typical Spring, Summer, Fall, and Winter seasons. We have two tomato seasons a year (Spring and Fall) and a season for greens (Winter). We have a long enough warm season to grow lengthy crops like sweet potatoes which take four frost-free months from planting to harvest.

There are many gardening terms, from tools to techniques, that can be confusing when you first encounter them. Check out the back of this guide for a glossary of terms.

Starting Your Garden

Site Selection

Be sure to choose a site near a water source. You may eventually put in micro-irrigation, but in the meantime, make hand watering easier on yourself.

Most vegetables will need full sun, which equates to six hours of direct sunlight. Tallahassee is an urban forest so it is important to site your garden where it can be productive. If you are unsure your site receives enough sunlight, face south and raise your arms to make a "Y". If tree canopy encroaches in your view within your "Y", find a sunnier location.

Beds

Many gardeners choose to grow vegetables in raised beds. We have a variety of soil types in Leon County - from sand to sandy clay - and a raised bed can help growers avoid problems in native soil. However, with the addition of soil amendments, growing in native soil is definitely doable for a first time gardener.

There are many designs for raised beds, but they really only need to be about six to ten inches of soil deep. Vegetable roots tend to stay in this range in the soil.

Avoid old pressure-treated wood (pre 2004) or railroad ties that can leach creosote and arsenic. Modern pressure treated wood is safe to use as well as naturally rot resistant woods like redwood and cedar. Untreated wood will start to rot within a year. Other materials include concrete blocks, bricks, and logs.

In the VegHeadz garden, we have filled the bottom of the tall raised beds with garden debris like leaves, branches, and banana stalks. Mushroom compost was then added to the top six to ten inches. Over time, the debris breaks down and the soil level sinks a bit, but we top it off as needed. This cuts down on up-front costs for filling a taller and more accessible garden bed and the debris material helps retain moisture and adds nutrition as it decomposes.

Starting Your Garden

Timing

North Florida has a completely different set of growing seasons than the rest of the country and even the state. We have hot, wet summers and colder winters than the average Floridian is used to. This means common planting sayings can be off the mark here. "Knee high by the 4th of July" works for corn in northern states but here in Leon County, corn is knee high by early May if not sooner.

A year in the vegetable garden here might look like this:

Tomatoes and peppers can be started from seed indoors as early as the first of the year for planting mid-March and onwards. Tomatoes don't set fruit when night temperatures are above about 80 degrees, so it's important to give your plants a head start on the heat. Grape and cherry tomatoes are tough and may fruit all summer long, but larger tomatoes usually stop fruiting when the summer heats up. Peppers can fruit all summer and may even last two years if the winter is particularly mild.

Plant potatoes and English peas (along with snow and sugar snap) on or before Valentine's Day. This allows the potatoes enough time to grow underground before harvest in about May. Peas are harvested as ready throughout the spring.

Transplant squash seedlings by the end of March to help avoid squash vine borers. Squash plants are frost sensitive so pay attention to the weather in late March and early April as they may need protection. Squash are native to the Americas and so is a major pest: the squash vine borer. This moth is native, but the caterpillars can wreak havoc on plants in the cucumber family. Transplanting seedlings early in the season can help you get at least a harvest or two in before the borers descend upon your garden.

In the heat of the summer (June, July, and August) the pest pressure and heat can become intense. Many gardeners take these months off by planting cover crops in lieu of harvestable crops. Cover crops help reduce run off, maintain soil structure and limit weeds taking root while you take a few weeks or months off. Read more about cover crops on page 55.

Cool season vegetables can be started from seed as early as September, though usually the latter half of the month. September can still be particularly hot for cool season vegetables. If you plant out cool season vegetables too soon, the heat can cause them to bolt, or they may get overwhelmed with pests.

Follow the calendars in this guide for best results. Treat your garden like an experiment, if you miss a planting deadline but already have the plants, just go ahead and plant them.

Starting Your Garden

Seeds

Seeds are a cost effective way to start a garden. You can get a lot of variety for your money but seedlings need tender loving care.

When planting seeds, follow the spacing directions on the packet and remember to thin as needed. This is particularly important for small-seeded crops that can be difficult to sow by hand so as to give the crop enough space to reach maturity. Thinning will be required for carrots, turnips, beets, radishes, and other root crops. It seems harsh to thin but it is necessary if you want a good harvest in a few months. Simply pull the smallest seedlings and eat them in the garden or a salad.

Some seeds do better when started inside under a grow light months before they are ready to be transplanted outside. Warm season crops like tomatoes, peppers and eggplants can be started in winter and cool season crops can be started inside in late August to beat the heat.

Remember that we have different growing seasons than the rest of the country so seed packets may not have the most accurate instructions. Use the calendars in this guide when you are starting seeds or buying transplants to make sure you are growing in the right season.

Check out the Leon County Seed Library at your local Leroy Collins Leon County Public Library branch for free seeds starting each February and August.

Transplants

Transplants are young plants that have been grown from seed in a container, either by the gardener or purchased. They are a good way to get a head start on gardening without all of the babysitting young seedlings need.

Plant your transplants with their mature size in mind. If they are too close, it can limit airflow and lead to disease and fungal problems, as well as making the bed hard to maintain.

Choosing the right transplant at the nursery can set you up for success later in the season.

- Look for plants that are about the same height as their pot is deep. This will ensure you don't get root-bound plants.
- Don't buy transplants that show signs of disease, even if they are on the discount rack. You could transfer disease or pests to the rest of your garden for the price of that good deal.
- Don't buy plants that already have flowers or fruit, as this is an indication of stress.
- Plant your transplants when you get home - don't let your investment dry up.

Seedling Care

Seeding

Fill starter cells with pre-moistened starting mix. In each pot, make a shallow indentation into the starting mix with your finger and place one to two seeds into each hole (if more than one seed germinates, pinch out weakest seedling). Seeds should be covered to a depth of two to three times the diameter of the seed. Label with crop name, variety, and date. Mist with water from spray bottle/mister hose. Keep moist but not water-logged. Place in temperature-controlled room or out of direct sunlight. For spring/summer crops, germination is best between 75-90°F. For fall/winter varieties, germination is best between 50-80°F. Once seedlings emerge, immediately move to sunny location (at least six hours direct sunlight). Keep moist, but not water-logged.

Tomato seedlings ready to be up-potted. Note the first leaves (cotyledons) are still present. The plants are as tall as the pot is deep so it is time to up-pot to further develop the root system.

Up-potting

The first leaves to emerge from the soil are cotyledons, embryonic leaves that do not look like mature leaves. Once seedlings develop "true" leaves, they can be moved into larger pots (two-to four-inch wide pots). Fill pots halfway with pre-moistened potting mix (nutrient rich, good drainage). Carefully remove seedling from starter cell (a butter knife helps) and place in larger pot. Add additional potting mix until seedling is secure, standing straight, and all roots are covered.

Although up-potting most seedling crop varieties into larger pots before going into the garden is beneficial, you can skip the up-potting step and transplant seedling from starter cell directly into the garden. The young seedlings will be more vulnerable to rain, wind, insects, and animal disturbances, but with care, the up-potting step can be skipped if conditions are favorable (weather and temperature). Up-potting into a larger pot with nutrient rich potting mix before going into the garden allows the plant better protection and more time to grow strong roots.

Transplanting

Preparing to Transplant

Once a plant has established strong roots and is about the height of its pot, it can be transplanted into the garden. If indoors under artificial light, allow plant to "harden-off" by placing outdoors a week before transplanting to adjust to wind, sunlight, and varying temperatures. Prepare garden with compost and other soil amendments. Dig small hole and place plant with potting mix in hole, following crop-specific spacing requirements. Cover up roots and keep moistened, but not waterlogged.

Timing

For spring gardening, plant transplants once danger of frost has passed (around the middle of March), when the transplant has had time to develop a strong root system, and when the transplant is about the length of its pot.

Transplanting Process

1. Prepare garden site with compost and other soil amendments.
2. Water plants very thoroughly just before planting to decrease transplant shock.
3. Dig a hole that is at least double the width of the plant's root ball.
4. Add one to two handfuls of fresh compost or worm castings to the hole.
5. Avoid covering any leaves or stems under the soil surface. Remove these lower stems with sharp garden clippers to minimize the size of the wound.
6. Avoid touching the stem and avoid disturbing the root ball when removing the transplant from its pot. Gently squeeze the pot to loosen the potting soil and turn the transplant upside down with the palm of your hand to gently catch the transplant.
7. Unless the transplant is a tomato, plant so that the soil level is about the soil level of the transplant, making sure the plant has good structure to decrease susceptibility of falling over as it grows.
8. If transplanting a tomato, plant deeper than the soil level of the transplant, as tomatoes can grow adventitious roots from their stem, which will improve overall root development.
9. Make sure to cover up all roots and water the soil around the plant thoroughly. Continue to water deeply, keeping the soil moist but not soggy, for the next three to four days while the plant becomes established. You can then begin to switch to a normal watering pattern.
10. Always water the soil around the plant, not the plant leaves, throughout the season to decrease susceptibility to disease.

Other Vegetables

Potatoes

Irish potatoes, or those that make up typical mashed potatoes, French fries, and baked potatoes, are in the Solanaceae family along with tomatoes, eggplants, and peppers. We eat the modified stems that grow underground, though colloquially they are referred to as tubers.

When planting potatoes, you will purchase seed potatoes. These aren't seeds, but actual potatoes, that will sprout to form a new plant. Depending on the size of the seed potato, you can plant them whole or cut them into 'chits.' Make sure each chit has at least two 'eyes' to ensure sprouting. You can plant right away or wait until your seed potatoes have started sprouting.

Garlic and Onions

Garlic and onions are part of the Amaryllidaceae family. Both can be planted either by seed or clove or set, respectively.

Garlic cloves can be planted from either nursery or grocery store bought bulbs. Simply take apart the cloves (leave the papery skin on) and plant them pointy side up throughout your garden. You can interplant garlic and onions with other crops.

Onion sets are small bulbs that can be planted the same way as garlic.

Sweet Potatoes

Sweet potatoes are propagated primarily from slips. These can be bought or easily grown at home.

Slips can be grown from store bought or home grown sweet potatoes. You can use the water propagation method pictured above or lay them in shallow pans with loose soil over them. The slips will grow off the root. Trim the slips off the potato when they have several long roots and leaves. Plant directly in the garden.

Direct Sow

Several vegetables we grow do not need to be started inside but are directly planted into your garden bed. These include peas, beans, corn, and root vegetables like carrots, beets, and turnips. These plants have particularly delicate root systems as seedlings which can be damaged in transplant.

Succession Planting

Adapted from UF/IFAS Gardening Solutions

Succession planting means planting crops so that they ripen a few plants at a time. This way you will harvest in small batches, over many weeks, rather than all at once.
There are many ways to plant "successively."

You can space out the ripening period by having multiple sowing dates. You can plant multiple varieties. You can take advantage of the change of season. Planting in succession is a great technique for any vegetable garden, large or small.

Radishes are a common succession planting. They can be ready to harvest in as little as 30 days from seeding. Radishes can be interplanted with other crops as they are harvested before larger plants like lettuce need space.

Multiple Planting Dates

One approach to succession planting is to begin several separate plantings of the same vegetable. We plant lettuce, for example, from October through February. Instead of planting a dozen rows on October 1st, plant a couple rows every month. With multiple planting dates, your garden will yield fresh lettuce for a longer period of time. A slow, steady supply is an improvement on the harvesting frenzy that lasts only a couple weeks. The method for succession planting works best for crops with long planting windows, like lettuce and corn.

Varieties

You can also practice succession planting by planting several varieties of the same crop. Most varieties have different numbers of "days to maturity." By planting several different varieties at the same time gardeners enjoy multiple harvests. This method works well for carrots, lettuce, tomatoes, and more. You'll get to enjoy a little more variety with this method, too.

Multiple Seasons

Succession planting also helps gardeners take advantage of Florida's year-round growing season. And many Florida gardeners are already doing this. When the fall warm-season crops wind down, we plant again with cool-season crops. To avoid garden down time, re-plant as crops stop producing. By planting successively, you'll have enough produce to feed your family, all season.

Square Foot Vegetable Planting Guide for Northwest Florida

Vegetable	Transplants or seed directly into garden?[1]	Seeding time	Transplant time	Days to harvest	Square foot spacing[2] (Number of plants)
Arugula	Direct	Feb-May	-	20-40	16
Basil	Transplant/Direct	Jan-May	Mar-May	60-90	1
Beans	Direct	Apr-May	-	55-70	8 (pole with trellis) 9 (bush)
Bok Choy	Transplant/Direct	Aug-Oct	Sept-Oct	30-50	1
Broccoli	Transplant/Direct	Aug-Oct	Sept-Nov	75-90	1 per 2 sq.
Carrots	Direct	Feb-Mar	-	70-80	16
Celery	Transplant/Direct	Jan-Mar	Mar-April	115-125	1
Collards	Transplant/Direct	Aug-Sept	Sept-Oct	70-80	1
Corn	Direct	Mar-Apr	-	60-95	2
Cucumbers	Transplant/Direct	Feb-Mar	Mar-April	50-65	1
Eggplant	Transplant	Jan-Feb	Mar-May	90-110	1
Garlic	Direct[3]	Oct-Nov	-	180-210	4
Kale	Transplant/Direct	Aug-Oct	Sept-Oct	70-80	1
Kohlrabi	Transplant/Direct	Sept-Oct	Oct-Nov	70-80	4
Lettuce	Transplant/Direct	Jan-Apr	Jan-April	50-90	4 (leaf) 1 (head)
Melons	Transplant/Direct	Feb-Apr	Mar-April	75-95	1 per 2 sq. (with trellis)
Mustards (large)	Transplant/Direct	Sept-Oct	Oct-Nov	40-60	4
Okra	Direct	Mar-Jul	-	50-75	1
Onions, Bulbing	Transplant/Direct[4]	Aug-Sept	Oct-Nov	90-150	4
Onions, Bunching	Transplant/Direct[5]	Aug-Mar	Sept-Apr	30-75	16
Onions, Multiplier	Transplant/Direct[6]	Aug-Mar	Sept-Mar	90-120	4
Peas (Southern)	Direct	Mar-Apr	-	60-90	8
Peas (English)	Direct	Jan-Feb	-	50-70	8
Peppers	Transplant	Jan-Feb	Mar-May	80-100	1
Potatoes	Direct[7]	Feb	-	85-110	1
Radishes	Direct	Sept-Mar	-	20-30	16
Summer Squash	Transplant/Direct	Feb-Apr	Mar-April	40-55	1 per 4 sq.
Sweet Potatoes	Direct[8]	Apr-Jun	-	120-140	1
Tomatoes	Transplant	Jan	Feb-Mar	90-110	1 per 2 sq. (with stake/cage)
Turnips	Direct	Sept-Nov	-	40-60	9
Winter Squash	Transplant/Direct	Feb-Jul	Mar-July	80-110	1 per 2 sq. (with trellis)

Square Foot Vegetable Planting Guide for Northwest Florida

[1]Many spring crops, such as tomatoes and peppers, should be seeded indoors in winter and transplanted once danger of frost has passed. Many fall crops, such as kale and broccoli, should be seeded in late summer, and transplanted once temperatures have cooled down.

[2]Square (sq.) foot spacing can depend greatly on variety and size of plant at harvest. If you find these recommendations unsuitable, adjust in subsequent seasons. *Seed packet plant spacing equivalents: 3" plant spacing (non-vining, such as carrots) = 16 per sq.; 3" plant spacing (vining, such as pole beans) = 8 per sq. using trellis; 4" plant spacing = 9 per sq.; 6" plant spacing = 4 per sq.; 12" plant spacing = 1 per sq.; 18" plant spacing = 4 in 9 sq.; 24" plant spacing (non-vining, such as summer squash, zucchini) = 1 in 4 sq.; 24" plant spacing (vining, such as watermelon, winter squash) = 1 in 2 sq. using trellis.*

[3]Garlic is grown from cloves, which are small bulblets split off larger bulbs. Elephant garlic, which is more closely related to leeks, do best in our climate, and can be grown from corms, pearls, or cloves.

[4]Bulbing onions should be "short day" varieties and can be grown from seeds or "sets", but take longer from seed.

[5]Bunching/green onions can be planted most of the year, but do not form enlarged bulbs.

[6]Shallots are a common type of multiplier onion, which are perennial, but need to be divided and reset every year.

[7]Potatoes are grown from "seed" potatoes, which are pieces of the potato that contain at least one "eye".

[8]Sweet potatoes are grown from "slips", which are sprouts grown from stored sweet potatoes.

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Calendar Key:

Planting Method:
D= Direct Seed
S= Seed indoors for transplanting later
T= Transplant

Color Code:
Overall Good Planting Time
Risky Planting Time
Needs Frost Protection
Needs Shade Cloth

	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July
Arugula	D	D	D	D	D	D	D	D	D	D	D	
Basil	ST	T					S	DT	DT	DT		
Beans	D	D						D	D	D		
Beets		D	D				D	D				
Bok Choy	SD	SDT	SDT					SDT	SDT			
Broccoli	S	ST	T	T			S	T				
Cabbage	S	ST	T	T		S	T	T				
Carrots	D	D	D	D	D		D	D				
Chard		SD	SDT	SDT			S	DT	T			
Collards	S	SDT	DT	DT		S	DT	DT				
Corn								D	D			D
Cucumbers							S	SDT	DT			
Eggplant							S	T	T	T		
Garlic			D	D								
Kale	S	SDT	DT	T								
Lettuce	S	ST	SDT	SDT	ST	ST	ST	ST	ST	T		
Melons							S	DT	DT			
Mustards		D	D	D								
Okra							S	SDT	SDT	DT	DT	DT
Onions	S	S	DT	T								
Peas (field)	D										D	D
Peas (English)		D			D	D	D					
Peppers						S	S	T	T	T	T	
Potatoes							D					
Spinach		ST	SDT	SDT	SDT	ST	ST	ST				
Strawberries			T	T								
Summer squash								SDT	DT			
Sweet Potatoes									T	T	T	
Tomatoes	T					S	T	T				S
Turnips		D	D	D			D	D				
Winter Squash								SDT	SDT	DT	DT	

Brought to you by the Red Hills Small Farm Alliance and Full Earth Farm

Planting Dates for North Florida

By Katie Harris of Full Earth Farm

Finding accurate vegetable and fruit planting information for our region can be challenging. Most gardening publications are geared for places with real winters and thus much shorter growing seasons. Here we are privileged to be able to plant food crops year-round. This doesn't, however, mean we can plant anything anytime of the year. Timing helps us plant with the appropriate seasons as well as when certain bugs are least active. For all gardens, but especially organic ones, timing is everything.

Terms to Know

Direct Seed: Putting seeds directly into the soil where they will be grown to maturity.
Transplant: Putting established plants, which were started from seed in flats or pots, into the ground where they will be grown to maturity.

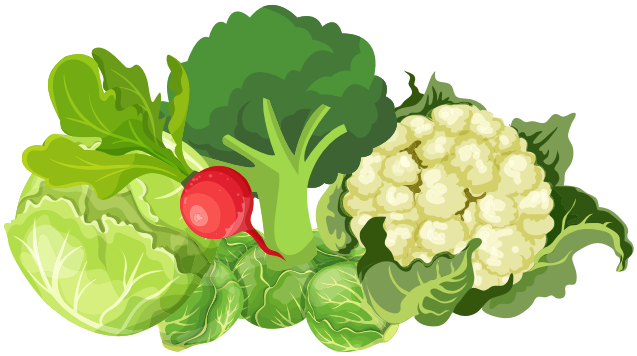
Frost Cloth: A thin cloth used to cover plants during a freeze to slow the thaw and protect the plants. (sold at local nurseries)
Shade Cloth: Netting used to cover plants in the summer, often over hoops, to create a cooler growing environment.

Risky Planting Times

When looking at the planting calendar you will notice some blocks that are orange, indicating they are "risky" planting times. This is because there are many different factors that determine whether or not a crop succeeds, and it is more difficult to succeed in certain times of year than others. Whether your growing space is on a hilltop or in a lowland effects temperature. Tree cover also plays a role. For example, planting in a pine grove can provide season extensions protecting from both frost and excessive heat, while full sun will leave crops exposed but provide more daylight. Every growing space has pros and cons that change the equation for what crops to grow when. And then there are bugs. Some gardens get pests earlier than others in practically the same location. The planting times labeled "risky" represent times when your

Crop Rotation

Crop rotation is an important part of the process of growing vegetables. It can limit the spread of crop disease and pests and help reduce the need for pesticides. Many of our vegetable plants are related to one another and can share specialized pests, disease, and fungi that affect them. By rotating your crops each season, you can cut down on reinfections and infestations. Learning plant families can help you better plan your garden and implement crop rotation.



Brassicaceae

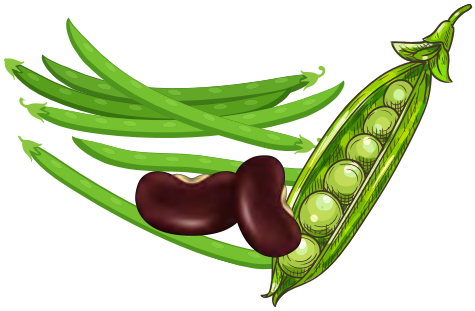
Broccoli
Cabbage
Kale
Radish
Cauliflower
Kohlrabi
Turnip
Arugula
Rutabaga
Brussels sprouts

Apiaceae

Carrot
Parsnip
Parsley
Celery
Fennel
Cilantro

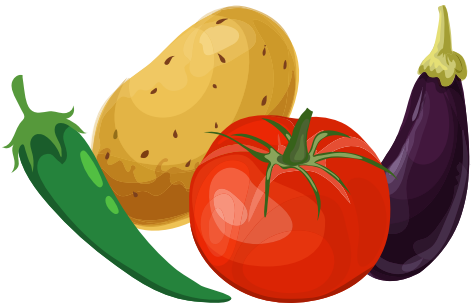
Cucurbitaceae

Cucumber
Summer squash
Pumpkin
Luffa
Zucchini
Winter squash



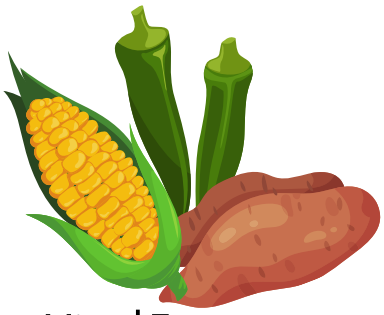
Fabaceae

Beans
Peas



Solanaceae

Pepper
Tomato
Potato
Eggplant



Mixed Taxonomy

Corn (**Poaceae**)
Sweet Potato (**Convolvulaceae**)
Okra (**Malvaceae**)

Asteraceae

Lettuce
Sunflower
Artichoke
Endive

Amaranthaceae

Beets
Spinach
Swiss chard

CROP ROTATION AND SUSTAINABLE GARDENING GUIDE FOR NORTH FLORIDA GARDENS
(Revised 2021)

Crop rotation, and cover crops in vegetable gardens are tools to improve your soil, discourage pests and suppress weeds. This four-year rotation guide was developed for the North Florida area utilizing information from UF/IFAS and other sources. For best pest and disease control, cover crops should also be rotated each year and suggested cover crops are included below.

Begin by dividing your garden space into four beds or areas or four sets of rows. To rotate crops, plant as indicated below, resulting in rotation of plant families in each area for a period of four years. On year five, the cycle begins again. Within the designated area, no specific placing of plants is necessary.			
Year 1 – Bed/Rows A	Bed/Rows B	Bed/Rows C	Bed/Rows D
Year 2—Bed/Rows D	Bed/Rows A	Bed/Rows B	Bed/Rows C
Year 3—Bed/Rows C	Bed/Rows D	Bed/Rows A	Bed/Rows B
Year 4 —Bed/Rows B	Bed/Rows C	Bed/Rows D	Bed/Rows A
Year 5 —Bed/Rows A	Bed/Rows B	Bed/Rows C	Bed/Rows D
Rotation List 1	Rotation List 2	Rotation List 3	Rotation List 4
Spring	Spring	Spring	Spring
Summer Crops: Sweet Potatoes/Yams, Southern Peas (Cowpeas) and Okra Plant Apr-May	Solanaceae: Tomatoes, Peppers, Eggplant Plant Mar-Apr Follow with cover crop: Buckwheat or oats in Jul-Aug. (Interplant with veg if necessary)	Legumes: Green bush and pole beans; Corn Plant Mar-Apr Follow with cover crop cowpeas, soybeans or sorghum-sudan	Cucurbits: Summer and Winter Squash, melons, cucumbers, pumpkins Plant Mar-Apr Cover crop: Cowpeas in Jul-Aug, followed by Rye, Oats, Alfalfa, Crimson Clover and/or Hairy Vetch in Sep-Oct
Fall	Fall	Fall	Fall
Lettuces, Spinach, Chard, Mustard, Arugula, Cilantro, Fennel, Parsley, Dill, Asian Greens Plant Sep–Oct Follow with cover crop: oats, wheat, or Abruzzi Rye Nov-Jan (Interplant with vegetables if necessary)	Root crops: Carrots Parsnips Turnips, Rutabagas Beets Radishes Onions, shallots Leeks, garlic Celery, Celeriac Plant Oct	Brassicas: Cabbage, Broccoli, Brussels Sprouts, Collards, Cauliflower, Kohlrabi, Kale Plant Sep-Oct	Early Spring Crops: Potatoes and Green Peas, Sugar Snaps, Snow Peas Plant Jan-Feb

NO TILL: It is best not to till the garden after the initial groundbreaking. Or use sheet mulching to begin your garden. Tilling tends to compact the soil and is destructive to the microbial communities you are building to make your garden productive. It also releases carbon and nitrogen from the soil into the air. Just push aside decomposing plants, cover crops, and mulch to plant your seedlings or seeds.

COVER CROPS: Periods when there are no plants within a bed should be minimized by the use of cover crops. Cover crops provide food for the microbes (an essential part of your soil health) which feed off the sugars secreted by plant roots. During periods when there are no plants, microbes will eventually starve. Cover crops also mine the soil for nutrients and interfere with the reproductive cycles of insect pests. When chopped down and composted on site, they furnish essential elements for ensuing crops. Cover crops should be cut down about half way through bloom and before any seeds form, and left on the ground under mulch or lightly worked into the soil, leaving roots in the ground. (Southern peas can be harvested, and then cut down, if desired.) Soil should be worked as little as possible to prevent disturbing microbe communities and releasing nutrients into the air. Planting cover crops, particularly those which fix nitrogen, should be timed so that the next crop can be planted as soon as possible after cutting the cover crop, since nitrogen is volatile and will escape from the soil.

When planting, just pull the cover crop mulch aside and insert the seeds or plants. Leave the mulch pulled back from seeds until they germinate. The beds should remain deeply covered with mulch during any fallow period. The chart in an IFAS document on cover crops is very helpful in determining what nutrients and advantages are supplied by different cover crops. Some cover crops help suppress nematodes, insects, or diseases as well as supplying various nutrients. Cover crop cocktails are now being used by farmers and can be used in the garden also – mixing the seeds from different cover crops and planting them together to supply a variety of advantages.

COMPANION PLANTING: Plant rosemary, lavender, nasturtiums, mint, basil, parsley, borage, sunflowers, cilantro, celery, dill, thyme, marigold, yarrow, and calendula throughout garden as they help to repel pests. Also cut them and work into the soil. Use their leaves to make an organic general insecticide spray. French marigolds discourage nematodes; Calendula is said to repel tomato worms and many other insects; thyme is supposed to deter cabbage worm, etc. Comfrey is a nutrient accumulator; plant along edges and use leaves for mulch; it is also a compost activator.

ATTRACTING GOOD BUGS AND POLLINATORS: It is important to sow lots of flowers and herbs among your vegetables, particularly in summer, to attract good bugs and pollinators. Winter crops do not experience as many pest problems, and most winter crops produce no fruit, thus no pollination is necessary. There are many good resources for plants that attract pollinators.

MULCH: Mulch should be maintained on soil at all times to aid in decomposition of harvested plants and cover crops, retain moisture, discourage weeds, and prevent leaching of nutrients from soil. Materials suitable for mulch are chopped plants from the garden, straw (oats, rye, wheat), pine straw or leaves, particularly oak leaves. Hay is not as good as it contains grass seeds, and because most hay has been treated with herbicides to kill weeds. Some sprouting will occur from grain straw, but consider leaving the sprouts in place. Cut and drop before they develop seed to use as nutritious mulch. Grains repel nematodes, and have strong root systems to mine minerals, particularly potassium.

HARVESTING: Soon after harvesting, cut plants at ground level and leave roots in the soil. They will decompose and supply nutrients to the soil as well as creating pathways for air and water to reach future plant roots. Plant your next crop around them. Chop up harvested plants while they are still green and leave on the ground under mulch or lightly work into soil. This, of course, does not apply to diseased plants which should be destroyed, or woody stems such as stalks from okra, corn, and eggplant. They can be chopped and composted but may be too bulky in the garden.

FERTILIZING: Start by adding a lot of organic matter in your soil. A mixture of aged manure, compost, and peat moss can be worked into the soil or used alone in raised beds. Vermiculite can be added to supply potassium. It will take longer to get your garden truly productive if you start with unimproved soil. Each year, several inches of compost can be added after harvesting the winter crop or at time of planting the summer crop. Fish emulsion can be added during the growing season to supply nitrogen and phosphorus. Add sparingly as aphids like plants with high nitrogen. Compost tea or worm castings are also beneficial additions, particularly if the soil has been disturbed or there has been a fallow period. Compost tea or bio-brew cultures microbes from worm castings or compost to add a richer load of microbes to your garden. With cover crops and the additions listed here, you will probably not need any other fertilizer. You can add wood ashes, potash, or greensand before planting if your soil tests low in potassium. Wood ashes also raise soil pH so add sparingly unless you have acid soil – low pH. A soil test every year is advisable to make sure the soil pH is staying within the optimum range for vegetables (roughly between 6.0 and 7.0), and to check soil nutrients to make sure no additional supplements are necessary. It is important to regulate pH as the pH level determines the extent to which nutrients in the soil are available to plants. Even if the soil contains ample nutrients, if the pH is out of range, the plants cannot access the nutrients and will not thrive.

SEED SAVERS: This rotation schedule may not work for those who wish to save seeds of heirloom plants because different varieties of the same species planted in the same bed may cross pollinate, which will usually not affect the current crop, but will be evident in the next generation planted from the saved seeds.

For the latest version of this schedule including active links to additional information, and additional references including planting guide for North Florida, organic insect control chart, UF vegetable gardening guide, links to insect and disease identification sites, and many more resources see the VegHeadz Blog: https://www.NorthFloridaVegheadz.blogspot.com

HARVEST GUIDE

Adapted from University of Georgia Extension Green Thumb Tips for the Urban Gardener

While harvesting too soon may result in only a reduction in yield, harvesting too late can result in poor quality due to development of objectionable fiber and the conversion of sugars into starches. A late harvest can also cause plants to terminate, or stop producing as they complete their reproduction process. Fully-mature vegetables left on the plant also attract more disease and insect problems. The following table gives suggestions for determining the proper stage of maturity for harvesting many vegetables.

Vegetable	Part Eaten	Too Early	Optimum Maturity	Too Late
Asparagus	Stem	Insufficient length	6" to 8" long; no fiber	Excess woody fiber in the stem
Beans, Pole Green	Pod and seed	Insufficient size	Bean cavity full; seed ¼ grown	Large seed; fibrous pods
Beans, Snap Bush	Pod and seed	Insufficient size	Turgid pods; seeds just visible	Fibrous pods; large seed
Beets	Root and leaves	Insufficient size	Roots 2" to 3" in diameter	Pithy roots; strong taste
Broccoli	Immature bloom	Insufficient size	Bright green color; bloom still tightly closed	Loose head; some blooms beginning to show
Brussels Sprouts	Head	Insufficient size; hard to harvest yellow	Bright green; tight head	Loose head; color changes to green
Cabbage	Head	Insufficient leaf cover	Heads firm; leaf tight	Loose leaf; heads cracked open
Cantaloupes	Fruit	Stem does not want to separate from fruit	Stem breaks away easily and cleanly when pulled	Yellow background color; soft rind
Celery	Stems	Stem too small	Plant stands 12" to 15" tall; medium-thick stem	Seed stalk formed; bitterness
Collards	Leaf	Insufficient leaf size	Bright green color; small midrib	Large midrib; fibrous
Corn, Sweet	Grain	Grain watery; small	Grain plump; liquid in milk stage	Grain starting to dent; liquid in dough stage
Cucumber	Fruit	Insufficient size	Dark green skin; soft seeds	Skin beginning to yellow; hard seeds
Eggplant	Fruit	Insufficient size	High glossy skin; side springs back when mashed	Brown seeds; side will not spring back when mashed

HARVEST GUIDE

Vegetable	Part Eaten	Too Early	Optimum Maturity	Too Late
Lettuce, Head	Leaves	Head not fully formed	Fairly firm; good size	Heads very hard
Okra	Pod	Insufficient size	2" to 3" long; still tender	Fiber development; tough pods
Onions, Dry	Bulb	Tops all green	Tops yellow; ¾ fallen over	All tops down; bulb rot started
Peas, English	Seed	Peas immature and too small to shell	Peas small to medium; sweet bright green	Yellow pods; large peas
Peas, Southern	Seed and pod	Peas immature and too small to shell	Seeds fully developed but still soft; soft pods	Hard seeds; dry pods
Pepper, Bell	Pod	Chocolate-colored pods	Bright red and firm	Shriveled pod
Potato, Irish	Tuber	Insufficient size	When tops begin to die back	Rotting or pest issues
Potato, Sweet	Root	Small size; immature	Most roots 2" to 3" in diameter	Early plantings get too large and crack; damaged by soil temperature below 50°F
Soybeans	Seed	Seeds not developed	Thick pods; bright green	Dry pods; seed shatters out
Squash, Summer	Fruit	Insufficient size	Rind can be penetrated with thumbnail	Damaged by frost
Squash, Winter	Fruit	Soft rind	Rind difficult to penetrate with thumbnail	Penetrating with thumbnail is difficult; large seed
Tomatoes	Fruit	May be harvested in three stages: Mature green – tomato is firm and mature, color changes from green to light green, no pink color showing on blossom end. These tomatoes will store one to two weeks in the refrigerator. Pink – pink color about the size of a dime on the blossom end. At room temperature, these tomatoes will ripen in about three days. Ripe – tomato is full red but still firm. Should be used immediately.		
Watermelon	Fruit	Green flesh; green stem is difficult to separate	Melon surface next to the ground turns from a light straw color to a richer yellow	Top surface has a dull sheen

Acknowledgement is made to Willie O. Chance III and Darbie Granberry for authoring the original manuscript of this table.

No-Till Gardening

No-till, sometimes called no-dig, is an easier way to garden. It limits disturbance to the soil life, largely made up of microbes, and prevents activating dormant weed seeds. To begin, you can more easily create a raised bed garden on turf or some other permeable surface by laying down one or two layers of cardboard over the footprint of your raised bed, and several feet beyond if you want mulched pathways around the bed. If the soil is particularly compacted it's a good idea to loosen it with a broadfork or garden fork before laying the cardboard. Adding a layer of mushroom compost under the cardboard will jumpstart the conversion to garden soil.

Place or construct your raised bed on top of the cardboard. Poke holes in a number of places through the cardboard to allow excess water to drain. Water the cardboard well and add your choice of garden soil, then plant seeds or seedlings. The cardboard will kill any weeds and grass beneath. Over the next six months to a year, as the cardboard decomposes, worms and microorganisms will move in and soften the earth beneath. Soon you'll have deep, fertile garden soil. At this stage it's a good idea to plant root vegetables such as carrots, beets, and particularly daikon radishes, to further loosen and aerate the soil.

Once your raised bed is established, you can garden traditionally or you can continue with no-till methods. In raised beds or in native soil, no-till involves cutting crops and cover crops at the soil surface, leaving the roots to decompose. Drop the plants in place to act as mulch and plant cover crops or new vegetable crops among the dropped plants. After cutting, diseased plants such as tomatoes should be discarded. Woody stalks like okra and eggplant may be removed as they take a long time to decompose. You can compost these stalks in a compost pile.

With this method, microorganisms, including the extensive webs of fungi called mycelium, which are necessary to sustain plants, are undisturbed. Dormant seeds, known as the seed bank, are not exposed to light and air, so weed germination is reduced. Dropped plants are moved aside as necessary, and new vegetables or cover crops are sown to continue nourishing microorganisms and to prevent erosion and leaching of nutrients. No-till gardening conserves moisture, discourages weeds, and provides a steady supply of nutrients for crops as mulched plants decompose. A three to four year crop rotation schedule discourages pests and diseases. It works best when cover crops are planted between vegetable crop seasons to rapidly build organic matter and so that the soil is never bare. Pioneer plants (weeds) will inevitably take root in bare soil.

Transitioning from traditional gardening to no-till requires a period of several seasons of weeding, cover crops, and management. Start by laying out pathways, lay cardboard and mulch to kill weeds there. Plant cover crops thickly, and cut or pull any weeds before they go to seed. Within a few growing seasons weeds will be discouraged, soil fertility will increase, and less care will be needed. It's a great way to garden. For more information about no-till and a similar process called sheet composting, search "IFAS no dig gardening" online.

Seed Saving

Adapted from UF/IFAS Gardening Solutions

Collecting seeds is one way to take your passion for gardening to the next level. You can collect seeds from annuals, perennials, vegetables, and fruits in your garden with varying degrees of ease.

Part of the fun of collecting seeds is growing your own low-cost plants and having extras to share with friends. Just remember that not all plants grown from seed will look exactly like the plants from which they were gathered (their parent plants).

For flowering plants that do not make fruit, wait until the flowers have dried, leaving you with a dry brown seed head. You can snip off a whole seed head into the container of your choosing. Figuring out exactly when your seeds are ready to be harvested may take some practice, just like it takes some practice to know when your vegetables and fruits are ripe for picking. Once picked, seeds will not continue to develop, so they do need to be harvested once mature and not too early.

Seed heads and seed pods need to be air-dried after they are harvested. You can lay them out on newspaper or in a shallow box to do this. Make sure you spread them out to allow them room to dry as you want to avoid seeds becoming moldy. Once they have dried out you can shake seeds loose from pods or seed heads. Keep seeds from different flowers in separate paper envelopes and label them with the plant's name and the date collected.

It is best to use paper envelopes to store your seeds; if there is even the slightest bit of moisture present, mold can develop. Keep the seeds stored in a cool dry place until it is time to plant.

When you are told to store seeds in a "cool, dry place," you may wonder what exactly that means. We recommend putting seed envelopes in a tightly sealed jar in the refrigerator. Some people choose to store seeds in the freezer, but this can be tricky, as seeds have to be very dry before freezing or the seeds can be killed.

Saving seeds from vegetables can be easy, too. Many vegetables like broccoli, greens, carrots, and more, will "bolt" and go to seed when temperatures rise. You can harvest seeds from these vegetables much the same way you harvest and dry seeds from flowers.
For fruits and vegetables that have wetter seeds (think tomatoes or blueberries), you'll want to clean and dry the seeds more thoroughly. Smear the seeds out across a paper towel and allow them to dry out. Once they are dry you can remove any leftover fruit particles.

Dried seeds should then be stored in a labeled paper envelope that is kept in a cool, dry place.

Of course, not every seed will grow. Errors and failures are all part of the game, but it can be immensely rewarding to grow plants from seeds collected in your own garden. Plus, passing along your own seeds to gardening friends can be a great gift.

Good Bug, Bad Bug, Benign Bug

A quick guide to common good bugs, bad bugs, and Integrated Pest Management (IPM) for home vegetable gardens.

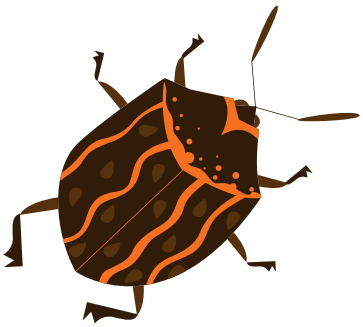
Good Bugs

Good bugs are beneficial insects and arachnids in the garden. They are often predators that feed on bad bugs in vegetable gardens. Common good bugs include lady beetles, lacewings, assassin bugs, spiders, predatory stink bugs, parasitic wasps, earwigs, big-eyed bugs, minute pirate bugs, dragonflies, syrphid flies, hover flies, and praying mantid.

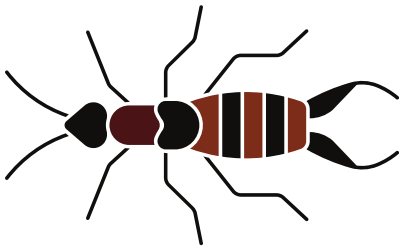
Pollinators pollinate many crops, which is the most common way crops that rely on cross-pollination produce fruit.

- Common pollinators include bees, butterflies, moths, flies, and beetles.
- Common crops that rely heavily on pollinators generally include crops that produce fruit, such as apples, tangerines, lemons, almonds, blueberries, cucumbers, onions, summer squash, pumpkins, watermelon, and blackberries.

Bad Bugs



Bad bugs are insect pests that eat plant leaves, stems, and fruit and can wreak havoc on plant health and appearance. Common bad bugs in vegetable gardens include aphids, mealybugs, whiteflies, thrips, spider mites, leaf-miners, stink bugs, leaf-footed bugs, hornworms, armyworms, cabbage loopers, southern armyworms, tomato fruitworms, tomato pinworms, yellowstriped armyworms, snails, and slugs. Snails and slugs are not insects yet they are often considered garden pests.



Benign Bugs

The vast majority of insects have neither a positive or negative influence in our lives and gardens. Insects are the foundation for our ecosystem and it is important not to overreact to insects in our gardens. Needlessly using pesticides on insects that will not harm your garden can be harsh on your wallet and the environment.

Integrated Pest Management (IPM)

IPM is a process to solve pest problems while minimizing risks to people and the environment. It focuses on long-term prevention of pests by managing the ecosystem.

Cultural IPM practices include:

- **Proper selection and maintenance of plants.** Use resistant varieties, proper fertilization, proper irrigation, crop rotation, and insect barrier fabric.
- **Determining your level of tolerance.** Is the insect damage reducing yield or a major aesthetic detraction in your landscape?
- **Scouting your garden often.** Examine upper and lower leaf surfaces, as well as the soil, for eggs, larva, and adults. Hand picking mild infestations may be enough to control the pest.

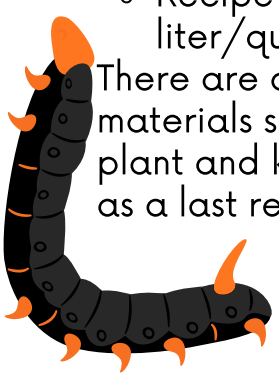
Biological IPM practices include:

- **Encouraging beneficial insects.** They are natural enemies of pests.
- **Using trap plants.** Lure bad bugs away from your crop, such as growing sunflowers to attract leaf-footed bugs.

Chemical IPM:

- Should be considered the last resort, as you do not want to disturb pollinators or beneficial insects. Always follow the label instructions carefully.
- Start with natural products and spot treat the specific plant to target the pest you want to control. Most chemicals are not selective, so good bugs may be destroyed along with the bad bugs.
- For caterpillars, try using Bt (Bacillus thuringiensis), which is an organic insecticide. It is most effective when caterpillars are small. Spray late in the evening, as this is when caterpillars actively feed, and Bt readily breaks down in sunlight.
- Spinosad is another natural substance created by a soil bacterium that is used to control a wide variety of pests, such as thrips, spider mites, leaf-miners, mosquitoes, ants, and fruit flies. It can be found in many pesticide products.
- You can try a homemade recipe for soft-bodied insects, but be careful not to use too much, as this can harm the plant. Always test on a section of foliage to check for phytotoxicity. Do not spray during hottest part of day, and cover top and bottom of leaves. If possible, apply when there is less sunlight during dusk and dawn to reduce chance of plant damage.
    - Recipe 1: Mix 1 teaspoon mild dish detergent (not with a degreaser) and 1 tablespoon of vegetable oil into a gallon of water.
    - Recipe 2: Add 2 teaspoons liquid soap (such as Ivory or Dr. Bronner's) to 1 liter/quart or water.

There are other forms of chemical IPM, such as oil based pesticides. These include materials such as horticultural oils and neem oils, but many of these oils can burn the plant and kill beneficial insects, so be sure to read the label carefully and only apply as a last resort.



Beneficial Insects

PREDATORS

Lady beetle larva (L) and adult (R)

Johnny N. Dell, Bugwood.org

Predatory stinkbug

Lacewing larva

Adult lacewing

Wolf Spider
(arachnid, not insect)

Whitney Cranshaw, Colorado State University, Bugwood.org

Assassin bug eggs

Gerald J. Lenhard, Louisiana State University, Bugwood.org

Adult assassin bug

Earwig

DECOMPOSERS

Dung Beetle

Lyle J. Buss, UF/IFAS

Roly-poly
(crustacean, not insect)

Beneficial Insects
POLLINATORS

There are over 300 species of native bees in Florida alone. You may encounter many of these species as well as non-native honey bees. Other pollinators include flies, wasps and moths.

Sweat Bee

Two-Spotted Longhorn Bee

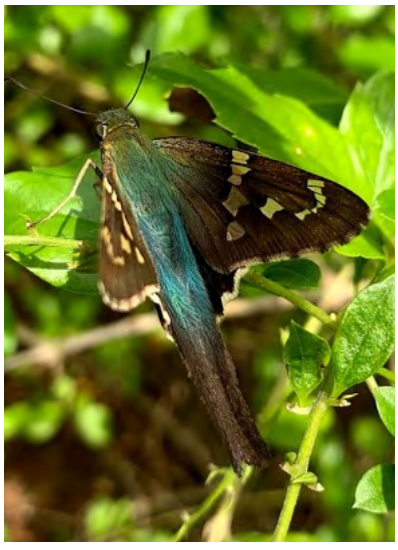
Scoliid Wasp

Honeybee

Carpenter Bee

Bumblebee

Giant Leopard Moth



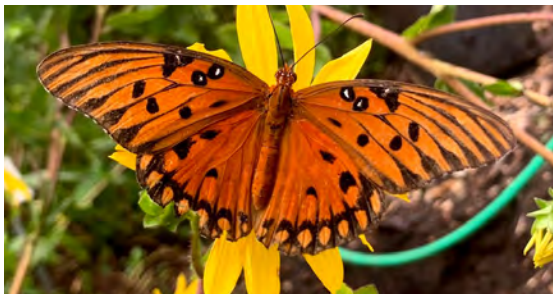
Long-tailed Skipper

Polka-dot Wasp Moth

Beneficial Insects
POLLINATORS

Butterflies and moths are important pollinators. Many of these insects have particular plants or plant families they feed on as larvae (caterpillars). To encourage adult butterfly pollinators in your garden, plant their larval host plants near your vegetables. Here is a selection of common species in Leon County.

Gulf Fritillary



Both of these species eat passionvine as caterpillars.

Zebra Longwing

Monarch

Larval host:
Native milkweed

Giant
Swallowtail

Larval hosts:
Citrus
Rue

Black
Swallowtail

Larval host:
Carrot family
(dill, fennel, etc)

'Bad Bugs'

PESTS IN THE GARDEN

Paul Choate, UF

Tomato hornworm

James Castner, UF

Squash vine borer

Lyle J Buss, UF

Leaf footed bug nymph

John Capinera, UF

Leaf footed bug adult

Lyle J Buss, UF

Stink bug

Vivek Kumar, UF

Whitefly adult

Lyle J Buss, UF

Southern armyworm

Lyle J Buss, UF

Cabbage aphid

Find a bug you can't identify? Don't squish it on sight! Try using an identification app like iNaturalist or send pictures to us. Email us at askamastergardener@ifas.ufl.edu

NO-PESTICIDE GARDENING

PREP WORK

- Till or hand-turn the soil well in advance of planting to discourage soil insects.
- Use soil solarization to reduce nematodes (microscopic worms that attack vegetable roots and reduce growth and yield).
- Add organic matter to the soil to help reduce nematode populations.

PLANTING

- Identify beneficial insects such as praying mantis, spiders, big-eyed bugs, assassin bugs, lady bugs, and all wasps.
- Plant flowers in the vegetable garden.

  Rotate vegetables so that the same vegetables are not planted repeatedly in the same areas.
- Choose adapted varieties with resistance or tolerance to nematodes and common diseases.

MAINTENANCE

- Remove unproductive plants and compost or dispose of them.

- Watch for early disease symptoms. Remove any diseased leaves or plants to slow spread.

- Monitor or scout the garden twice weekly for pest problems.

- Control weeds in and around the garden because they can be a source of insects and diseases.

- Remove large insects by hand.

- Do not panic and start spraying at the first sign of insect damage.

- Harvest ripe crops promptly.

- Keep plants growing vigorously and in a state of good health by supplying appropriate amounts of water and fertilizer.

Protect plants from cutworms by placing a collar around the plant. The collar can be made from a bottomless plastic cup or a waxed cardboard carton and should extend a few inches above and at least an inch below the surface of the ground.

For more information, please visit http://edis.ifas.ufl.edu/hs1215

UF|IFAS UNIVERSITY of FLORIDA

Companion Plants, Biodiversity, and Bugs

Think of how many different kinds of plants grow in a forest or any uncultivated area. These environments contain a large variety of plants, animals, and insects. Plants thrive in biodiversity. A variety of plants supports a variety of creatures in the garden and microorganisms in the soil, each providing different services to the garden ecosystem. By thinking of your garden as an extension of the larger ecosystem around us, you can provide services to wildlife and benefit from their presence with greater yields from less work.

Biodiversity in a vegetable garden means not just planting different types of vegetables, but growing other types of plants as well, such as flowers and grains. Native flowers, grasses, and perennials help attract helpful native insects, and provide a stability that is usually lacking in a vegetable garden as we change crops, till soil, and pull up plants. In choosing plants for your garden to provide biodiversity, consider what the garden creatures will need, and the services they and different plants will provide to the vegetables, which are the main crop. Plants which provide services to your garden are sometimes called companion plants.

Garden creatures need food such as nectar and pollen and they need habitat to overwinter and raise their young. We want to encourage earthworms, predatory toads, ground beetles, spiders, birds, and snakes to help create a balance in the garden. These garden predators and the many beneficial insects we want need a water supply and some place protected to thrive. A water feature, logs and brush piles, and groups of rocks are all things that support garden helpers. Companion plants can help provide food and habitat.

Add a water source to your garden for wildlife big and small. Pebbles create a shallow end for insects to land safely.

There are many companion planting charts available which give a variety of advice about what plants grow best together in your garden, but many of them don't apply to our area because they suggest pairing plants which don't grow in the same season for us. Also there is a lack of scientific evidence to support many of those claims. Companion plants actually are a much broader category than just planting two vegetables together which supposedly increase their yields.

Companion plants can attract beneficial insects, such as pollinators or predators, and repel certain pests. They can provide nitrogen for themselves, other crops around them, and crops that follow them. Some companion plants can mine minerals from deep in the soil and return them to the top layers of soil for use by other plants. Some attract bad bugs away from your crops. They can provide weed control, regulate sun exposure on adjoining plants, and provide natural trellises. They can add biomass to improve the texture of your soil and provide nutrition for your plants. They can provide living mulch. Different companion plants will provide different services to the garden.

Companion Plants, Biodiversity, and Bugs

Incorporating native (and non-native) flowers into your vegetable beds creates habitat and food for beneficial insects.

In the VegHeadz demonstration garden, increased pest pressure has caused us to reconsider traditional garden rows and monocultures. Consider a different style of gardening to control pests and avoid the use of pesticides. Planting different species together, including selected non-edible plants in beds or groups rather than rows of the same plant, provides many benefits. Companion plants should be intermingled with vegetables to provide the best results, not just parked at the end of a row.

Planting companions for your vegetable crops work best when you make note of what works in your garden from season to season. The interaction of plants with each other and with the other denizens of the garden is complex, and each garden environment is different.

For more information and ideas about specific companion plants and their benefits search "Companion Plants IFAS." Another good reference is "Plant Partners—Science Based Companion Planting Strategies for the Vegetable Garden," by Jessica Walliser, Storey Publishing, 2020.

Pollinator Plants

Rudbeckia

Liatris

Echinacea

Dotted Horsemint

Consider some of these native and non-native flowers to incorporate into your vegetable garden to increase pollinator activity. These plants are a mix of annuals and perennials that do well in a full sun environment. You can also include herbs like basil, thyme, and fennel by letting them flower.

Coreopsis

Yarrow

More plants to consider:

Perennials:	Annuals:
Gaillardia	Marigold
Salvias	Basils
Pentas	Nasturtium
Milkweed	Cilantro
Goldenrod	Cosmos

Stokes' Aster

Tithonia

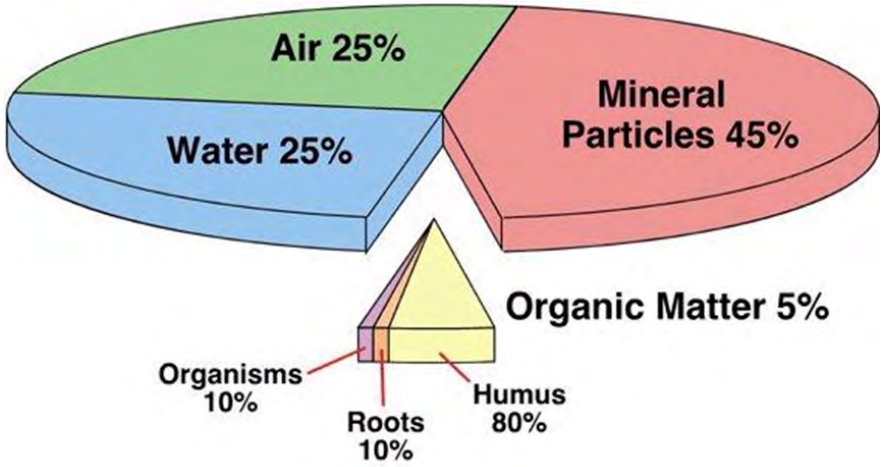
Zinnia

Sunflower

Soil, Compost, Mulch

Every gardener wants the best soil for their garden. How do you know if your soil is "good"? What do you add to make it good? When you go to a plant nursery or the gardening section of a big box store, you see bags of things advertised as garden soil or mulch or mushroom compost. Which one do you use for your garden? And what about the garden mix from landscape companies or free materials at solid waste facilities? Can you plant in that?

It is confusing. For instance compost can be used as garden soil, or as mulch, or as an amendment to the native soil in your garden. And what's the difference between mushroom compost and the compost you make in your own yard? Let's start with soil—what is it and what makes it "good"?



A typical soil's basic components include mineral particles, air, water, and organic matter (organisms, roots, and humus).

Soil—Soil is a primary component of the earth's surface and provides a place for plant roots, as well as a source of necessary materials for plant growth. Soil is composed of minerals, organic matter, microorganisms, air, and water— usually about 45% mineral material, 5% (or less in Florida soils) organic material, and 50% pore space, which is occupied by air and/or water. The organic portion of the soil provides most of the nutrients which sustain plants and the microorganisms which assist them. The mineral portion of soil consists of particles graded by size, with sand the largest, silt smaller, and clay smallest.

The particles in the soil gather in clumps, called aggregates, which create the soil structure. Organic matter assists by coating the mineral particles of the soil, helping them clump together.

Florida soils are generally low in organic components and adding organic matter helps to bind soil particles into aggregates and improves soil structure.

Improving soil structure provides many benefits for a garden. The structure of the soil affects its ability to transmit and store water and nutrients and allows roots to reach deeper to access more resources.

A soil test can determine soil pH and the concentration of phosphorus (P) and potassium (K) —two of the three essential elements for plant growth—in your soil. Nitrogen (N) is the other essential element but it is not determined from soil samples. Florida soils usually have adequate P. The soil test won't tell you how much organic matter is in the soil or the nature of the soil structure.

Organic matter—Organic matter consists of decaying organic materials, which when fully decomposed, are called humus. Organic materials in your garden are anything that was alive and now exists on or in the soil. Common organic materials are plant residues, leaves, grass clippings and other yard waste, food waste, and animal manures. Organic matter in soils provides a variety of benefits such as:

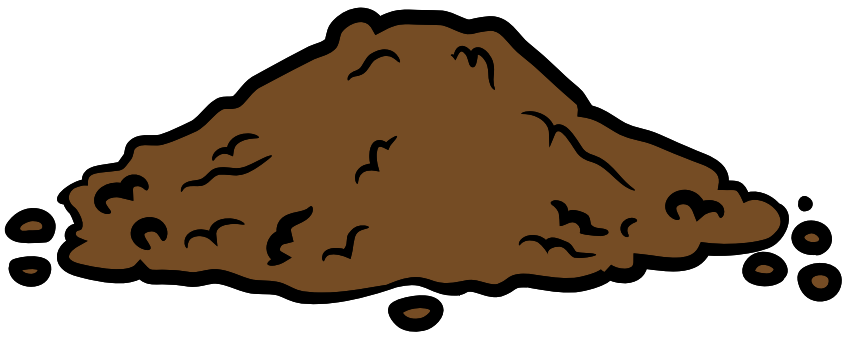
- **Maintenance of stable soil pH**: Soil organic matter moderates major changes in the soil pH. This helps to keep soil pH in the low neutral range (5.5 - 7), which is optimum for most garden plants.
- **Supplying energy to soil microorganisms**: Organic matter is a source of food for microorganisms. When fresh organic matter (e.g., plant residues, composts, organic waste) is added to the soil, microorganisms start the decomposition process. During this process, nutrients are released, soil aggregates are formed, and humus is created.
- **Maintenance of soil fertility**: Organic matter must be regularly replenished as decomposition is completed and nutrients are used up by microorganisms and plants. Plants obtain P, K, and trace minerals from decomposing organic matter. It also feeds specialized soil bacteria which convert N from the atmosphere to a form available to plants.
- **Maintenance of soil structure**: The presence of adequate amounts of organic matter in soils helps to coat soil particles (sand, silt, clay), aids aggregation, and improves soil structure.
- **Removal of harmful pollutants**: Soil organic matter binds some harmful pollutants like residual pesticides and trace elements so they can't escape from the soil and pollute our water bodies.

Adding compost and growing cover crops improves soil structure, increases the population of microorganisms, and enhances the overall health of the soil ecosystem.

Compost—Compost is a dark, crumbly material created when microorganisms break down organic materials such as leaves, grass clippings, animal manures, and kitchen waste. Compost is not completely decomposed (like humus); it will contain small pieces of debris like bits of twigs and leaves. The decomposition process is far enough along in compost so that nutrients are more readily available to plants.

Converting yard debris and kitchen waste into compost is an environmentally friendly way to reduce the amount going to solid waste facilities, and it provides useful and beneficial products for gardens. Compost is an excellent soil amendment that improves the health and structure of both sandy and clayey soils. It can be incorporated into garden soil or added on top as mulch. It can be mixed with other materials for use as potting soil or brewed into compost "tea" for plants.

Mushroom compost—This is the residual waste sold by mushroom farms when it no longer produces a commercially viable crop of mushrooms. It is generally some mix of grain straw, bloodmeal, animal manure, and lime composted together.



Bagged amendments and garden mixes—These materials are beneficial to your garden to a greater or lesser degree. No general statement can be made about which ones are best but some best practices include reading the labels to see what materials are incorporated into the bags and noticing the concentration of NPK in each type which will be noted on the bag as a percentage number such as 10-10-10 or 5-2-3. In general you would want to avoid materials that are high only in nitrogen (the first number) or low in the last number (potassium). The middle number (phosphorus) can be as low as zero since Florida soils usually contain enough phosphorus. But a soil test can confirm the amount of phosphorous in your soil.

Bulk garden mixes are usually good for raised beds or amending your native soil and are generally some mix of composted animal manure and other materials. As a rule of thumb, the darker the mix the more organic matter is incorporated, and the better it is for your garden.

Mulch—Mulching is one of the best ways to improve your garden at low or no cost. Mulch helps control weeds, conserves moisture, moderates soil temperatures, improves soil fertility and last, but not least, adds to the order and beauty of the garden.

Your garden soil should always be covered with closely spaced edible plants, companion plants, cover crops, or mulch.

When soil is bare, pioneer plants - which we know as weeds - spring up, nutrients leach away, soil erodes, and predator insects, spiders, and other garden helpers, like beneficial microorganisms, move on. Then your garden ecosystem must be reestablished when you plant your next crop, giving it a slow start each season.

Mulch is material placed on the soil to moderate the soil environment. Mulches can be organic or inorganic. In a vegetable garden, organic mulches are preferred, since these are simply additional organic materials added to the top of the soil. Microorganisms soon begin the decomposition process and the mulch eventually becomes part of the soil's organic matter.

As organic mulches decompose they improve soil structure and release nutrients. Organic mulches include wood chips, pine straw or bark, hay, oak or other tree leaves, compost, and cover crops which are growing or which have been cut and dropped.

Free mulches—The best mulches are those which are readily available (and free) such as leaves and pine straw. Some tree services will put you on a list to receive free wood chips if they are cutting or trimming trees in your area. Neighbors who rake their yards in the fall are also good sources for additional mulch.

Free mulch is often available at the Leon County solid waste facility in two sizes—wood chips and "fines" which are ground up much smaller. Occasionally there will be partially composted material available also.

The question is often asked whether these mulch materials can be incorporated into your garden soil as organic material or whether the fines can be used as garden soil. All these materials are suitable for composting, and as mulches will provide organic matter to your garden as they decompose on top of the soil. In the decomposition process microbes use large amounts of nitrogen, and when uncomposted materials are incorporated into the soil, the possibility of nitrogen depletion is a factor. This is usually not a problem when the materials are left on the surface of the soil to decompose. For the same reason planting in uncomposted "fine" mulch could be a problem.

An excellent source of more in-depth information on building soils is the Sustainable Ag Research and Education publication, "Building Soils for Better Crops," available free at sare.org.

pH in the Garden

Have you ever wondered how those deodorants that look like a stick of marble work? They work because they change the pH on your skin surface to a more alkaline environment, making the area where it is applied less hospitable to odor-causing bacteria.

A soil test one fall revealed that the pH was quite high in the VegHeadz demonstration vegetable garden at the UF/IFAS Leon County Extension office. Plants did not thrive in our spring garden that year, and we had a lot of bug problems.

So what is pH and why is it important? pH stands for potential of hydrogen. Hydrogen ions directly affect the acidity or alkalinity of your soil. The concentration of hydrogen ions in a sample can be measured, revealing the acidity or alkalinity of a substance. The pH scale ranges from 1.0 to 14.0 with 7.0 as neutral. pH above 7.0 is alkaline or basic, while pH below 7.0 is acidic.

For reference, your blood has a pH ranging from 7.35 to 7.45, slightly alkaline. If blood pH exceeds that range in either direction, you will rapidly become ill, and will soon die, if it is not corrected.

Every living organism exists within a certain range of pH. Some organisms have a very narrow tolerance for changes in pH, such as our own bodies. Others, such as plants, can survive in a wider range of pH, but may only thrive within a prescribed range. Most plants in your yard and garden can survive in soil with a pH from 6.0 to 7.5. Acid loving plants like azaleas, camellias, potatoes, and blueberries prefer a lower pH.

Even with adequate nutrients, if the pH is out of the desired range, your plants cannot easily access the nutrients in the soil. Due to the complex interaction of pH and nutrients, it is difficult to determine whether the pH is incorrect or there is a nutrient deficiency when plants do not thrive. A soil test is the only reliable way to do so.

The level of acidity also affects the activity of soil microorganisms - fungi, bacteria, algae - which play an important role in converting nutritional elements from one form to another as well as breaking down organic matter to a form accessible to plants. They are also helpful in suppressing disease pathogens and degrading pesticides and other chemicals in the soil.

pH in the Garden

The interactions between soil organisms and plants is not yet fully understood, but maintaining soil at a desirable pH is well-known to benefit both the microorganisms and the plants. It also contributes to resistance to pests and plant diseases.

If a soil test reveals a pH between 5.5 and 7.0 in your yard or garden, there is no need to adjust pH. The majority of vegetables prefer this range.

Soil pH can be raised or lowered, but a better approach is to select plants that prefer the existing pH. Applying chemicals to change pH only has a temporary effect. For instance, the soil near your home may have a higher pH, reflecting alkalinity from masonry materials in the foundation or materials left there during construction. Alkaline materials will continue to leach into the soil throughout the life of the home, so it is better to select plants that prefer a more alkaline environment rather than attempting to lower the pH (Right Plant, Right Place). Organic mulch and soil amendments can slightly lower pH over the long term. Soil tests for your landscape should be done every two to three years and compared to previous results to determine if any major changes are taking place.

For individual plants and small vegetable gardens or container plants, changing the pH is possible. To raise the pH or make the soil less acidic, lime in various forms can be added.

The wrong pH for plants can lead to nutrient deficiencies. In this case, a high pH meant there was less iron available for the bean plant to uptake, leading to the deficiency. Photo by Howard F. Schwartz, Colorado State University, Bugwood.org.

To lower the pH, or make the soil more acidic, elemental sulfur, and/or peat moss, which has a pH around 4.0, can be incorporated to effect change over time. This should be done by following directions obtained from a soil test, as well as following the directions on the packaging of any amendments. A soil test before each planting season is ideal, particularly if you are amending the soil.

So what did we do at the VegHeadz demo garden to bring our pH down into a more desirable range? For each 25 foot row (about three feet wide), in a wheelbarrow, we combined a third garden soil from the row, a third mushroom compost, and a third peat moss with two cups of elemental sulfur. We mixed this well and added it back to the row. This only lowered the pH by two tenths of a point, possibly because mushroom compost tends to have an elevated pH. We did have a very nice garden that season with minimum pest and disease damage (except in our tomatoes). We would need to amend again if we wanted to lower the pH some more, and amendments only last for a year or two. We planned to do another soil test before we planted our following season's crop.

Potting Mix Recipes

You can purchase pre-mixed potting soil at the store or make your own. Our recipes are peat-free as peat is a non-renewable resource.

Seed Starting Mix Recipe

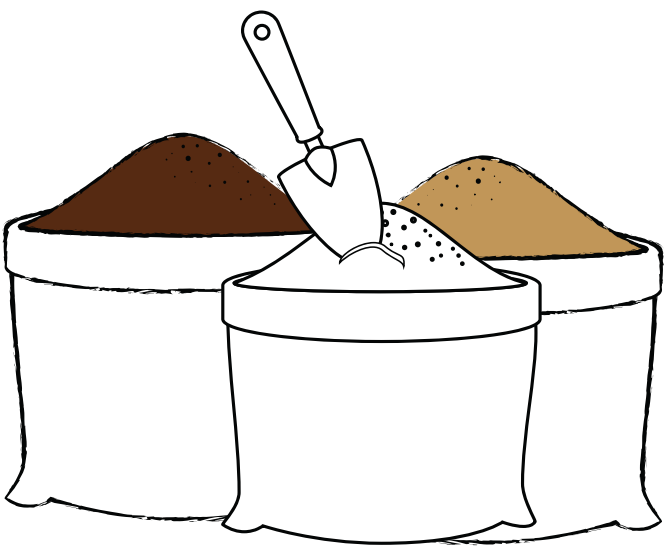
Use this recipe to create a starting medium for seeding indoors. Be sure to mix all ingredients well and moisten just before use. The mix should stay together when squeezed in your palm, but should not be dripping. To make a smaller batch, divide the ingredients in half.

Recipe for about 9-10 gallons of starting mix:

- 4 gallons fresh sifted worm castings or fresh sifted compost
- 4 gallons fine vermiculite

Amendments:

- 8 oz greensand or kelp meal for **potassium**
- 8 oz supplement with full spectrum of **micro-nutrients** (e.g. Azomite)
- 8 oz **phosphate** rock for phosphorus
- 8 oz alfalfa meal for early **nitrogen**



Container/Up-Potting Mix Recipe

Use this recipe to create a potting medium for container grown vegetables or for "up-potting" vegetable seedlings into bigger pots (prior to transplanting into the garden). Be sure to mix all ingredients well and moisten just before use. The mix should stay together when squeezed in your palm, but should not be dripping. To make a smaller batch, divide the ingredients by one-half.

Recipe for about 9-10 gallons of container mix:

- 1 gallon compost
- 1 gallon perlite
- 5 gallons pulverized pine bark
- 2 gallons worm castings

Amendments:

- 8 oz greensand or kelp meal for **potassium**
- 8 oz supplement with full spectrum of **micro-nutrients** (e.g. Azomite)
- 8 oz phosphate rock for **phosphorus**
- 8 oz alfalfa meal for early **nitrogen**
- 4 oz feather meal for **mid-late nitrogen**
- 2 oz oyster shell flour or crushed eggshells for **calcium**

COMPOST BASICS

UF | IFAS Extension UNIVERSITY of FLORIDA

What *IS* composting?

Composting is the breakdown of organic materials by microorganisms under controlled conditions where oxygen is available. Anybody can compost, all you need is a little space, water, air, and organic material. Compost will happen!

Composting is important because 20 percent or more of household waste is organic material that can be composted, rather than disposed, thus saving landfill space. Compost is a valuable soil amendment that will help your plants thrive. Composting is just good for the environment.

WHY Compost?

- Around 133 million pounds of food in the USA each year—or about 40 percent of total production—is wasted, according to The USDA.
- The average household wastes more than $1,500 annually on unused food items.
- Roughly 25 percent of landfilled material is organic and can be composted.
- Food waste breaking down in landfills creates carbon dioxide and methane, gases that contribute to climate change.

Compost Pile *COMPONENTS*

1. Browns - carbon (woody materials)
2. Greens - nitrogen (food waste)
3. Water - pile should feel like a damp sponge
4. Air - composting is an aerobic process

Meet *YOUR* Composting Team

"Aerobic" composting involves microbes requiring oxygen.

Bacteria

- PSYCHROPHILES
  - » Less than 55 degrees
- MESOPHILES
  - » 40 degrees F to 110 degrees F.
- THERMOPHILES
  - » 105 - 140 degrees

Non - bacteria critters:

- ACTINOMYCETES
- FUNGI
- INVERTEBRATES
  - » Sowbugs and Pillbugs
  - » Millipede / Centipedes
  - » Spiders
  - » Earthworms

Building A Pile

Microbes are not much different than people in terms of their basic needs, so be sure to provide your microbes with all of the basics:

Food	Browns (carbon-rich) and greens (nitrogen-rich)
Water	Moist, not soggy
Air	Oxygen
Volume	Cube: 3 feet long x 3 feet high x 3 feet deep Cylinder: 3 feet high x 3-5 feet diameter
Particle Size	Less than 2-3 inches

The Benefits *OF* Composting

1. Less waste in landfills.
2. Improves soil's ability to retain water and reduce the need to irrigate.
3. Improves soil health and provides nutrients to plants.
4. Reduces soil erosion and controls runoff.

DO Compost these:

DO NOT Compost these:

Hot Composting

What can be composted?

- Carbon-based materials ("browns"): fallen leaves, small branches and twigs, shredded newspaper and cardboard, paper plates, paper napkins, and paper towels
- Nitrogen-based materials ("greens"): fruit and vegetable scraps, coffee grounds, young herbaceous plants, grass clippings, egg shells (calcium), and farm animal manure (if compost reaches 140°F for five days)

What should not be composted?

- Weeds that have gone to seed and diseased plants
- Meat, bones, oils, fats, and dressings (may attract animals and cause foul odors)
- Animal waste of carnivores (such as dogs or cats, can harbor diseases)

The Composting Process

- Locate compost pile or unit in partially shaded area within reach of hose.
- Layer "brown" carbon-based materials and "green" nitrogen-based materials into tiers at about a 2-3:1 ratio (by volume).
- Compost pile should be a minimum of 3′ by 3′ by 3′ for best results.
- If using highly carbon-based materials (browns), watering the pile as you build may be beneficial.
- Pile will heat up rapidly due to microbial activity and may produce steam.
- In ~4-7 days it will begin to cool and should be turned to mix materials and allow pile to heat again.
- Ready in about 6-8 weeks if turned and watered regularly.
- When finished, compost will be dark brown and crumbly and temperature will plateau.
- Mix into top 4-6 inches of soil surface.
- Compost will provide and help retain nutrients, suppress weeds, condition soil, balance soil pH, and provide habitat for beneficial microorganisms.

Temperature

- Most effective range for composting is 122°F - 131°F in the center of the pile.
- Higher temperatures, 131°F - 140°F, can more readily destroy weed seeds and plant pathogens, but it's harder to maintain in small, home composts at this temperature.
- Can monitor temperature of the pile using long-stemmed compost thermometer that reads up to 160°F.
- Materials added to compost pile but not turned or watered will still decompose, but takes much longer (static composting).

Compost Troubleshooting

Problem	Cause	Action
Odor 	Excess Nitrogen	Mix in 'brown' material (carbon)
	Excess Moisture	Open pile, add carbon material and turn
	Lack of Oxygen	Turn pile
Pile too cool (below 110F) 	Lack of Nitrogen	Mix in "green" material (nitrogen)
	Lack of Oxygen	Turn pile
	Lack of Moisture	Dampen pile
	Excess Moisture	Open pile, add carbon material and turn
Animal or insect pests	Food in pile (meat, fat, eggs)	Keep animal products out of pile

WHAT CAN I COMPOST?

THROW IT IN!

NAPKINS

PAPER

COFFEE GROUNDS & TEA BAGS

FOOD SCRAPS

KEEP IT OUT!

MEAT BONES

COFFEE CUPS

DAIRY

FOOD COOKED IN OIL

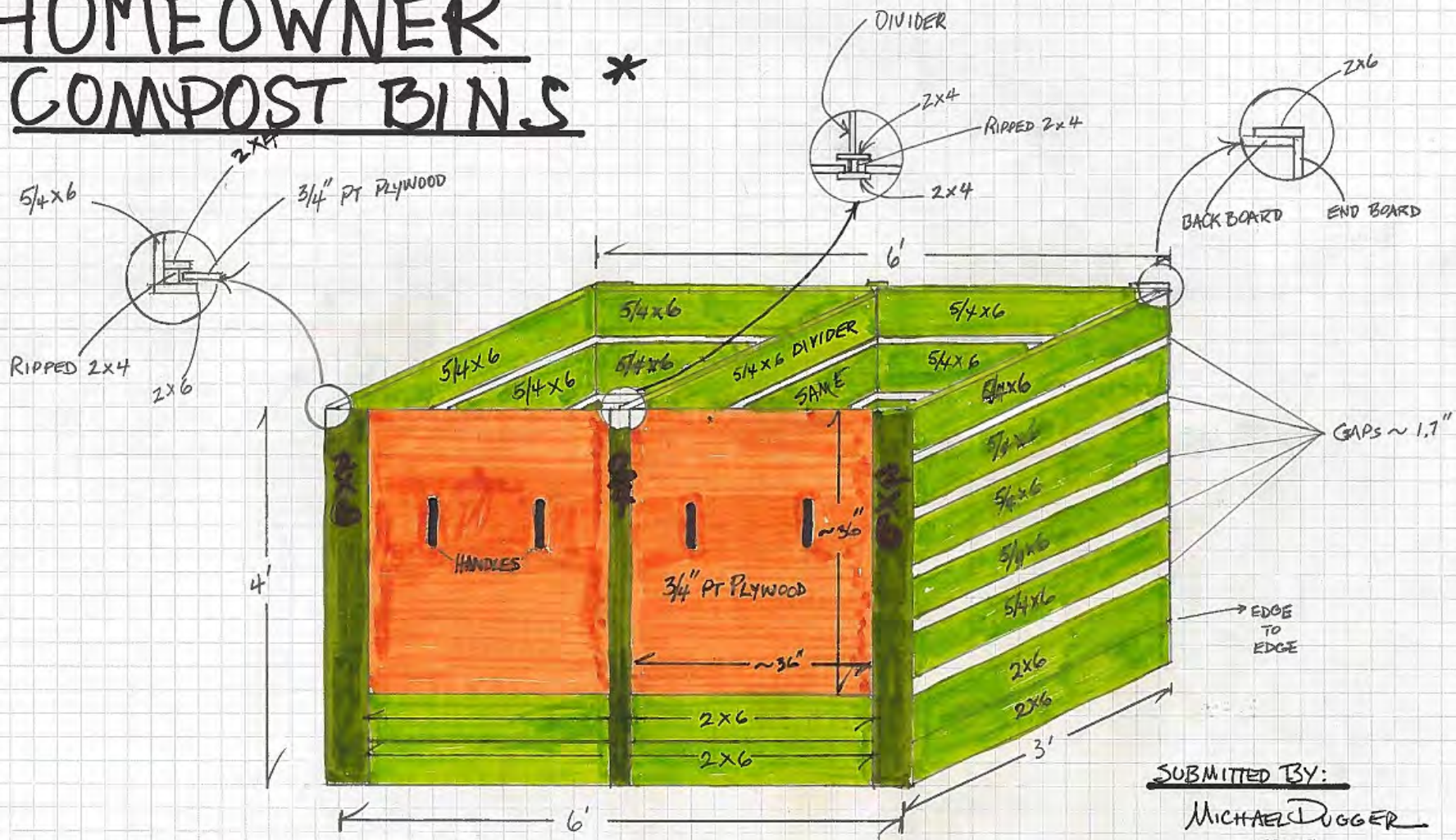
RECYCLABLES

NON-BIODEGRADABLE WASTE

Growing Green LEON FLORIDA'S CAPITAL COUNTY

Find out more information at www.GrowingGreen.org or call (850) 606-1800

HOMEOWNER COMPOST BINS *



XEXTRA DURABLE TWO 3'x3'x4' BINS

MATERIALS LIST - ALL PT

- 2"x4"x 8' = 5 ea
- 2"x6" x 8' = 2 ea
- 2"x6" x 10' = 4 ea
- 5/4 x 6" x 10' = 8 ea
- 4' x 8' x 23/32" PLYWOOD = 1 SHEET
- T-25 TORX DECK SCREWS = 1 lb - 3"
- GALVANIZED HANDLES = 4

SUBMITTED BY:
MICHAEL DUGGER
05-2018

BASED ON A BUILD BY:
GLENN BERMAN
BUDDY HOLSHOUSER
MICHAEL DUGGER

Soil Testing

Why soil test?
When you call the extension office with a problem in your garden or landscape, one of the first questions we will ask is if you have had your soil tested. We ask because nutrient deficiencies and high or low pH values can often have adverse affects on plants and can be easily fixed most of the time.

What does the soil test report provide?
The UF/IFAS Analytical Services Laboratories (ANSERV Labs) have two test types listed on the Landscape and Vegetable Garden Test Form. Test A is the pH and Lime Requirement Test and Test B is the Standard Soil Fertility Test. Both tests indicate the soil pH and lime requirement. Test B also indicates the values of the following nutrients in the soil sample: phosphorous (P), potassium (K), magnesium (Mg), sulfur (S), copper (Cu), manganese (Mn), and zinc (Zn). Nitrogen cannot be tested because there are many factors that influence the amount of nitrogen that is present at any given time. Instead, nitrogen recommendations will be given for the selected crops to be grown based on field experiments and current research.

What doesn't the soil test report provide?
The ANSERV Labs in Gainesville do not test for disease, insects, or fungal issues. They also do not test for heavy metals. This test can be done through the Agricultural and Environmental Services Lab at the University of Georgia (UGA), though there are few sites where it is necessary. Although, if you are gardening on a former industrial site, for example, it would be advisable to get a test through a lab such UGA's before you eat any vegetables produced on the site.

The North Florida Research and Education Center in Quincy has a plant pathology lab that can help you determine if your plants have a disease.

Soil Testing Instructions

- Obtain a soil testing bag and form from UF/IFAS Extension.
- To collect your sample, it is recommended that you divide your area into 10 to 15 sections and collect a small amount of soil from each section. For vegetable gardens, take your mini-samples from the upper 6 inches of the soil.
- Mix your mini-samples together in a clean container, such as a plastic bucket.
- If your soil sample is wet, lay it out to air dry before transferring it to the soil testing bag.
- Fill the soil testing bag to the fill line indicated on the bag (about 1 cup of soil).
- If you are collecting multiple samples from different areas or sites, please make sure to label each sample on both the bag and the form so that you know which sample came from which area (ex. front yard, back yard).
- While filling out the form please make sure to indicate your county (ex. Leon), because in addition to you receiving your results in 7-10 business days, horticulture staff from your county's extension office will also receive the soil test results in case you have any questions regarding the results.
- Be sure to choose either Test A or Test B on the Landscape and Vegetable Garden Test Form.
- Place your soil sample bag, completed form, and payment (check, money order, or cash) in a box and mail your sample to the UF/IFAS Analytical Services Laboratories Extension Soil Testing Laboratory. The address (which is also listed on the form): 2390 Mowry Road/PO Box 110740/Wallace Building 631 Gainesville, FL 32611-0740

Mailing Address (please print)

Name _____ Date _____

Address _____

_____ , FL Zip _____ Phone _____

Email* _____
*Please provide an email address to receive your results faster.

Signature _____
(signature only required for UF personnel for approval of chartfield charges)

UF/IFAS Analytical Services Laboratories
Extension Soil Testing Laboratory
2390 Mowry Road/PO Box 110740/Wallace Building 631
Gainesville, FL 32611-0740
Email: soilslab@ifas.ufl.edu Website: http://soilslab.ifas.ufl.edu

Landscape and Vegetable Garden Test Form

Note: This lab only tests samples from Florida.

Direct any questions about this test or the interpretation of the results to your local UF/IFAS Extension agent.

Note:

- Consult an expert to determine if plant growth problems require soil testing.
- These samples will not be tested for nematodes, disease organisms, or chemicals other than those listed on this form.
- Commercial producers should use the Producers Soil Test Form SL135 (http://edis.ifas.ufl.edu/ss186).

Step 1. Collect samples from your landscape or garden. See the instructions at the bottom of this page.

Step 2. Choose **EITHER** Test A or B, but not both, for all samples.

Test A. The pH and Lime Requirement Test provides the following information:

- Soil pH
- Lime Requirement

Test A is appropriate if you do the following:

1. Use only complete fertilizers (such as 16-4-8)
2. Follow the generic fertilizer recommendations found in UF/IFAS landscape and vegetable garden publications
3. Need only the soil pH test

Test B. The Standard Soil Fertility Test provides the following:

- Soil pH
- Lime Requirement
- P, K, Ca, Mg, S, Cu, Mn, and Zn

Test B will enable you to tailor your use of single-element fertilizers based on existing soil fertility status. However, if you use a complete fertilizer, such as 10-10-10, the extra tests for extractable P, K, Mg, and Ca are of little value.

Fill in all requested information, using one line per sample. Use additional forms for more than 5 samples.

Remember: Choose either test A or B for each sample.

Lab Use Only	Sample ID	County	Crop Code(s) (See back of form)	Estimated Acreage	Cost of Test A	OR	Cost of Test B
					(Circle appropriate amount.)		
					$3	OR	$10
					$3	OR	$10
					$3	OR	$10
					$3	OR	$10
					$3	OR	$10

Check ○ Money Order ○ Cash ○ Total _____

Please enclose payment and this sheet in the same package as sample(s).
Please make checks and money orders payable to **UNIVERSITY OF FLORIDA.**
Samples will not be processed without payment. Do not send cash through the mail.

How to Sample Your Lawn or Garden

Obtain a small amount of soil from 10 to 15 different spots in the area you wish to test (a minimum of ½ pint). When you sample a lawn, take the soil from the upper 2–4 inches. When sampling a vegetable garden or landscape plants, take soil from the upper 6 inches. If soil is wet, spread soil on clean paper or other suitable material to air dry.

Figure 1. Use a soil probe for faster soil sampling.

Figure 2. If you don't have a soil probe, use a hand trowel, shovel, or other garden tool. Trim out soil of uniform thickness to the recommended depth.

Figure 3. Place 10–15 soil cores into a plastic bucket; mix, dry, and transfer to a bag.

RELATIONSHIP OF SOIL TESTING TO LAWN MAINTENANCE OR VEGETABLE GARDENING

Single-Element Fertilizers and Complete Fertilizers

People have different opinions about lawn or landscape care or garden productivity because they have different skills, training, and experiences. This diversity shows in the management levels observed in any neighborhood. However, most people are able to grow beautiful lawns and productive gardens by applying the UF/IFAS recommended amount of a complete fertilizer (a fertilizer that contains nitrogen, phosphorus, and potassium). This method of fertilization saves time and effort for most homeowners compared to using single-element fertilizers. If you use complete fertilizers, testing only for soil pH and lime requirement is your best testing plan (Test A). A soil fertility test is worth the extra fee only if you have access to single-element fertilizers and you wish to use more carefully estimated amounts of P and K in your fertilization program (Test B).

As with any chemical, proper handling and application of recommended fertilizer amounts will minimize any potential hazard to you or the environment.

Lime Requirement

Most garden plants respond unfavorably when soil pH is too high or too low. You should test your soil pH every 2–3 years to minimize plant growth problems relating to soil pH. The pH of your soil and a lime requirement test are the only accurate means to determine if your lawn, landscape, or garden will benefit from the addition of lime.

Soil Testing as a Diagnostic Tool

The main purpose behind soil testing procedures is to establish lime and fertilizer needs of a crop before planting. Most research efforts have been directed to that goal. When production problems occur, many people feel that a soil test is the best diagnostic tool. However, soil testing is useful in diagnosing crop production and growth problems only under special circumstances. Make sure to do the following:

1. Consult an expert to help you interpret your soil test results.
2. Ask the expert about other possible causes. In many cases, additional tests are also needed, such as plant analysis, nematode analysis, etc.
3. Maintain complete and orderly records of all management practices.

TAKING A REPRESENTATIVE SOIL SAMPLE

Tools

1. Digging implement, such as a soil probe, a spade, or a regular garden hand trowel (Figures 1 and 2)
2. Plastic bucket
3. Clean shopping bag or some newspaper
4. Soil sample bags for each of your soil samples (one per sample) and a shipping box to send samples to the UF/IFAS Extension Soil Testing Laboratory. Soil sample bags are available for free at your local UF/IFAS Extension office. This office is also a good source of many UF/IFAS publications to help you with lawn care and home gardening.

Sampling

1. Use your digging implement to obtain a small amount of soil from 10–15 spots over the area you wish to test. When you sample a lawn, take soil from the upper 2–4 inches (Figures 1 and 2). Sample a vegetable garden or landscape plants by taking soil from the upper 6–8 inches.
2. As you take each small sample, place it into the plastic bucket (Figure 3). Space your sampling sites throughout the area. Do not include soil from any problem spots in the regular samples. Submit soil samples from problem spots as separate samples.
3. After sampling, mix the soil in the bucket with your hand so that all the soil is well blended.
4. Take about 1 pint of the blended soil and place it on the shopping bag or newspaper to air-dry. Return any soil remaining in the bucket to the lawn or vegetable garden.
5. While the soil is drying, fill out the requested information in the soil test package, both on the form and on the sample bag. A list of the various lawn types and landscape plants for which recommendations are available can be found in Table 1.
6. When the soil is dry, transfer about ½ pint of soil into the labeled sample bag from the soil test package.
7. Include these items in the shipping box:
   - Your labeled soil sample(s)
   - This Landscape and Vegetable Garden Soil Test Form (SL136)
   - A check or money order payable to **University of Florida**. Checks written to other names will not be honored and will be returned, causing a delay in processing the samples.

Mail your sample to:
UF/IFAS Analytical Services Laboratories
Extension Soil Testing Laboratory
Wallace Bldg. 631, 2390 Mowry Road
PO Box 110740
Gainesville, FL 32611-0740

Test Results

A soil test report, including notes to help you use these results to your best advantage, will be emailed/mailed to you 3–6 days after your sample arrives at the UF/IFAS Extension Soil Testing Laboratory. Contact your local UF/IFAS Extension office if you have questions about the soil test report.

Table 1. List of lawn types and landscape plants for which recommendations are available. Please record the applicable code numbers on page 1 of this form under Crop Code(s).

Crop Code	Lawns
72	Bahiagrass
73	Bermudagrass
74	Carpetgrass
75	Centipedegrass
76	Ryegrass
77	St. Augustinegrass
78	Zoysiagrass
Crop Code	**Landscape Plants and Vegetable Gardens**
603	Landscape azaleas, camellias, gardenias, hibiscus or ixora
67	Blueberries
62	Dooryard citrus
602	Woody ornamentals or trees in the landscape
90	Vegetable garden

Amendments in the Organic Garden

Adding fresh compost several inches deep can supply the bulk of nutrients needed to grow healthy crops throughout the season in your garden. But if a soil test indicates you are low on particular nutrients, or if foliage color or plant vigor indicate your crops could benefit from a modest boost, it can be helpful to keep in mind some generalities about the three major nutrients plants need: nitrogen (N), phosphorus (P), and potassium (K).

For leafy vegetables, such as lettuce, mustards, and kale, a boost of N can improve foliage production and less P and K are needed.

For fruiting crops - such as tomatoes, cucumbers, and squash - as well as legumes, such as beans, take care not to add too much N. This could cause excessive leafy growth and negatively impact flower and fruit production. P and K, on the other hand, can improve flower and fruit production.

For root vegetables, such as carrots, radishes, and onions, excessive N can stimulate extra foliage growth and less root growth. But a boost of P and K can help promote a strong healthy root system.

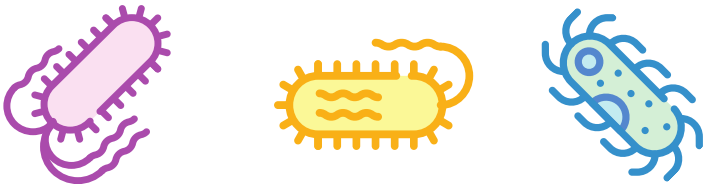
Amendments that supply Nitrogen (N):
Compost, composted animal manure (horse, cow, rabbit, chicken), bloodmeal (strong, be careful not to burn young plants, water soluble), alfalfa meal (also good source of P and K), cottonseed meal and soybean meal (cottonseed meal is slightly acidic and slow release), feather meal (moderate release rate), fish emulsion and fish meal (fast acting, especially in liquid form—apply with care as fast growing green crops attract pests), green manure legume cover crops such as alfalfa, clover, peas, etc.

Local market gardener and permaculture designer, Greg Jubinsky, reminds us about the relative amount of nutrients crops need depending on if they are leafy, fruiting, or root vegetables.

Amendments that supply Phosphorus (P):
Compost, bone meal, pulverized rock phosphate, and green manure cover crops such as buckwheat and lupine. Buckwheat and lupine are good at mining P existing in the soil. Unlike N, which can be pulled from the atmosphere by microorganisms and supplied to legumes, minerals like P and K must exist in the soil to be accessed by cover crops. In order to utilize the minerals mined by the cover crop, cut it and drop in place to decompose and release the minerals back into the soil. (Additional P is usually not needed in Florida soils. A soil test can make that determination.)

Amendments that supply Potassium (K):
Compost, seaweed, wood ashes, greensand, granite, and deep-rooted cover crops such as grains and daikon-type radishes. Grains and daikon radishes are good at scavenging minerals deep in the soil.

Microorganisms in the Garden



The largest population on earth is never seen with the naked eye. They are everywhere—in our bodies, on our skin, in the air, in the water, and in the soil. They are referred to collectively as microorganisms. It is said that more microbes can be found in one gram of soil than there are people on the Earth.

Plants and microorganisms have evolved together. Bacteria were one of Earth's first inhabitants and they created an environment that allowed plants to develop. Without microorganisms, both then and today, life on earth would not exist.

A healthy population of microorganisms is the most important element for a successful garden. They are essential in nutrient cycling – providing nutrients to plants and breaking down organic matter to keep the supply constant. They promote plant growth and suppress diseases. They provide communication channels between plants and even help plants share resources.

When more fertilizer is applied than plants can absorb, it washes away and eventually makes its way to streams, lakes, rivers, and seas. In a healthy organic garden, microbes and plants form a symbiotic relationship to release essential elements like hydrogen, oxygen, carbon, nitrogen, phosphorus, potassium, iron, and micronutrients from organic matter and the atmosphere and make them available to plants. In return, plants spend as much as a third of their energy to produce compounds known as exudates and release them through their roots to nourish microorganisms.

Mycorrhizal fungi develop mutually beneficial symbiotic relationships with plant roots. Photo by Edward L. Barnard, Florida Department of Agriculture and Consumer Services, Bugwood.org.

The five types of soil microbes are bacteria, actinomycetes, fungi, protozoa, and nematodes. There are many, many thousands of unique varieties of microbes, most not yet identified specifically. Each type of microbe has its own niche in the soil.

Bacteria are the workhorses. Among their many services, they complete decomposition of organic material and release nutrients, promoting plant growth and increasing nutrient uptake, producing hormones essential for plant growth, and inducing disease resistance in plants.

Actinomycetes are actually classified as bacteria but they are unique enough to be mentioned separately. They help decompose less degradable organic materials found in soil, including chitin and cellulose, and produce several pigments which create the dark color of decomposed matter (humus). They can form associations with non-leguminous plants to help them fix nitrogen from the atmosphere.

Microorganisms in the Garden

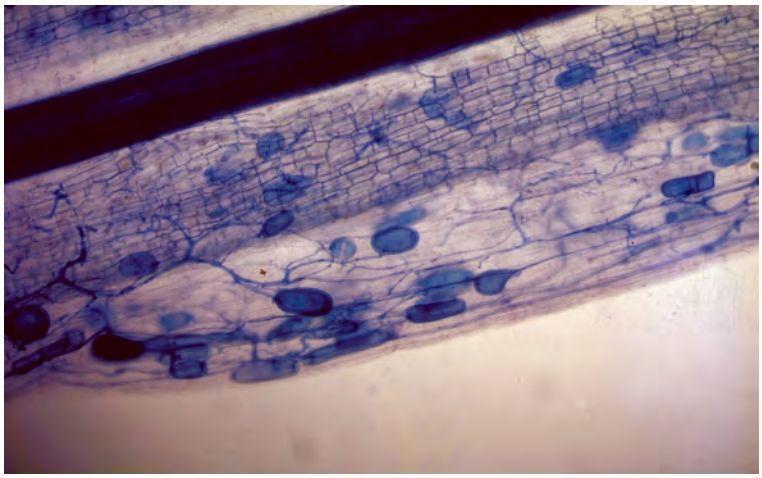
Fungi are the primary decomposers. Fungi known as mycorrhizae live in the root zone and connect with plants to exchange nutrients for sugars. They also help facilitate the uptake of nutrients and water for the plant.

Protozoa consume bacteria and in doing so mineralize organic soil nitrogen to produce ammonia. They can help plants add mass even when additional nutrients are not available. Their presence in the soil is influenced by the presence of living and dead plant roots.

Nematodes are microscopic worms. Harmful ones include root knot nematodes and others, but helpful nematodes prey on the bad ones and also provide nutrients to plants.

A balance of the different types of microbes is also necessary because some are predators and others are prey. Too many predators can deplete the helpful microbial prey. The application of fertilizers, herbicides, and pesticides can upset this balance and degrade the soil ecosystem.

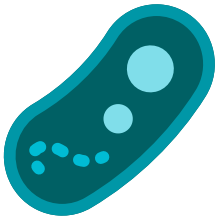
The Steinernema scapterisci insect-parasitic nematode in the juvenile phase can infect and kill insects in the Orthoptera order, such as grasshoppers and crickets. Photo by David Cappaert, Bugwood.org.

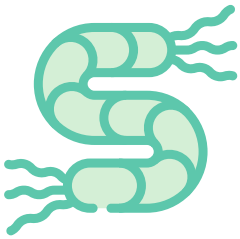


A microscopic image of mycorrhizal fungi in black walnut. Photo by Robert L. Anderson, USDA Forest Service, Bugwood.org.

We can help stabilize the environment by disturbing the soil as little as possible, providing a constant supply of organic materials as fuel, and keeping the soil covered with plants and mulch to keep populations of microbes thriving. A wide variety of plants is important to provide biodiversity as each variety attracts and sustains its own unique population of microbes, adding to the balance of the entire garden environment.

In a healthy forest, plants, animals, and microorganisms join together in a balanced ecosystem known as the soil food web. This is the ecosystem we want in our gardens and if one element is out of balance, the garden suffers. As opposed to landscape beds, which are relatively stable other than where we plant annuals, we are constantly disturbing the soil in our vegetable gardens, making it difficult to keep a consistent garden environment.





Cover Crops for Home Gardeners

Why Cover Crops?

Cover crops don't usually provide an edible harvest; but they are worth growing for the benefits they provide to your soil and the garden ecosystem.

Different varieties can provide one or a combination of benefits such as: provide biodiversity to attract and provide food for beneficial insects and soil organisms, mine minerals from deep in the soil, discourage weeds, prevent erosion and leaching, retain moisture, combat diseases and harmful soil organisms, break reproduction cycles of harmful insects, regulate soil temperature, provide living mulch, and supply your soil with organic material. Cover crops are so beneficial to your garden that they are often referred to as green manure.

All cover crops supply essential organic materials to the garden when they are cut to decompose in place. They are usually planted after edible crops are harvested. Cover crops can also be grown instead of or among edible crops. With so many reasons to grow cover crops and so many different ones to choose from, how do you know which ones to select? Your choice depends on the season and what you want to accomplish. There are three basic types of cover crop plants. Mixtures of multiple types are also good and provide a wider range of advantages for each planting.

Types of Cover Crops

Grains/annual grasses like rye, oats, and wheat. These cold-hardy crops are usually planted in fall in our area. They have deep roots which break up compacted soil. They reduce nematode populations and accumulate potassium from the soil which is recycled when cover crops are cut to decompose in the garden.

Legumes like field peas, clover, and vetch. Field peas are planted in summer while clover and vetch are cool season crops. These nitrogen-fixers capture nitrogen from the atmosphere to supply their needs and those of immediately following crops.

Broadleaved crops like buckwheat, mustard, and rapeseed. Buckwheat can be planted in most seasons, but will not survive freezing. Mustard and rapeseed are cool season crops. These plants germinate quickly to shade out weeds, and they easily decompose for a quick release of nutrients.

Site Preparation and Planting:

Lightly cultivate with a rake or a broadfork to prepare a place to plant. Broadcast seed evenly over prepared area and cover with a very light layer of fine mulch, compost, chopped leaves, or garden soil. Alternatively, pat firmly and cover with light row cover until germination to protect seed from birds. Water thoroughly but gently so as not to displace seeds. About one-fourth cup of seed is adequate for an 8' x 4' bed (32 sq ft) to provide weed suppression. Up to one cup can be used for heavier and faster coverage, and to add more organic matter to your soil.

Managing your Cover Crops:

Cover crops need little management. In severe drought they should be watered, but for the most part they can be allowed to grow with no additional input. Large cover crops like sun hemp and sesame can be cut several times over the growing season to keep them from being too bulky when it's time to terminate. Smaller crops like clover and buckwheat can be allowed to mature. Observing them to determine when to terminate is most important.

Termination: Cover crops should be cut while in full bloom, but before they set seed. Here's why:

- Allowing cover crops to grow until flowering maximizes their contribution to soil organic matter and nitrogen (legumes).
- Cover crops that are cut before they flower may regrow and become weeds among your veggies. Allowed to set seed, crops may reseed and appear in subsequent seasons where you don't want them.

Chop and Drop or Incorporate your cover crop?

The ultimate object of terminating your cover crop is to return the nutrients contained in the cover crop tissue to the soil for use by microorganisms and subsequent crops. This is called nutrient cycling. When the time comes to terminate your cover crop, you have two options:

Chop and Drop:

Cut the plants down to ground level using clippers, hedge shears, a small sickle or a weed eater, and leave them as mulch on the soil surface. DO NOT pull up the plants – leaving the roots to decompose in place reduces disturbance of microorganisms, aerates the soil, and preserves organic matter. You can speed up decomposition by adding a mulch of leaves or pine straw on top of the chopped cover crop and watering.

Chop and drop before transplanted and large-seeded crops (tomatoes, peppers, squash, etc.).

Advantages: Best for soil quality (reduces microorganism disturbance); provides the same advantages as any other mulch—discourages weeds, conserves moisture, etc.; less labor.

Incorporation:

Use a shovel or hoe to chop the plants and work them into the top 3-5 inches of the soil. Grass cover crops can be more persistent and may need this method.

Advantages: Creates better planting space for small-seeded crops, like carrots or lettuce. Wait several weeks to a month before planting to allow decomposition to get under way. Also best for terminating legumes when planting crops like greens that benefit from nitrogen. Subsequent crops can be planted right away as nitrogen is volatile and will begin to dissipate as soon cover crops are terminated.

Disadvantages: Disturbs microorganisms, less weed control than cut-and-mulch; may activate dormant weed seeds, lots of work!

Regardless of termination method, subsequent crops can be planted by moving aside remaining cover crop residue and planting in the soil (no-till). Plant remnants act as a mulch and continue to provide nutrients through decomposition.

Cover Crops for North Florida

All cover crops are beneficial in that they discourage weeds, reduce soil erosion, nourish soil micro-organisms, and capture residual nutrients for the next crop when composted in place of incorporated into the soil. Cover crops can be selected based on additional factors such as specific nutrients they provide, season when soil is fallow, etc. Many of the cover crops also provide forage for domestic animals, attract beneficial insects, and provide habitat for wildlife.

Crop	Scientific Name	Planting Dates	Benefits	Some Tried and True Varieties	Notes
Alfalfa**	*Medicago sativa*	Mar-May, Sep-Nov	Attracts beneficial insects to blooms	Bulldog 805	Often seeded with grains, grows after grain harvest
American Joint Vetch**	*Aeschynomene americana*	Mar-Aug	Suppresses nematodes		Reseeds heavily, can become weedy
Austrian Winter Pea**	*Pisum sativum*	Sep-Feb	Attracts beneficial insects	Common, Maple, Frost, Whistler	High nitrogen fixer
Buckwheat	*Fagopyrum esculentum*	Mar-Nov	Can suppress diseases, provides P, nectary for beneficial insects	Manor	Reseeds readily, can be grown in 5 weeks. Not frost tolerant
Clover, Crimson**	*Trifolium incarnatum*	Oct-Nov	Suppresses nematodes, attracts beneficial insects; good to mix with grains	Dixie	Reseeding annual, can be interplanted with fall vegetables
Clover, White**	*Trifolium repens*	October	Attracts beneficial insects to blooms	Ocoee, Alice	Perennial, but sometimes annual in Florida
Cowpeas**	*Vigna unguiculata*	Mar-Nov	Suppress nematodes, attract beneficial insects	Iron Clay	Crop can be harvested before cutting
Daikon Radish	*Raphanus sativus*	Mar-Nov	Suppresses weeds, breaks up soil	Niger, Soil Buster	Dynamic accumulator
Jackbean (Swordbean)**	*Canvalia gladiata* *Canvalia ensiformis*	Mar-Nov	Suppresses nematodes, antibacterial and antifungal properties		Vining plant
Lablab (Hyacinth Bean)**	*Lablab purpureus*	Mar-Nov		Alba, Rongai, Highworth	
Lupine**	*Lupinus spp*	Mar-Nov	Suppresses nematodes	Tifblue	
Millet, Japanese	*Echinochola frumentacea*	Apr-Nov	Suppresses nematodes		
Millet, Pearl	*Pennisetum glaucum*	Apr-Nov	Suppresses nematodes	Tifleaf 3	
Mustard	*Brassica spp.*	Mar-Nov	Fast growing weed suppressor. Contains chemical that repels insects when mowed	White Cold, Pacific Gold, Trifecta, Kodiak	Can be weedy if allowed to see. Should be cut and dropped when flowering starts

Cover Crops for North Florida

Crimson clover with honeybee

Crop	Scientific Name	Planting Dates	Benefits	Some Tried and True Varieties	Notes
Oats	*Avena sativa*	Mar-Nov	Suppresses nematodes, provides potassium	Legend 567, Horizon 720	
Perennial Peanut**	*Arachis glabrata*	Mar-Nov			Best for orchards
Pigeon Pea**	*Cajanus cajan*	Mar-Nov	Drought tolerant		Short-lived perennial
Rape	*Brassica napus*	Mar-Nov	Do not plant where brassicas will be the next crop, can harbor brassica diseases.		Canola is a type of rape
Rye (cereal)	*Secale cereale*	Mar-Nov	Suppresses nematodes, provides potassium	Florida 401, Wrens Abruzzi	
Ryegrass (annual)	*Lolium multiflorum*	Mar-Nov	Suppresses nematodes, provides potassium	Attain, Big Boss	
Sesame	*Sesamum inedicum*	Mar-Nov	Suppresses nematodes		
Sorghum	*Sorghum bicolor*	Mar-Nov	Suppresses nematodes		
Sorghum Sudangrass	*Sorghum bicolor x S. sudanese*	Mar-Nov	Suppresses nematodes, provides nitrogen		Can get very large, cut 1-2x during growing period if desired
Soybean**	*Glycine max*	Mar-Nov	Suppresses nematodes		
Sunflower	*Helianthus annus*	Mar-Nov	Trap plant for leaf-footed and stink bugs	Mammoth	
Sunn Hemp**	*Crotalaria juncea*	Mar-Nov	Suppresses nematodes and weeds	Tropic Sun	
Triticale	*x Triticosecale*	Mar-Nov	Suppresses nematodes, provides potassium	Tamacale, Monarch, Tri-Cal 342	Cross between wheat and cereal rye
Velvet Bean**	*Mucuna pruriens*	Mar-Nov	Suppresses nematodes		
Vetch (Hairy)**	*Vicia villosa*	Mar-Nov	Suppresses nematodes	Purple Bounty	Dynamic accumulator
Wheat	*Triticum aestivum*	Mar-Nov	Suppresses nematodes, provides potassium	AGS 2024	

Watering

Adapted from UF/IFAS Gardening Solutions

Whether you water with a hose, bucket, drip irrigation system, or sprinkler, regular irrigation is the edible gardener's most important chore. There's no "right" frequency to water; check on your plants every day or two and irrigate them when the top half-inch or inch of soil is dry or when plants begin to wilt.

Plants can be permitted to curl some leaves and wilt a little—it won't hurt them—but you should prevent severe water stress. Without periodic rains or irrigation, your plants will stop producing fruit and will drop any fruit they have already produced. Remember, most Florida soils drain easily and don't retain water. Adding organic matter to the soil will help the soil retain moisture, conserving you water and saving you effort.

Too much water also has ill effects. Plants should always be allowed to dry out between waterings. Soggy roots quickly begin to rot, causing plants to decline. Overwatering can cause fruit to explode, and can dilute its flavor.

Planning for Water

How to water your plants should be a major part of early garden planning. Most people site their gardens near a faucet or hose to facilitate easy watering. But if you are going to use an irrigation system for convenience or because your garden site is far from the nearest water source, install it before planting so that you don't disturb roots.

Water may be drawn from lakes, wells, or municipal systems. Most gardeners don't need to worry about water quality. Unless you live on the coast or in an area where saltwater intrusion into the aquifer is a problem, your plants should thrive as long as they are irrigated regularly.

When to Water

In general, it's best to water when the top half-inch to inch of soil begins to dry. Check your plants frequently for dropping leaves and other signs of distress. Thick-leaved plants like cabbage, collards, and broccoli won't dry out as fast as plants with large, thin leaves such as squash, cucumbers, and pumpkins. Young plants and vegetables with root problems may need frequent watering.

Water enough to thoroughly wet the soil and root zone, but never let your irrigation system run indefinitely. Not only will you waste water, but you can also encourage disease. Soil and foliage need time to dry, so the best time to water is early in the morning, preferably between 4 and 6 a.m.

In sandy soil, a half-inch of water will moisten down to about six inches deep, which should be sufficient. In soils with more organic or clay content, and in gardens with a thick layer of mulch, you made need to apply up to an inch of water to wet the same depth. Of course, these soils will also hold moisture longer than sandy soil, meaning you can water less often.

Watering

Ways to Water

Drip irrigation and soaker hoses are much more efficient than overhead irrigation systems. Handwatering is low-tech, but usually allowed during water restrictions, when other kinds of irrigation are limited, because it uses less water than an irrigation system.

Handwatering

To handwater, you can use a watering can, pail, or hose. Handwatering can be an effective and efficient way to irrigate edible gardens, as long as you make sure to water the soil to a depth of several inches. Watering less will encourage your plants to develop shallow root systems and a dependency on frequent waterings, making them much less drought-tolerant. Handwatering is especially useful for container gardens as it's easy to see when the pots or planters are filled with water. You always want to water container plantings until moisture runs out of the drainage holes in the bottom, and you can tell whether they need water by sticking a finger in the soil up to the first joint. Dry soil indicates it's time to water. Containers sometimes need daily watering during the hot months, but a thorough soaking every few days will probably suffice during cooler months.

Drip Irrigation

Drip and micro-spray irrigation systems apply water directly to the soil around the roots of plants, where it's needed. They're the most efficient form of irrigation, losing minimal water to evaporation and wind drift. Drip irrigation systems rely on a system of plastic pipes to carry water to plants. They apply water more slowly than sprinklers, and can use a lot less. Drip irrigation systems are easy to find and install, but do require periodic maintenance to make sure the emitters are working properly. Drip irrigation lines can be placed under mulch, buried in the soil, or placed on the soil surface for easy access. They can also be used to water container-grown plants.

Overhead Irrigation

Overhead sprinklers are inexpensive and easy to install, but are the least efficient way to water your garden. Much of the water evaporates before being used by the plants, and overhead irrigation can also encourage disease. Hose-end sprinklers screw into the end of the hose and have to be moved by hand to cover more area. Impact sprinklers spray out a fan-shaped curtain of water, and the arm tips back and forth to cover a large area. Gear-driven sprinklers have pop-up nozzles that rotate in an adjustable arc, and spray heads also pop up, typically with a fixed pattern. Position sprinkler heads carefully, and adjust the flow so that foliage and flowers are not damaged with a forceful stream.

Soaker Hoses

Soaker hoses are perforated hoses that soak the ground. The water sprays out in fine streams from slits or holes in the hose, usually moistening the plant's foliage, flower, and fruit as well as the soil. They can help conserve water, because they're placed where water is needed and their proximity to the soil means that less water is lost to evaporation than in overhead irrigation. Some experts recommend that they only be used to help new plantings get established.

UF/IFAS Leon County Extension Irrigation Guide

Irrigating your plants is an important step in creating a successful landscape.
However, too much irrigation wastes a limited natural resource and can cause disease.
Use this guide to help decide how often and how much to irrigate your plants.

Established Plants

Plants that have been in the ground long enough to develop a good root system.
Annuals/Perennials (1-2 months), Shrubs and Trees (4-8 months), Turf (2-3 months), Vegetables (> 1 month)

Plant Type	Cool Season (Fall - Win)		Warm Season (Spr-Sum)	
	How Often?	How Much?	How Often?	How Much?
Annuals/perennials	1 day/week	1/2" to 3/4" per application	2-3 days/week	1/2" to 3/4" per application
Shrubs	Rarely*	1/2" to 3/4" per application	1 day/week	1/2" to 3/4" per application
Trees, fruit	1 day/week	2 gal./inch of trunk	2-3 days/week	2 gal./inch of trunk
Trees, landscape	Rarely*	2 gal./inch of trunk	Rarely*	2 gal./inch of trunk
Turf	Rarely*	1/2" to 3/4" per application	2-3 days/week	1/2" to 3/4" per application
Vegetables	2-3 days/week	3/4" per application	3-4 days/week	3/4" per application

Other Considerations:

Recent Weather
No need to water if there has been recent rainfall or if rain is predicted.

Soil Type
Sandy soils may require more irrigation, while clay soils require less.

Plant Requirements
Some plants like it dry! Know your plant.

Root Depth
The longer a plant has established, the greater the root system and less need for irrigation.

Mulch
Plants with a heavy mulch layer typically need less water.

Native Plants
Once established, native plants may only need irrigation during drought.

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UF/IFAS Leon County Extension Irrigation Guide

New Plantings/Seeds

New plantings and seeds require frequent, low volume irrigation events to ensure survival and successful establishment.

Newly planted turf and seeds may need to be watered up to three times a day with a small volume of water.

Plant Type	Cool Season (Fall - Win)		Warm Season (Spr-Sum)	
	How Often?	How Much?	How Often?	How Much?
Annuals/perennials	2-3 days/week	1/2" per application	4-5 days/week	1/2" per application
Shrubs	2-3 days/week	1/2" per application	4-5 days/week	1/2" per application
Trees, fruit	2-3 days/week	2 gal./inch of trunk	4-5 days/week	2 gal./inch of trunk
Trees, landscape	2-3 days/week	2 gal./inch of trunk	4-5 days/week	2 gal./inch of trunk
Turf	4-5 days/week	1/2" per application	daily	1/2" per application
Vegetables	4-5 days/week	3/4" per application	daily	1/2" to 3/4" per application

How to Measure 1/2" to 3/4" per application?

Place small containers in the irrigated area and let system run for 15 minutes. Use a ruler to measure how much water collected during that time and adjust accordingly to apply the recommended amount.

Additional Resources:

UF/IFAS Resources

Websites and Publications

EDIS - edis.ifas.ufl.edu

Florida-Friendly Landscaping - ffl.ifas.ufl.edu

Florida Lawn Handbook - online at EDIS website

Florida Automated Weather Network (FAWN) - fawn.ifas.ufl.edu

Apps

Smart-Irrigation Apps - smartirrigationapps.org

Other Resources

National Weather Service - Tallahassee - www.weather.gov/tae/

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FLORIDA RESIDENT IRRIGATION PRIORITIES

UF/IFAS Extension recognizes landscape irrigation as an area of focus for Initiative #2: Enhancing and Protecting Water Quality, Quantity, and Supply. UF/IFAS Extension programs encourage the adoption of landscape water conservation practices and technologies which result in water savings statewide.

There are three segments of Florida residents who use landscape irrigation. Extension educators are encouraged to consider these segments when designing Extension's landscape water conservation programs, and deliver impactful programs based on the characteristics and needs of each segment.

Many people in the target audience are actively engaged in certain landscape water conservation practices.

RESIDENTIAL Irrigators:

Water Considerate Majority

Somewhat engaged in conserving water and likely to engage in landscape water conservation practices in the future.

Water Savvy Conservationists

Very engaged in conserving water in the landscape and highly likely to engage in landscape water conservation practices in the future.

Unconcerned Water Users

Not actively engaged in and unlikely to engage in landscape water conservation.

We *CONSERVE* Water By:

23%	Installing smart irrigation	90%	Following water restrictions
22%	Using drip irrigation	80%	Seasonally adjusting irrigation times
20%	Using rain barrels	61%	Using different irrigation zones & run times based on plant needs

Clearly, there are still some practices that very few audience members participate in. This is an opportunity for Extension!

PLENTIFUL water is most important for:

- 90% Aquifers, springs, rivers & lakes
- 88% City use
- 86% Agricultural use

CLEAN water is most important for:

- 98% Drinking water
- 95% Beaches
- 94% Bays & estuaries

We want to *LEARN* about:

- Florida-Friendly Landscaping 40%
- Smart-irrigation practices 36%
- Irrigation management 30%

from these *SOURCES:*

- Internet 65%
- Printed materials 45%
- Television 43%

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Center for LANDSCAPE Conservation & Ecology

For more information about this audience, visit the "Encouraging Landscape Water Conservation Behaviors Series"
http://edis.ifas.ufl.edu/topic_series_encouraging_landscape_water_conservation

Microirrigation for Home Landscapes[1]

Anne Yasalonis and Michael Dukes[2]

What is microirrigation?

Microirrigation is a way to water plants using low pressure and low flowrates (usually 15 psi or less and 60 gph or less). Microirrigation systems can be easy to install above, on, or below the soil or mulch in landscape beds and are inexpensive to purchase. There are four types of microirrigation systems available.

Types of Microirrigation Systems

Drip Emitters

Drip emitters are used for plants that are spaced far apart, such as containerized plants or hanging baskets. Emitters can be installed directly into the main tubing line or attached to the "spaghetti" tubing that can be placed directly at the base of the plants. If plant spacing is not uniform, the latter method may work the best.

Bubblers

Bubblers are often used to establish and maintain large plants such as trees, but they can also be used in containers or on large shrubs. Bubblers can be installed directly into the main tubing line or on short stakes. Bubblers typically have the highest flowrate of all the microirrigation emitters.

Drip Tubing

Drip tubing can be manufactured with in-line emitters or can be tubing with separate emitters attached. Drip tubing can be placed under the soil surface or mulch. This type of irrigation can be completely hidden. Drip tubing has evenly spaced holes in the in-line tubing line, so it is important that the holes are near the base of the plants being watered. Emitter spacing can be customized with tubing and separate emitters. One option is to match the plants' spacing with that of the in-line distribution holes. This type of system works well for annual bedding plants where layout matches the emitter holes on the irrigation line.

Figure 1. Drip emitter.
Credits: Anne Yasalonis, UF/IFAS

1. This document is AE524, one of a series of the Department of Agricultural and Biological Engineering, UF/IFAS Extension. Original publication date October 2017. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Anne Yasalonis, residential horticulture agent, Master Gardener coordinator, UF/IFAS Extension Polk County; and Michael Dukes, professor, Department of Agricultural and Biological Engineering; UF/IFAS Extension, Gainesville, FL 32611.

Figure 2. Microbubbler.
Credits: Anne Yasalonis, UF/IFAS

Figure 3. Drip tubing (in-line).
Credits: Anne Yasalonis, UF/IFAS

Microsprays

Microsprays (also microjets or microsprinklers) must be installed above the mulch. Compared to the other types of microirrigation, microsprays water the largest area. Many different spray patterns are available and can water up to 8 feet in diameter. Microsprays work well in mixed planting beds such as perennial gardens.

Figure 4. Drip tubing in-line emitter.
Credits: Michael Gutierrez, UF/IFAS

Figure 5. Microspray.
Credits: Anne Yasalonis, UF/IFAS

Why use microirrigation?

Microirrigation benefits include:

- Reduced water use, financial savings, and conservation of water.
- Reduction of disease if a drip or bubbler system is used and foliage is kept dry.
- Reduction of weeds through focused distribution of water to the plants and not to open areas.
- Low water pressure requirement, which makes microirrigation exempt from some watering restrictions.

- Easy installation, ability to irrigate unusually shaped gardens, and relatively low cost.

Design and Installation

Microirrigation can be installed with a battery-operated timer on an outside hose bib or attached to an existing in-ground sprinkler system. If attached to an in-ground system, a new valve will be needed to accommodate the low pressure needs of the microirrigation components. Always remember to keep like sprinkler heads in the same zone and never mix with other types of sprinkler heads. Microirrigation emitters should not be mixed with rotors or pop-up spray heads.

Maintenance

Frequent inspection is key with any microirrigation system. This style of watering can make detection of leaks or other issues difficult. Look for wet/dry soil and decline in plant health. Turn on the system frequently and inspect it while it is operating. Remember to check timer batteries and irrigation run times to maintain efficiency.

The small plastic parts of a microirrigation system can be damaged by mowing and maintenance equipment, so take care when using machinery around these systems.

Microirrigation is an efficient way to water your vegetable gardens, containerized plants, hanging baskets, and garden beds. The systems are flexible and easy to expand and adapt to changing landscapes over time.

Where can I find more information?

Operation of Residential Irrigation Controllers: http://edis.ifas.ufl.edu/ae220

Home Irrigation and Landscape Combinations for Water Conservation in Florida: http://edis.ifas.ufl.edu/ae287

Estimated Water Savings Potential of Florida-Friendly Landscaping Activities: http://edis.ifas.ufl.edu/ae515

FLORIDA-FRIENDLY™ LANDSCAPING PRINCIPLES

Protect the Waterfront

Waterfront property, whether on a river, stream, pond, bay or beach, is very fragile and should be carefully protected to maintain freshwater and marine ecosystems.

Attract Wildlife

Plants in your landscape that provide food, water and shelter will attract Florida's diverse wildlife.

Reduce Stormwater Runoff

Water running off your landscape can carry pollutants such as soil, debris, fertilizer, gasoline and pesticides that can negatively impact water quality. Reduction of this runoff will help prevent pollution.

Mulch

Maintaining a 2"-3" layer of mulch will help retain soil moisture, prevent erosion and suppress weeds.

Recycle

Grass clippings, leaves and yard trimmings recycled on-site provide nutrients to the soil and reduce waste disposal when reused on the landscape.

Manage Yard Pests Responsibly

Unwise use of pesticides can harm people, pets, beneficial organisms and the environment.

Fertilize Appropriately

Less is often best. Overuse of fertilizers can be hazardous to your landscape and the environment.

Right Plant, Right Place

Plants selected to suit a specific site will require minimal amounts of water, fertilizers and pesticides.

Water Efficiently

Irrigate only when your lawn and landscape need water. Efficient watering is the key to a healthy Florida yard and conservation of limited resources.

UF | IFAS Extension UNIVERSITY of FLORIDA

Sarasota County

Florida-Friendly Edible Landscaping

UF | IFAS Extension
UNIVERSITY of FLORIDA

Florida-Friendly Landscaping™ PROGRAM

Produce vegetables, herbs, and fruits in an environmentally-friendly way by applying the Florida-Friendly Landscaping™ (FFL) principles. UF/IFAS Extension suggests these helpful tips for for edible plants to conserve water and reduces pesticide and fertilizer use:

- **Match plants to site conditions** (wet/dry, sun/shade). Select fruit trees appropriate for your region (North, Central, South Florida).
- **Use drip or microirrigation** for vegetable gardens, fruit trees, plants in containers to water efficiently.
- **Fertilize** according to special requirements of your fruits and vegetables.
- **Select vegetables for planting** each season according to the planting calendar in the Florida Vegetable Gardening Guide.
- **Compost yard and food waste** and regularly add finished compost to the garden.
- **Plant flowers** to attract beneficial insects to eat garden pests.
- **Mulch** to protect the soil, hand pull or cultivate weeds when they are small.
- **Check for pests** often, use hand control, use less toxic pesticides first, and practice crop rotation.

For more information on this topic check out the **Florida Vegetable Gardening Guide (edis.ifas.ufl.edu/vh021)** and the **Dooryard Fruit Varieties (edis.ifas.ufl.edu/mg248)**

Florida Vegetable Gardening Guide[1]

Sydney Park Brown, Danielle Treadwell, J. M. Stephens, and Susan Webb[2]

Vegetable gardening offers fresh air, sunshine, exercise, enjoyment, mental therapy, nutritious fresh vegetables, and economic savings, as well as many other benefits (Figure 1). Vegetables can be grown year-round in Florida if attention is paid to the appropriate planting dates (Table 1). Planting dates and other vegetable gardening information are also available as a free mobile app called "Florida Fresh." Access an app provider for your mobile phone or download it from http://m.ifas.ufl.edu.

Figure 1.
Credits: kazoka30/iStock/Thinkstock.com

While this guide provides recommendations primarily for traditional home gardens, the information may be useful in other situations, such as community gardens, market gardens, and unconventional approaches like container and raised bed gardens (see EDIS publication ENH1211, *Gardening in Raised Beds* [http://edis.ifas.ufl.edu/ep472]).

Steps in Gardening

Site

For convenience, locate the garden near the house on a well-drained site close to a source of water and in a location that receives at least six hours of direct sunlight daily. With proper care, vegetables may also be included in the landscape among ornamental plants. Coastal sites are also suitable. Where possible, rotate the garden from place to place to help control soil diseases and other pests.

Plan

Before planting, draw a garden plan that includes the name, location, and planting date(s) of the vegetables you want to grow. Use the planting guide (Table 1) to develop your plan. Make a list of supplies and order or purchase seeds early if you intend to grow your own transplants. The planting guide lists which vegetable seedlings transplant easily and

1. This document is SP 103, one of a series of the Horticultural Sciences Department, UF/IFAS Extension. Original publication date December 1999. Revised October 2015, January 2016, May 2018, and September 2020. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Sydney Park Brown, associate professor emerita, Environmental Horticulture Department, and adjunct professor, Center for Landscape Conservation and Ecology; Danielle Treadwell, assistant professor, Horticultural Sciences Department, and organic farming specialist; J. M. Stephens, professor emeritus, Horticultural Sciences Department; and Susan Webb, associate professor, Entomology and Nematology Department; UF/IFAS Extension, Gainesville, FL 32611.

which do not. Vegetables that are difficult to transplant should be seeded directly into the garden or started in containers first.

Soil Preparation

Gardeners often plant on whatever soil type is available, but it is usually worthwhile to improve the garden plot with additions of organic matter (see below). Spade or plow the plot at least three weeks before planting. At planting time, rework the soil into a smooth, firm surface.

ORGANIC MATTER

Most Florida soils are low in organic matter and therefore benefit from the addition of organic matter such as animal manure, rotted leaves, compost, commercial soil mixes, and/or cover crops. Composted organics may be applied at planting time; un-composted organics (such as fresh grass clippings) should be mixed into the soil at least a month before seeding. Due to low and inconsistent levels of nutrients in compost, accompanying applications of inorganic or organic fertilizer may be beneficial (See "Fertilizing" below). Thoroughly mix liberal amounts of un-composted organics in the soil well in advance of planting, preferably at least a month before seeding. Animal manure if used should be spread at a rate of 25–100 pounds per 100 square feet and should be worked into the soil 90–120 days before harvesting any vegetables. See EDIS publication HS1215, *Organic Vegetable Gardening in Florida* (http://edis.ifas.ufl.edu/hs1215).

COMPOST

Create your own "garden gold" by converting yard wastes to compost (Figure 2). Composting is easy to do and yields a manure-like, organic fertilizer/soil conditioner, which highly benefits Florida's infertile native soils. See EDIS publication ENH 1065, *Compost Tips for the Home Gardener* (http://edis.ifas.ufl.edu/EP323).

1. Buy a compost unit or build one from recycled wood pallets, concrete block, sturdy wire, etc. The minimum size should be 3'×3'×3'.

2. Make successive, 12-inch-thick layers of plant waste—such as leaves, lawn clippings, shredded branches, and wood chips. Kitchen scraps may also be used.

3. Animal (not pet) manure, finished compost, blood meal, or fertilizer can be added to each layer if desired.

4. Moisten each layer and keep the pile moist.

5. Turn the pile frequently to add oxygen and help the decomposition process.

6. Depending on how intensively it is managed, compost should be ready for use in two to twelve months, when plant parts are decomposed.

7. Cover the pile to keep rain from leaching nutrients from it.

Figure 2.
Credits: UF/IFAS

COVER CROPS (GREEN MANURE)

Cover crops can be planted in off-seasons to suppress erosion, weeds, or nematodes. The following cover crops are recommended for Florida gardens:

- Summer: cowpea, velvet bean, soybean, and sunflower
- Winter: cereal rye (FL 401), crimson clover, and Austrian winter pea

When a cover crop is turned into the soil, the decaying organic matter (green manure) supplies organic matter and nutrients. Some cover crops can also suppress nematodes.

For more information, see EDIS publications ENY012, *Nematode Management in the Vegetable Garden* (http://edis.ifas.ufl.edu/NG005) and ENY059, *Soil Organic Matter, Green Manures, and Cover Crops For Nematode Management* (http://edis.ifas.ufl.edu/vh037).

ADJUSTING SOIL PH

Soil pH is important because it determines how available nutrients are to plants. The best pH range for vegetable gardens on sandy soil is between pH 5.8 and 6.3. If your soil pH is between 5.5 and 7.0, no adjustment in pH needs to be made.

If your soil pH is below 5.5, apply lime at a rate recommended by a reliable soil testing facility, such as the UF/IFAS Extension Soil Testing Laboratory (http://soilslab.ifas.ufl.edu/). Two to three pounds of finely ground dolomitic limestone per 100 square feet will usually raise the pH one point. **Caution**: Application of lime when it is not needed may cause plant nutritional problems. Lime is best applied two to three months before the garden is to be planted. However, lime may be applied as late as one or two weeks before planting. Make sure the lime is thoroughly mixed into the soil to a depth of 6 of 8 inches, then water the soil to promote the chemical reaction.

If your soil pH is naturally above 7.0 (alkaline), where limestone, marl, or shells are present, there is no practical way of permanently lowering soil pH. Additions of acidic organic matter will help, but only temporarily. Use a fertilizer that contains micronutrients. If the high pH is the result of previous over-liming, application of granular sulfur (1 lb/100 sq ft) will lower soil pH.

Fertilizing

Unless very large quantities of organic matter are applied, commercial synthetic fertilizer is usually needed for Florida gardens. Gardeners find it convenient to use commonly available fertilizer grades such as 10-10-10. However, some Florida soils contain adequate phosphorus (the middle number), and additional amounts should not be added as phosphorus is a pollutant in surface water such as lakes and rivers. A soil test will provide guidelines for the amount of phosphorus and other nutrients to apply. See EDIS publication Cir 1248, *UF/IFAS Extension Soil Testing Laboratory* (https://journals.flvc.org/edis/article/view/126879).

Using the amount of fertilizer recommended on the product or based on your soil test results, broadcast fertilizer over the entire garden plot just before planting. During the growing season, 2 or 3 light applications of fertilizer can be applied as needed. Apply the fertilizer just beyond the outside leaves. Leafy vegetables such as lettuce, kale, and collards benefit from side dressings of nitrogen-containing fertilizer such as ammonium nitrate. Tuber and root crops, like carrots and potatoes, respond to potassium fertilizer such as muriate of potash.

More information on organic fertilizers and nutrient management can be found in EDIS publication HS1215, *Organic Vegetable Gardening in Florida* (http://edis.ifas.ufl.edu/hs1215).

Irrigation and Drainage

Vegetables cannot tolerate standing water from excessive rainfall or irrigation. At the same time, vegetables need soil moisture to grow and produce. Frequency of irrigation depends upon the age of the crop and your soil type. Young plants need frequent but light irrigation; maturing crops need more water but less often. Sandy soils demand more frequent irrigation than clay, muck, or amended soils. Conserve water by using mulch, organic matter, and techniques such as drip irrigation. Make a slight depression at the base of plants to hold water until absorbed by the soil.

Extending the Gardening Season

Gardeners can extend the growing season with protective covers and structures that reduce plant stress and damage from hot and cold temperatures. Commercial growers use shade houses, high tunnels, and row covers; gardeners can adopt modifications of these approaches (Figure 3). To learn more, see the EDIS publications *Veggies and Herbs Made in the Shade* (http://edis.ifas.ufl.edu/hs1228) and *Row Covers for Growth Enhancement* (https://edis.ifas.ufl.edu/cv106). Remove covers when plants that need bees for pollination begin to flower (see vegetables listed in Table 1 as members of the Squash/Cucurbitacae family).

Figure 3.
Credits: UF/IFAS

Pest Management

Pests in the vegetable garden include weeds, insects, mites, diseases, nematodes, and even animals such as raccoons and birds that might consume the vegetable crop (see http://edis.ifas.ufl.edu/VH036).

A gardener has many options for reducing pest problems (http://edis.ifas.ufl.edu/in197). Pesticides can be harmful to people, pets, beneficial insects, and the natural environment and should be used only after all other pest-management steps have been taken.

No-Pesticide Approaches

- **Follow recommended planting date(s)** listed for each vegetable in Table 1. However, be aware that vegetables planted in late summer or early fall (August or September) will be susceptible to insects and diseases that thrive in hot weather. Likewise, cold-tender vegetables planted in late winter or early spring may be damaged by frosts or freezes if not protected with covers (see "Extending the Gardening Season" above for more information on covers).
- **Rotate** vegetables so that the same vegetable (or members of the same vegetable family) are not planted repeatedly in the same areas. The plant family for each vegetable is listed in Table 1.
- **Till or hand-turn** the soil well in advance of planting to discourage soil insects—especially when the garden is a converted lawn area. The garden soil should be turned and free of weeds, grass, and woody material at least 30 days before planting.
- **Control weeds** in and around the garden because they can be a source of insects and diseases. Weed control is best accomplished by mulching and hand-pulling or hoeing small weeds. Recommended mulches are straw, fallen leaves, and unfinished compost. Wood mulches and un-decomposed sawdust should not be used. Weeds around the outside of the garden and between rows can be reduced by putting down several layers of newspaper and then covering them with leaves.
- **Choose adapted varieties** with resistance or tolerance to nematodes and common diseases.
- **Purchase healthy transplants** that are free of insects and disease symptoms (such as leaf spots or blights). Avoid transplants that are already flowering. Consider growing your own transplants from seed (Figure 4).

Figure 4.
Credits: WendellandCarolyn/iStock/Thinkstock.com

- **Protect plants from cutworms** by placing a **collar** around the plant. The collar can be made from a bottomless plastic cup or a waxed cardboard carton. The collar should extend a few inches above and at least an inch below the surface of the ground.
- **Keep plants growing** vigorously and in a state of good health by supplying appropriate amounts of water and fertilizer. A healthy plant is often able to survive insect attacks. Too much nitrogen, however, can make plants more inviting to aphids and whiteflies.
- **Monitor** or **scout** the garden twice weekly for pest problems. This includes inspecting the plants from the bud to the soil, including both upper and lower leaf surfaces. Record notes on pest problems and the performance of different varieties. Include photographs of insects, diseases, and beneficial insects that you find.
- **Identify beneficial insects** (praying mantis, spiders, big-eyed bugs, assassin bugs, lady beetles [also called ladybugs or ladybird beetles], and all wasps). Some of these insects can be purchased, but keep in mind that many beneficial insects exist naturally in Florida, and purchased beneficials will leave if there are no insects for them to eat.
- **Plant flowers** in the vegetable garden. They provide nectar and pollen that attract beneficial insects.
- **Remove large insects** by hand and destroy. Place them in a container of soapy water, where they will sink and drown.
- **Watch for early disease symptoms**. Remove any diseased leaves or plants to slow spread.
- **Do not panic and start spraying** at the first sign of insect damage. Most plants that produce fruits, pods, or ears can stand a 10%–20% loss of leaves without loss of potential yields.
- **Harvest ripe crops** promptly. Allowing overripe fruits to remain on the plants often invites additional insect problems.
- **Remove unproductive plants** and compost or dispose of them.
- **Use soil solarization** to reduce nematodes—microscopic worms that attack vegetable roots and reduce growth and yield. This technique uses the sun's energy to heat the soil and kill soilborne pests. To solarize soil, first remove vegetation, then break up and wet the soil to activate the nematodes. Cover the soil with sturdy, clear-plastic film. Weight down the edges with additional soil to keep the plastic in place. Soil solarization should be done during the warmest six weeks of summer. High temperatures

(above 130°F) must be maintained for best results. See EDIS publication ENY012, *Nematode Management in the Vegetable Garden* (http://edis.ifas.ufl.edu/NG005).

- **Add organic matter** to the soil to help reduce nematode populations. Organic matter improves the capacity of the soil to hold water and nutrients and, in turn, improves plant vigor and resistance to pests.
- See also EDIS publication HS1215, *Organic Vegetable Gardening in Florida* (http://edis.ifas.ufl.edu/hs1215).

Using Pesticides Wisely

If you choose to use pesticides, refer to Table 3 and follow pesticide label directions carefully.

- **Use pesticides only when a serious pest problem exists.** Your local UF/IFAS Extension office can provide information about insect identification. Organic gardeners can use certain products (Bt, for example and others; http://edis.ifas.ufl.edu/in197).
- **Protect bees and other pollinators.** Apply insecticides late in the day when they are less active. Malathion, carbaryl, and pyrethroids are especially harmful to bees (Figure 5).
- **Spray the plant thoroughly**, covering both the upper and lower leaf surfaces.
- **Do not apply pesticides on windy days.**
- **Prevent spray burn**; make sure the plants are not under moisture stress. Water, if necessary, and let leaves dry before spraying. Avoid using soaps and oils when the weather is very hot.
- **Control slugs** with products containing iron phosphate. Products with metaldehyde as the active ingredient are extremely toxic to animals, such as dogs and wildlife that may be attracted to the bait.
- **Prevent fungus diseases.** Purchase fungicide-treated seed. Many common diseases can be controlled by spraying with fungicides if control efforts begin early—ideally before symptoms appear. Look on the label for these chemical names under "active ingredients": chlorothalonil, maneb, or mancozeb fungicide. Powdery mildews can be controlled with triadimefon, myclobutanil, sulfur, or horticultural oils. Rusts can be controlled with sulfur, propiconazole, or tebuconazole. Sprays are generally more effective than dusts.
- **Read the label.**
  - Not every off-the-shelf pesticide can be used on every vegetable or on vegetables at all. Make sure the vegetable and the pest are on the label before purchasing the product.
  - Follow label directions for measuring and mixing.
  - Pay close attention to "waiting periods"—the time that must elapse between the application of a pesticide and harvest. For example, broccoli sprayed with carbaryl (Sevin) should not be harvested for two weeks after application.
  - Follow all safety precautions on the label and keep others and pets out of the area until sprays have dried.

UF/IFAS Extension agents are located in every county to advise you further. Contact information can be found at Find Your Local Office (http://sfyl.ifas.ufl.edu/find-your-local-office/).

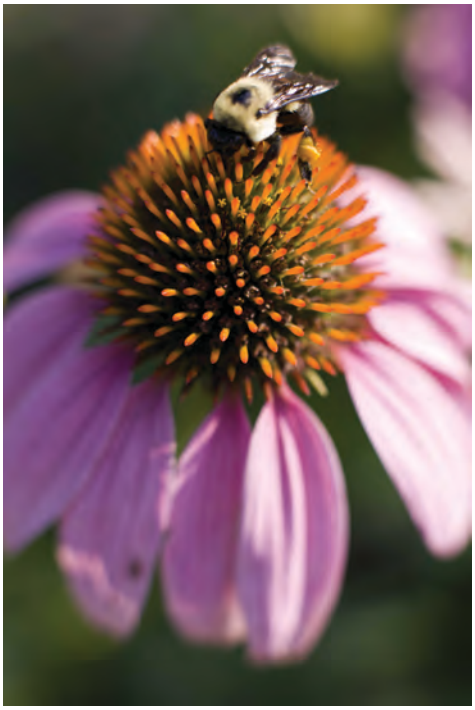

Figure 5.
Credits: UF/IFAS

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Table 1. Planting guide for Florida vegetables.

Crop	Planting Dates in Florida (Outdoors) [1]			Yield per 10 ft (Pounds)	Plants per 10 ft [2]	Days to Harvest [3]	Spacing (Inches)		Seed Depth (Inches)	Transplant Ability [5]	Plant Family [6]
	North	Central	South				Plants	Rows [4]			
Arugula	Sept–Mar	Sept–Mar	Oct–Mar	2.5	30–40	35–60	3–4	10	¼	I	(Cabbage) Brassicaceae
Beans, bush	Mar–Apr Aug–Sept	Feb–Apr Aug–Sept	Sept–Apr	4.5	30–60	45–60	2–4	18	1–1½	III	(Bean) Fabaceae
Beans, pole	Mar–Apr Aug–Sept	Feb–Apr Aug–Sept	Sept–Apr	8	24–40	50–70	3–5	36	1–1½	III	(Bean) Fabaceae
Beans, lima	Mar–Apr Aug	Feb–Mar Aug–Sept	Sept–Apr	5	20–40	60–80	3–6	18	1–1½	III	(Bean) Fabaceae
Beets	Aug–Feb	Sept–Feb	Oct–Jan	7.5	30–60	50–70	2–4	12	½ –1	I	(Beet) Chenopodiaceae
Broccoli	Aug–Feb	Sept–Feb	Oct–Jan	5	8–12	75–90 (50–70)	10–15	24	¼– ½	I	(Cabbage) Brassicaceae
Brussels Sprouts	Aug–Feb	Sept–Feb	Oct–Jan	10	5–7	90–120 (70–90)	18–24	24	¼–½	I	(Cabbage) Brassicaceae
Cabbage	Aug–Feb	Sept–Feb	Sept–Jan	12	8–13	85–110 (70–90)	9–16	24	¼– ½	I	(Cabbage) Brassicaceae
Cantaloupes	Feb–Apr	Jan–Mar	Dec–Mar	15	4–6	85–110 (70–90)	20–36	60	½–1	III	(Squash) Cucurbitaccae
Carrots	Aug–Mar	Aug–Mar	Sept–Mar	10	40–120	70–120	1–3	10	¼	II	(Carrot) Apiaceae
Cauliflower	Aug–Feb	Sept–Feb	Sept–Jan	8	7–10	75–90 (50–70)	12–18	24	¼– ½	I	(Cabbage) Brassicaceae
Celery	Aug–Feb	Sept–Mar	Oct–Mar	15	10–20	75–90	6–12	18	On surface	II	(Carrot) Apiaceae
Chinese cabbage	Aug–Feb	Sept–Apr	Sept–Apr	10	7–9	70–90 (60–70)	14–18	14	¼ – ½	I	(Cabbage) Brassicaceae
Collards	Aug–Feb	Sept–Feb	Sept–Jan	15	5–10	70–90 (50–70)	12–24	24	¼– ½	I	(Cabbage) Brassicaceae
Corn, sweet	Feb–Apr	Jan–Apr	Oct–Mar	12	15–20	65–90	6–8	28	1–1½	III	(Grass) Poaceae
Cucumbers	Feb–Apr July–Aug	Jan–Mar Sept	Sep–Feb	10	10–20	40–65	6–12	48	½–¾	III	(Squash) Cucurbitaceae
Eggplant	Feb–Mar Aug	Jan–Feb Aug–Sept	Aug–Feb	20	3–7	90–115 (70–90)	18–40	36	½–¾	I	(Tomato) Solanaceae
Endive/ Escarole	Jan–Feb Aug–Oct	Aug–Feb	Sept–Mar	7.5	8–9	60–80	14–16	18	¼	I	(Aster) Asteraceae
Kale	Aug–Feb	Sept–Feb	Sept–Jan	7.5	9–10	50–70	8–12	18–	¼– ½	I	(Cabbage) Brassicaceae
Kohlrabi	Sept–Mar	Oct–Mar	Oct–Feb	10	24–40	70–80 (50–55)	3–5	24	½	I	(Cabbage) Brassicaceae
Lettuce	Jan–Feb Sept–Oct	Sept–Feb	Sept–Feb	7.5	10–15	60–80	8–12	18	¼	I	(Aster) Asteraceae

Crop	Planting Dates in Florida (Outdoors) [1]			Yield per 10 ft (Pounds)	Plants per 10 ft [2]	Days to Harvest [3]	Spacing (Inches)		Seed Depth (Inches)	Transplant Ability [5]	Plant Family [6]
	North	Central	South				Plants	Rows [4]			
Mustard	Aug–Feb	Sept–Feb	Sept–Jan	10	12–24	40–50	5–10	12	¼– ½	II	(Cabbage) Brassicaceae
Okra	Mar–June	Feb–Aug	Jan–Mar Aug–Oct	7	12–30	60–70	4–10	36	½–1	III	(Hibiscus) Malvaceae
Onions, bulbing	Mid-Sept–Mid-Nov	Oct	Oct	10	30	100–130	4–6	14	¼–½	III	(Lily) Liliaceae
Onions, bunching (green and shallots)	Aug–Mar	Aug–Mar	Sept–Mar	10	30	50–75 (green) 75–100 (shallots)	2 (green) 6–8 (shallots)	14	¼–½	III	(Lily) Liliaceae
Peas, snow or English	Jan–Mar	Nov–Feb	Nov–Feb	4	20–60	60–80	2–6	12	1–1½	III	(Bean) Fabaceae
Peas, southern	Mar–July	Feb–Aug	Sept–Apr	8	20–60	75–90	2–6	12	1–1½	III	(Bean) Fabaceae
Peppers	Feb–Mar July– Aug	Jan–Mar Aug–Sept	Aug–Feb	5	8–13	90–100 (65–75)	9–15	15	¼–½	I	(Tomato) Solanaceae
Potatoes, Irish	Jan–Feb	Nov–Feb	Oct–Jan	15	12–24	85–110	5–10	36–42	3–4 (seed pieces)	II	(Tomato) Solanaceae
Potatoes, sweet	Mar–Jun	Feb–Jun	Dec–Sept	30	10–12	85–130	10–12	36	—	I	(Morning Glory) Convolvulaceae
Pumpkin	Early July	Mid July	Early Aug	30	2–4	80–100 (70–90)	36–60	60	1½ –2	III	(Squash) Cucurbitaceae
Radish	Sept– Mar	Sept–Mar	Oct–Mar	4	120	20–30	1	6	¼	III	(Cabbage) Brassicaceae
Spinach	Sept–Mar	Sept–Mar	Oct–Feb	4	20–60	45–60	2–6	12	½	II	(Beet) Chenopodiaceae
Squash, Summer	Feb–Apr Aug–Sept	Jan–Apr Aug–Sept	Aug–Mar	15	5–10	40–50	12–24	36	1–1½	III	(Squash) Cucurbitaceae
Squash, winter	Feb–Apr Aug–Sept	Jan–Apr Aug–Sept	Aug–Mar	30	2–4	85–120	36–60	60	1½ –2	III	(Squash) Cucurbitaceae
Strawberry	Sept 15–Oct 15	Sept 25– Oct 25	Oct	9–12	8–10	(30–60)	12–16	12	– – –	I	(Rose) Rosaceae
Swiss chard	Sept–May	Sept–May	Sept–Mar	8–12	10–20	45–60	6–12	18	¼–½	I	(Beet) Chenopodiaceae
Tomatoes (supported)	Feb–Apr July–Aug	Jan–Feb Aug–Sept	Aug–Feb	2	4–7	90–110 (70–90)	18–32	48	¼– ½	I	(Tomato) Solanaceae
Turnips	Aug–Feb	Sept–Feb	Sept–Jan	15	20–60	40–60	2–6	12	¼– ½	III	(Cabbage) Brassicaceae
Watermelon	Feb–Apr	Jan–Mar	Dec–Mar	40	3–5	80–100 (60–90)	24–48	60	1½ –2	III	(Squash) Cucurbitaceae

[1] North = all of Florida north of State Road 40; central = the section of Florida between State Roads 40 and 70; south = all of Florida below State Road 70.
[2] Use transplants (if appropriate) or buy the amount of seed needed to grow this many plants per 10 feet of row. Most seed packets state the number of seeds the packet contains.
[3] Days from seeding to harvest: values in parentheses are days from transplants to first harvest.
[4] Minimum distance between rows (when planting in rows). Row spacing can be reduced or ignored as long as plants are spaced correctly.
[5] Transplant ability (the ability of a seedling to be successfully transplanted): I = easily survives transplanting; II = survives transplanting with care; III = only plant seeds or containerized transplants with developed root systems.
[6] Rotate plant families = avoid successively planting vegetables from the same family in the same area of the garden.

Table 2. Suggested varieties for Florida gardens.

CROP	RECOMMENDED VARIETIES[1]	NOTES/REMARKS
Arugula	Speedy, Astro	Plant at 2–3 week intervals from fall through spring for a continual harvest. The dark-green, spicy leaves can be steamed, pureed, or used raw in salads and sandwiches. Harvest individual leaves as needed or the entire plant when it is 8–10 inches tall. High temperatures cause arugula to flower and become bitter.
Beans, Bush	**Snap**: Bush Blue Lake, Contender, Roma II, Provider, Cherokee Wax **Shell**: horticultural, pinto, red kidney, black bean, navy, garbanzo	Bush beans mature early and do not need staking. Fertilize at 1/2 the rate used for other vegetables; too much nitrogen limits production. Flowers self-pollinate. Plant rust-resistant varieties.
Beans, Pole	McCaslan, Kentucky Wonder, Blue Lake	Fertilize at 1/2 the rate used for other vegetables; too much nitrogen limits production. Support vines. May be grown with corn for vine support. Plant rust-resistant varieties.
Beans, Lima	Fordhook 242, Henderson, Jackson Wonder, Dixie (Speckled) Butterpea, Early Thorogreen	Pole and bush-types exist; provide trellis support for pole-type varieties. Control stinkbugs that injure pods. Fertilize at 1/2 the rate used for other vegetables; too much nitrogen limits production. Slightly more heat tolerant than bush or pole beans. Plant rust-resistant varieties.
Beets	Tall Top, Early Wonder, Detroit Dark Red, Cylindra, Red Ace, Yellow Detroit	Beets require ample moisture at seeding or poor germination will result. Leaves are edible. Thin early to so beet roots have room to enlarge. Very cold tolerant. High in vitamins and iron.
Broccoli	Early Green, Early Dividend, Green Sprouting/Calabrese, Waltham, Packman, De Cicco, Broccoli Raab (Rapini)	Harvest heads before flowers open. Many small side shoots develop after main head is cut. Very cold hardy and nutritious. Broccoli raab is not related to broccoli.
Brussels Sprouts	Jade Cross, Long Island Improved	Cool weather (58°F–60°F) is required or sprouts will open and not be solid. Sprouts are picked when they are walnut-sized and firm. The first sprouts near the bottom of the plant will be ready first. Pull off the leaves below the mature sprouts, then remove the sprouts by twisting them from the stem. Pick the sprouts at about 2-week intervals and keep refrigerated.
Cabbage	Rio Verde, Flat Dutch, Round Dutch, Wakefield types, Copenhagen Market, Savoy, Red Acre	High in vitamins, especially vitamin C. Long fall/winter planting season. Buy clean plants to avoid cabbage black-rot disease. Needs ample moisture and fertilizer. Frost tolerant. Watch for caterpillars.
Cantaloupes and Honeydews	Athena, Ambrosia, Galia (green flesh)	Bees needed for pollination. Disease prone. Mulch to reduce fruit-rot and salmonella. Overwatering or heavy rainfall reduces sugar content of maturing fruit. Harvest when the fruit cleanly separates from the vine with light pressure.
Carrots	Imperator, Nantes, Danvers, Chantenay	Grow carrots on a raised bed for best results. Sow seeds shallowly. They are slow to germinate. Keep soil consistently moist throughout the germination and growing periods. Thin seedlings to recommended spacing when they are an inch tall. Excellent source of vitamin A
Cauliflower	Snowball Strains, Snow Crown, Brocoverde	Can be difficult to grow. Plants are cold hardy; heads are not. Tie leaves around the head (called blanching) when it is 2–3 inches to prevent discoloration or plant self-blanching varieties.
Celery	Utah strains	Can be a difficult crop in the home garden. Requires very high soil moisture during seeding/seedling stage. Needs 3 months or longer to mature. Look for early-maturing varieties.
Chinese Cabbage	Michihili, bok choy, Napa, baby bok choy, pak-choi, joi choi	Easy to grow. Two types exist: Heading (Pekinensis) and Open-leaf (Chinensis). Bok Choy is open-leaf type, while Michihili and Napa form tighter heads.
Collards	Georgia, Georgia Southern, Top Bunch, Vates	Cold and heat tolerant. Cool-season greens are more flavorful. Greens are ready for use 2 months after planting. Harvest lower leaves; never remove more than 1/3 of the plant at one time. Responds, well to nitrogen fertilizer.
Corn, Sweet	Silver Queen (white), How Sweet It Is (white), Sweet Ice (white), Sweet Riser (yellow), Early Sunglow (yellow)	Requires space; plant in blocks of at least 3 rows for good pollination. Isolate different varieties by cross-pollination. Plant where it will not shade other vegetables. Sucker removal not beneficial. Harvesting in early morning maintains sugar content. Scout for corn earworm.

CROP	RECOMMENDED VARIETIES[1]	NOTES/REMARKS
Cucumbers	**Slicers**: Sweet Success, Poinsett, Ashley, MarketMore 76, Straight Eight, Space Master **Picklers**: Eureka, Boston Pickling	Two types: slicers and picklers. Pickling types can also be used fresh. Burpless varieties exist. Many hybrids are gynoecious (female flowering; only female flowers set fruit). Bees are required for pollination.
Eggplant	Black Beauty, Dusky, Long, Ichiban, Cloud Nine (white)	Requires warm soil and weather. Harvest into summer. May need staking. Bitter fruit caused by high temperatures or drought conditions.
Endive/Escarole	**Endive**: Green Curled Ruffec **Escarole**: Batavian Broadleaf	Excellent ingredient in tossed salads or can be cooked as greens. Bitterness can be reduced by blanching 2–3 weeks before harvest. Escarole (Batavian endive) is a broad-leaved selection.
Kale	Vates Dwarf Blue Curled, Tuscan (lacinato), Winterbor, Redbor	Good source of greens late fall through early spring in north and central Florida. Harvest outer leaves, but no more than 1/3 of the plant at one time. Ornamental types are edible, but not very tasty.
Kohlrabi	Early White Vienna, Purple Vienna	Easy to grow. Red and green varieties exist. Use fresh or cooked. Leaves are edible. Harvest stems when 1½ to 3 inches in diameter.
Lettuce	**Crisphead**: Great Lakes **Butterhead**: Ermosa, Bibb, Tom Thumb, Buttercrunch **Loose Leaf**: Simpson types, Salad Bowl, Red Sails, New Red Fire**,** Oak Leaf, Salad Bowl, Royal Oak **Romaine**: Parris Island Cos, Outredgeous	Leaf types grows well in Florida; grow crisphead type only in coolest months. Damaged by freezing temperatures. Warm temperatures cause bitterness. Sow seeds very shallow because they need light to germinate. Intercrop lettuce with long-season and/or taller vegetables.
Mustard	Southern Giant Curled, Florida Broad Leaf, Tendergreen, Giant Red, Green Wave, Mizuna	Good cooking green fall through spring; harvest outer leaves. Broadleaf types require more space. Damaged by freezing temperatures. Warm temperatures create bitter flavor.
Okra	Clemson Spineless, Emerald, Annie Oakley II, Cajun Delight	Soak seeds in water for 6 hours for better germination. Requires warm soils and temperatures. Very heat tolerant. Highly susceptible to root-knot nematodes. Harvest pods a few days after flower petals have fallen or pods become tough and stringy.
Onions	**Bulbing**: Granex (yellow) **Green**: Evergreen Bunching, White Lisbon Bunching **Multipliers**: Shallots **Leeks**: American Flag	Depending on type, onions may be grown from seed, sets, transplants, or division. Bulbing onions must be planted in fall and be short-day varieties. Green/bunching onions may be grown fall through spring. Plant close and harvest (thin) as needed. Insert sets upright for straight stems. Divide and reset multiplier types every year.
Peas, English or Snow	Wando, Green Arrow, Sugar Snap, Oregon Sugarpod II	Fertilize at ½ rate used for other vegetables; too much nitrogen limits production (as do warm temperatures). May need support depending on type. Consume soon after harvest for best quality.
Peas, Southern (aka Field Peas, Cow Peas, Crowder Peas, Cream Peas)	California Blackeye No.5, Pinkeye Purple Hull, Texas Cream	Highly nutritious. Fertilize at ½ rate used for other vegetables; too much nitrogen limits production. Good summer cover crop. Cowpea curculio is a common pest. Maintain consistent soil moisture.
Peppers	**Sweet**: California Wonder, Red Knight, Big Bertha, Sweet Banana, Giant Marconi, Cubanelle **Hot**: Early Jalapeno, Jalapeno M; Cherry Bomb, Hungarian Hot Wax, Big Chile II, Mariachi, Numex, Ancho, Thai, Anaheim Chile, Long Cayenne, Habanero, Caribbean Red Habanero	Transplants often more successful than seeds. Mulching especially beneficial. Will often produce into summer. Pepper "heat" depends on variety and is measured in Scoville units.
Potatoes, Irish	Red Pontiac, Yukon Gold, Gold Rush	Plant 2-ounce certified seed pieces with at least one eye. Each will produce 6–8 potatoes. Do not start with "store bought." Require cool temperatures, moisture, and large amounts of fertilizer.
Potatoes, Sweet	Centennial, Beauregard, Vardaman, Boniato	Start with certified-free transplants (slips). Use vine tip cuttings for a second crop and prolonged harvest season. Types: moist-flesh (yams) and dry-flesh (e.g., boniata). Bush types conserve garden space. Sweet potato weevils are a serious problem; rotate the planting site.

CROP	RECOMMENDED VARIETIES[1]	NOTES/REMARKS
Pumpkin	Big Max, Connecticut Field, Prizewinner, Jack Be Little, Jack O Lantern, calabaza	Requires a lot of space but can be grown under taller vegetables. Bees required for pollination. Foliage diseases and fruit-rot are common.
Radish	Cherry Belle, White Icicle, Sparkler, Champion, Daikon	Easy and fast-growing; thin early and inter-crop with slow-growing vegetables to save space. Plant every two weeks during the growing season for a continuous supply. Spicy, bitter flavor caused by hot weather and over-maturity. Winter/Oriental radishes (such as Daikon) also grow well in Florida.
Spinach	Melody 3, Bloomsdale Longstanding, Tyee, Space	Grows best only during the coolest months. Quick maturing. Harvest entire plant or by removing outer leaves. New Zealand spinach and Malabar spinach, although not true spinach, grow well during warm months in Florida. Plant New Zealand spinach or Swiss Chard for summer greens.
Squash	**Summer**: Early Prolific Straightneck, Summer Crookneck, Early White Scallop, chayote **Zucchini**: Cocozelle, Spineless Beauty, Black Beauty, Chayote, Calabaza **Winter**: spaghetti, Table King, Table Queen & Table Ace (Acorn), Waltham, Early Butternut (butternut)	Summer squash and zucchini are usually bush types; winter squash have a spreading, vining habit. Calabaza is similar, but is a heat and disease-resistant hard-shelled squash, similar to a butternut or acorn in taste. Chayote is a vine that needs support. All cucurbits have male and and female flowers separated on the plant and pollination by insects is required for fruit set. Crossing between types occurs but is only evident when seeds are saved. Leaf and fruit diseases are fairly common. Winter types store well.
Strawberry	Chandler, Oso Grande, Sweet Charlie, Selva, Camarosa, Festival	Grown as an annual crop in Florida starting with disease-free plants in the fall. Plant only varieties adapted to Florida.
Swiss Chard	Bright Lights, Bright Yellow, Fordhook Giant, Lucullus, Red Ruby	Seeds can be sown in the fall as well as in late winter/early spring. An excellent alternative green for warm weather. Harvest outer leaves when 8–10 inches long. Very susceptible to root-knot nematodes.
Tomatoes	**Large Fruit:** Celebrity, Heat Wave II, Better Boy, Beefmaster, BHN444-Southern Star*, Amelia*, BHN 640*, Tasti-Lee™ **Small Fruit**: Sweet 100, Juliet, Red Grape, Sun Gold, Sugar Snack, Sweet Baby Girl **Heirloom**: Green Zebra, Cherokee Purple, Eva Purple Ball, Brandywine, Mortgage Lifter, Delicious	Staking/supporting and mulching are beneficial. Flowers self-pollinate. Blossom drop is usually due to too high or too low temperatures and/or excessive nitrogen fertilization. Serious problems include blossom-end rot, wilts, whitefly, and leafminers. Cherry types are heat resistant *Resistant to TSWV (Tomato Spotted Wilt Virus)
Turnips	**Roots:** Purple Top White Globe **Greens**: Seven Top, Shogoin	Quick-growing, cool weather crop. Grow for roots and tops (greens). Broadcast seed in a wide-row or single file. Thin early to allow for root expansion. Smaller roots (2") are milder in flavor.
Watermelon	**Large**: Jubilee (aka FL Giant), Crimson Sweet, Charleston Grey 133 **Small**: Sugar Baby, Mickeylee	Vines require lots of space. Smaller "ice-box" types exist. Plant disease resistant varieties. Bees required for pollination. "Seedless" types must be interplanted with regular types to dependably bear fruit. Harvest when melon underside begins to turn yellow or when fruit tendril shrivels.

[1] Other varieties may produce well also. Suggestions are based on availability, performance, and pest resistance.
[2] Information on New Zealand and Malabar spinach, calabaza, chayote, and many other minor vegetables can be found at http://edis.ifas.ufl.edu/topic_minor_vegetables

Table 3. Products currently labeled for insect and mite management in home vegetable gardens.

Pest	Neem[d,e]	Spinosad[d,e]	Bt[a,e]	Carbaryl[d]	Malathion[d]	Pyrethroids[b,d]	Soap[c,e]	Hort. Oil[c,e]	Imidacloprid[d]	Acetamiprid[d]
Aphids	X				X		X	X	X	X
Armyworm		X	X			X				
Bean leafroller		X	X			X				
Cabbage looper		X	X		X	X				
Colorado potato beetle		X							X	X
Corn earworm/ fruitworm		X	X			X				
Cowpea curculio				X		X				X
Cucumber beetle	X			X	X	X				X
Diamondback moth caterpillar		X	X							
Flea beetle				X	X	X			X	X
Leafminers		X								
Leafhoppers				X					X	X
Melonworm, pickleworm		X	X		X	X				
Mexican bean beetle				X	X	X				X
Spider mites	X							X		
Squash vine borer			X			X				
Stink bugs						X				X
Thrips		X							X	X
Tomato hornworm, pinworm		X	X			X				
Whiteflies	X					X	X	X	X	X

An X means the product is at least somewhat effective for controlling the listed pest. (Refer to the "active ingredient" on product labels to determine which pesticide(s) the product contains. Also note the specific vegetables for which the product can be used. Pay close attention to the waiting period indicated on the label. This is the amount of time that must elapse between pesticide application and harvest.)

[a] *Bacillus thuringiensis*

[b] Includes bifenthrin, cyhalothrin, cyfluthrin, esfenvalerate, and permethrin. Labeled pests and crops vary by product. Read labels carefully.

[c] Test on a few plants first because of the potential for leaf burn; do not use in hot weather.

[d] To protect bees and other pollinators, do not apply this insecticide when the plant is blooming

[e] Least toxic products

UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED ENH1330

Edible Landscaping Using the Nine Florida-Friendly Landscaping™ Principles[1]

Tiare Silvasy, Lynn Barber, Esen Momol, Tina McIntyre, Tom Wichman, Gail Hansen, Jen Marvin, Terra Freeman, Joseph Sewards, Wendy Wilber, and Jacqlyn Rivas[2]

Introduction

The Florida-Friendly Landscaping™ (FFL) Program provides science-based information to promote practices that protect and improve the environment, including proper application of water, fertilizer, and pesticides; erosion control; recycling yard waste; and improving water quality. This publication provides recommendations to manage food gardens in an environmentally friendly way guided by the nine FFL principles (https://ffl.ifas.ufl.edu/homeowners/nine_principles.htm).

By following the nine FFL principles, you can produce vegetables, herbs, and fruits in a way that conserves water and reduces pesticide and fertilizer use. There are many different terms for edible landscaping, such as foodscaping, food forest, permaculture, square-foot gardening, and urban agriculture. However, the FFL principles represent best management practices that can be applied to all types of edible landscapes. This publication is for Floridians interested in expanding their own edible landscapes, with information about creating a backyard garden that delivers fresh food in an affordable, sustainable way.

Figure 1. Pineapples are a versatile edible landscape choice in parts of Florida with milder winters. Plant them in the ground or in containers. Credits: Tiare Silvasy, UF/IFAS

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Figure 2. Bananas thrive in moist, rich soils and can be planted within the understory of mature trees.
Credits: Tiare Silvasy, UF/IFAS

1. Right Plant, Right Place

• Edibles can be grown year-round in Florida. Choose fruits and vegetables appropriate for your region. Tropicals for south Florida can be grown upwards into the state until killing frosts deter their growth. Northern species may need a certain number of chill hours to produce yields and can grow as far south as chilling-hour requirements are met.

- Follow planting dates for your region's season according to *Florida's Vegetable Gardening Guide* (https://edis.ifas.ufl.edu/vh021).
- Select UF/IFAS-recommended and locally adapted varieties that are well-suited for Florida—for example, 'Seminole' pumpkin and 'Everglades' tomato. See *Dooryard Fruit Varieties* (https://edis.ifas.ufl.edu/mg248).
- Grow annual vegetables in areas where you can amend the soil and provide custom irrigation and fertilization.
- Strategically interplant fruiting trees, shrubs, and perennial herbs with existing landscape plants according to the plant's requirements and your yard's conditions. For more tips on replacing ornamentals with plants that produce foods, see *Edible Landscaping* (https://edis.ifas.ufl.edu/ep146) and *Landscape Design with Edibles* (https://edis.ifas.ufl.edu/ep475).
- Focus on perennials and low-maintenance plants, such as long-lived herbs, shrubs, and trees, that do not need to be planted year after year. Self-sowing herbs, such as cilantro and calendula, can also save time and money.
- Choose drought-tolerant plants. Examples that can withstand stress during dry periods include lemongrass, rosemary, loquat, and persimmon.
- Summer vegetables are limited to a few select crops that can withstand the high temperatures and disease and pest pressure. Black-eyed peas, sweet potato, okra, malanga, yuca, pigeon peas, Malabar spinach, hot peppers, and roselle thrive in the heat of summer. Avoid plants that are listed as invasive in your region. To identify non-natives, refer to the UF/IFAS Assessment of Non-native Plants in Florida's Natural Areas (see https://assessment.ifas.ufl.edu).

• Fruit and vegetable growing are permitted on residential properties according to Florida's Senate Bill 82. Homeowner associations may restrict home gardens to backyards (see https://www.flsenate.gov/Session/Bill/2019/00082).

Figure 3. Drip or microirrigation are good choices for watering your edible crops efficiently.
Credits: Jacqlyn Rivas, UF/IFAS

2. Water Efficiently

- Observe your plants and watch for signs of water stress (wilting leaves, droopiness).
- Use a rain gauge to monitor rainfall and adjust irrigation accordingly.
- Use water-conserving irrigation methods, such as hand-watering, microirrigation, and drip irrigation. Efficient

irrigation methods can reduce water use in the garden and promote efficient fertilization (see https://extension.psu.edu/drip-irrigation-for-vegetable-production).

- Choose the most efficient watering method for your garden type. For example, drip irrigation is best for row crops, and bubblers are best for trees.
- Use the concept of hydrozones, which means grouping plants based on similar water needs. Seedlings and young plants need to be watered often during the establishment period.
- Water at the base of plants, in the morning before 10 a.m. or in the evening after 4 p.m., to reduce water loss due to evaporation.
- Select containers with water reservoirs, or use water saucers. Plastic pots retain moisture more than clay containers.
- Reclaimed water is not recommended for edible crops due to possibility of contamination from pathogens (see https://edis.ifas.ufl.edu/ss544).

Figure 4. Apply fertilizer around the base of vegetables and fruit trees, extending to the drip line.
Credits: Tiare Silvasy, UF/IFAS

3. Fertilize Appropriately

- Amend soil with compost and other organic amendments to build the soil, provide nutrients, and increase water-holding capacity (see *Organic Vegetable Gardening in Florida*, http://edis.ifas.ufl.edu/hs1215).
- Follow the UF/IFAS fertilization recommendations for each specific crop (see *Fertilizing the Garden*, https://edis.ifas.ufl.edu/vh025).
- Apply fertilizer according to the fertilizer label.
- Avoid fertilization when heavy rain is likely. Edible crops are exempt from restrictions mandated by the Florida fertilizer ordinances (see https://ffl.ifas.ufl.edu/fertilizer). However, be aware that nutrients from fertilizer can leach from the soil and pollute water bodies.
- Get a soil test annually to check the pH and nutrients, because vegetables extract a lot of nutrients from the soil.

Figure 5. Mulch adds visual appeal to the edible landscape while also providing many benefits to the plants.
Credits: Terra Freeman, UF/IFAS

4. Mulch

- Mulch your vegetable garden, herbs, and fruit trees to control weeds, conserve moisture, regulate soil temperature, and keep crops clean.
- A fine mulch can be applied to seedlings to protect the soil from drying out in early growth stages.
- Use organic materials such as leaves, hay, and straw for mulch on tender vegetables.
- Apply a 2" to 3" layer of wood chips or pine bark mulch to edible shrubs and fruit trees (except citrus because of root rot). FFL does not recommend the use of cypress mulch, because its origin is difficult to determine.
- Pull mulch away from the base of vegetable crops and tree trunks, because crowding the base can cause disease and plant damage.

5. Attract Wildlife

- The majority of fruit and vegetable crops need pollination to set fruits.
- Pollinators include bees, butterflies, wasps, flies, moths, hummingbirds, and other creatures that help move pollen from flower to flower.

- Encourage a pollinator-friendly garden by planting a variety of flowering plants that provide nectar and pollen. These plants will also attract beneficial insects, which will prey on pests in your edible landscape.
- Birds, toads, bats, anoles, and lizards are beneficial in the garden. Use strategies to provide habitat for them so they can consume insect pests.
- Use the least toxic pesticide available, because they can harm beneficial insects.
- Use an ecological approach that allows pests to be controlled by natural predators, such as ladybugs eating aphids.
- Learn more about pollinators in EDIS publications *Butterfly Gardening in Florida* (https://edis.ifas.ufl.edu/uw057), *Florida Honey Bee Plants* (https://edis.ifas.ufl.edu/in1223), and *Hummingbirds of Florida* (https://edis.ifas.ufl.edu/uw059).

Figure 6. 'Dwarf Everbearing' mulberry is a hardy, low-maintenance tree that stays small with minor pruning and provides sweet fruits for humans and wildlife.
Credits: Tina McIntyre, UF/IFAS

6. Manage Yard Pests Responsibly

- Use the Integrated Pest Management (IPM) process to make decisions about pest management (see *Landscape Integrated Pest Management*, https://edis.ifas.ufl.edu/in109).
- Scout and monitor the garden often—for example, checking cucumbers and squashes, a favorite of many caterpillar species, for caterpillars in the new leaves.
- Identify insects to determine if they are a garden pest. There are many beneficial insects that gardeners kill by mistake.
- Practice sanitation in the garden. Remove dead fruits, which can attract pests.
- Use crop rotation to minimize pest problems season to season.
- Consider hand removal of pest issues, clip off heavy pest infestations, or use physical barriers.
- Promote an ecological approach where pests are controlled naturally using insect predators. This means no "routine" pesticide applications.
- If a chemical spray is needed, choose organic before synthetic pesticides. Products like horticultural oils, botanical soaps, and microbials are the least harmful to human, pets, and wildlife. If chemical weed and pest controls are needed, use them according to the label, and apply them during the cooler part of the day (see *Natural Products for Managing Landscape and Garden Pests in Florida,* https://edis.ifas.ufl.edu/in197).
- Be aware of attracting wildlife that eat food plants. Exclusion tactics can be used to prevent unwanted wildlife (see *Dealing with Unwanted Wildlife in the Urban Environment*, https://edis.ifas.ufl.edu/uw070).

Figure 7. Integrating flowers and herbs with your edible plants can provide food for beneficial insects that eat pests.
Credits: Tom Wichman, UF/IFAS

7. Recycle Yard Waste

- Purchase a bin or build a compost pile (see *Compost Tips for the Home Gardener*, https://edis.ifas.ufl.edu/ep323).
- Compost appropriate organic kitchen and yard waste.
- Consider worm composting to recycle kitchen and paper waste.
- Add leaves to your compost pile, or use them as mulch.

Figure 8. A healthy dose of compost will provide your edible landscape with a good start. Buy compost or make your own.
Credits: Pete Kanaris, Green Dreams Landscaping

Figure 9. Permeable walkways can increase water infiltration for plants and groundwater recharge.
Credits: Gail Hansen, UF/IFAS

8. Reduce Stormwater Runoff

- Rainwater collected in rain barrels from roofs is not recommended for edible crops due to the possibility of contamination from pathogens and chemicals from roofing materials (see https://edis.ifas.ufl.edu/wc297).
- Collected rainwater in rain barrels can be used to water your nonedible flowers, shrubs, and trees in other areas of the yard.
- Use permeable materials for walkways to increase water infiltration.
- Construct berms and swales to reduce erosion and direct water to your edible plants.

Figure 10. Plant native edibles, such as elderberries, that do not require fertilizer or irrigation in areas adjacent to the waterfront.
Credits: Tiare Silvasy, UF/IFAS

9. Protect the Waterfront

- Do not plant edible crops that require tilling, irrigation, or fertilization within a minimum of 10 feet of water bodies. These low-maintenance areas help protect waterbodies.
- The waterfront is a great place to add native wildflowers and plants, which will support the beneficial insect community and protect the water body from erosion and pollution.
- For more information on selecting appropriate plants, refer to the guide developed by Seminole County: https://www.seminole.wateratlas.usf.edu/upload/documents/LakeManagementBookletSmall.pdf.

Figure 11. Papaya and passionfruit growing along the edge of a community garden.
Credits: Jacqlyn Rivas, UF/IFAS

Glossary

Berm—a raised earthen area

Food Forest—a diverse planting of edible plants that attempts to mimic the ecosystems found in nature

Foodscaping—the practice of integrating edible plants into ornamental landscapes

Hydrozone—a distinct grouping of plants with similar water and climatic needs

Microirrigation—application of small quantities of water (gallons per hour versus gallons per minute in an in-ground irrigation system) as drops, tiny streams, or miniature spray through emitters or applicators placed along a water delivery line

Permaculture—the conscious design and maintenance of agriculturally productive ecosystems that have the diversity, stability, and resilience of natural ecosystems

Square-Foot Gardening—the practice of dividing the garden space into equally spaced sections to create a small yet concentrated garden

Swale—a depression in the ground designed to increase rainwater infiltration

Urban Agriculture—the practice of cultivating, processing, and distributing food in or around an urban area

Vermiculture—the cultivation of worms for use in composting

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Local Resources

Community Gardens

Through its Community Garden Program, Leon County promotes gardens in schools, neighborhoods, and other community centers. In addition, Leon County provides financial and technical support to help the gardens flourish. To date, Leon County has supported 21 gardens.

https://cms.leoncountyfl.gov/growinggreen/Green-Topics/Community-Gardens

Growing Green ArcGIS

Use this tool to connect with community gardens, local farms, and farmers markets in the Leon County area.

https://www.arcgis.com/apps/MapJournal/index.html?appid=f141fdd834b24f1e82faa0c58a70b25b#

Farm Tour

Millstone Institute for Preservation works with local farmers to provide a weekend for the public to explore the crops and animal products that are produced in our region. The annual self guided Farm Tour occurs every October. Some years the VegHeadz garden is a stop on the tour.

https://www.facebook.com/Millstone-Institute-for-Preservation-146794575347307/

Mulch

Free mulch made up of shredded yard debris in two grades: fine and large. The fine breaks down much faster than the large. It is available all year long to County/City Residents at the Renew Center. 7550 Apalachee Parkway, Tallahassee, Fl 32311
Loading of pickups and trailers available M-F, 8:30-11:30 and 1:30-4:30.
Please call ahead 606-1800 to check on availability.

Red Hills Small Farm Alliance

The Red Hills Small Farm Alliance is a 501c3 non-profit organization committed to helping small farms in the Red Hills Region.

The Red Hills Small Farm Alliance puts on the Tomato Feastival (in June) and Seven Days of Local Delights every year.

https://www.redhillsfarmalliance.com/

Second Harvest of the Big Bend Food Bank

Have a bumper crop from your vegetable garden? Second Harvest of the Big Bend can get it to those experiencing hunger in our area. They work with local organizations in Leon and surrounding counties to serve those in need.

Individuals may drop non-perishable food donations at their warehouse located at 4446 Entrepot Boulevard, Tallahassee, FL 32310, Monday-Friday from 8:00 am until 4:00 pm.

https://fightinghunger.org/

Sustainable Tallahassee

Sustainable Tallahassee is a non-profit organization dedicated to promoting environmental, economic, and social sustainability in our Tallahassee regional area through education and collaboration. They are especially focused on how sustainability impacts, and is impacted by, Energy, Transportation, Water, Waste, and Local Food - for today and for future generations.

https://sustainabletallahassee.org/

TAPP

The TAPP (Think About Personal Pollution) Campaign helps educate individuals on ways that small personal changes in home and yard practices can help keep local lakes, sinks, and streams cleaner. Rain garden grants are available yearly to City of Tallahassee residents. UF/IFAS Leon County Extension also works with TAPP to bring rain barrel workshops to the public annually.

https://tappwater.org/

UF/IFAS Sites

Ask IFAS Powered by EDIS
https://edis.ifas.ufl.edu/

Florida Friendly Landscaping
https://ffl.ifas.ufl.edu/

Gardening Solutions
https://gardeningsolutions.ifas.ufl.edu/

Extension Offices in Surrounding Counties

If you live in one of our surrounding counties, you have a local Extension Office too.

Jefferson County
2729 W Washington St, Monticello, FL 32344
(850) 342-0187

Thomas County, Georgia (UGA Extension)
442 Smith Ave, Thomasville, GA 31792
(229) 225-4130

Wakulla County
84 Cedar Ave, Crawfordville, FL 32327
(850) 926-3931

Gadsden County
2140 W Jefferson St, Quincy, FL 32351
(850) 875-7255

We also have a UF/IFAS Research Station located near us in Gadsden, Florida. They conduct research on a variety of agriculture and horticulture related topics which helps us provide up to date information to the public.

UF/IFAS North Florida Research and Education Center
155 Research Rd, Quincy, FL 32351
(850) 875-7100

VegHeadz

Catch up with the Master Gardener Volunteer vegetable gardeners on their blog:
https://northfloridavegheadz.blogspot.com/

Interested in learning from and working with the VegHeadz? Join them on most Wednesday mornings from 8 to 10 am in the summer and 9 to 11 am in the cool season.

FARMERS MARKETS

Market	When	Where	Contact
Downtown Market Tallahassee	Saturdays 9am-2pm March through November	115 E Park Ave	downtownmarket@earthlink.net
Frenchtown Farmers Market*	Saturdays, 10am-2pm year-round	524 North Martin Luther King Jr. Blvd	frenchtownmarketplace@gmail.com
Ft. Braden Farmers Market	2nd Saturdays, 9am-noon March to November	Lake Talquin Baptist Church, 21335 Blountstown Hwy	facebook.com/fortbradenfarmersmarket/
Lake Ella Grower's Market	Wednesdays and Saturdays, 11am-2pm	229 Lake Ella Dr	facebook.com/LakeEllaGrowersMarket
Market at Bannerman Crossings	Wednesdays 3-7pm, Saturdays, 10:30am-2:30 pm	Bannerman Crossing, 6668 Thomasville Rd	facebook.com/bannermancrossings/
Red Hills Online Market*	Orders: Sun 8am-Tues 6am; Deliveries Thursdays	Online	https://www.rhomarket.com/
Southside Farmers Market*	2-6pm on various Thursdays	Walker-Ford Community Center, 2301 Pasco St	https://www.talgov.com/neighborhoodservices/ssfm.aspx#dates
Southwood Street Market	2nd and 4th Sundays, 11:30am-2:30pm	3196 Merchants Row Blvd	southwoodtowncenter@gmail.com
Tallahassee Farmers Market**	Saturdays, 8am-noon Year-round	2904 Kerry Forest Pkwy	tallahasseefarmersmarket.com

*Accepts and doubles SNAP and EBT with “Fresh Access Bucks” program.
**Some vendors accept and double SNAP and EBT with “Fresh Access Bucks” program.
Information up to date as of Fall 2021

Glossary

Annual- Plants that germinate, bloom, set seed, and die in one season.

Biennial- Plants that have a life cycle of two years. The first year they germinate and grow; the second year they bloom, set seed, and die.

Catch plants- Plants that are good at taking up minerals from the soil and storing them in the plant tissues. The minerals are returned to the soil for use by subsequent crops when the catch plants are chopped and allowed to decompose in place (nutrient cycling). Roots left in the soil to decompose also return stored minerals to the soil.

Chop and drop- Refers to the cutting of cover crops or other plants, leaving roots in the soil, and allowing the rest of the plant to drop in place and remain as mulch and sheet compost as the plants decompose.

Cover crop- Plants that usually are not planted to provide a product but which furnish services to the garden such as discouraging weeds, regulating soil temperature, attracting pollinators and predator insects, aerating soil with deep roots, and furnishing organic material back to the soil when allowed to decompose in place.

Crop rotation- Refers to a planting plan which rotates crops to a different area of the garden from year to year, thus discouraging pests and diseases which might prey upon that crop. A three- to four-year rotation schedule is desirable.

Compost- A dark, crumbly material created when microorganisms break down organic materials such as leaves, grass clippings, animal manures, and kitchen waste. It is not completely decomposed like humus.

Good bug, bad bug, benign bug- A quick way to identify insects in the garden to see what their effect on plants will be.

Greens and browns- Refers to the ratio of nitrogen (greens) and carbon (browns) needed for a successful compost pile. The general recommendation is 1:2 greens to browns.

Food forest- A low-maintenance sustainable plant-based food production and agroforestry system based on woodland ecosystems, incorporating fruit and nut trees, shrubs, herbs, vines, and perennial vegetables which have yields directly useful to humans.

Humus- The organic component of soil, formed by the decomposition of leaves and other organic material by soil microorganisms. Humus is completely decomposed and stable as opposed to compost which is in the process of decomposition.

IFAS- Institute of Food and Agricultural Sciences. At the University of Florida, Extension is located in IFAS, along with the College of Agricultural and Life Sciences (CALS) and the Florida Agricultural Experiment Station, and is called UF/IFAS Extension.

Master Gardener Volunteer (MGV)- UF/IFAS Extension-certified volunteers who are trained to provide research-based horticultural education to Florida residents.

Micro irrigation- A method of irrigation through which water is distributed through drippers, sprinklers, foggers, and other emitters on the surface.

Mulch- Any material applied to the soil surface for protection or improvement of the area covered.

NPK- Nitrogen (N), phosphorus (P) and potassium (K) - The three plant nutrients that compose a complete fertilizer; a product's N-P-K numbers reflect each nutrient's percentage by weight.

Organic- Natural matter or compounds with a carbon base; also, food grown without synthetic chemicals or pesticides.

Organic materials- Those materials which can decay into organic matter, i.e. anything that was alive and is now in or on the soil.

Organic matter- Organic materials which are in the process of decomposing into humus.

Pollination- The transfer of pollen from the male anther of a flower to the female stigma enabling fertilization and the production of seeds. Most often is done by animals or wind.

Perennial- A cold hardy plant that will return again in the spring; typically a plant that lives more than two years.

Raised bed- A planting bed that sits on top of the soil and can be made of different materials.

Soil- Unconsolidated mineral or organic material on the immediate surface of the earth that serves as a natural media for the growth of plants; typically consists of a mixture of organic remains, clay, and rock particles.

Square foot gardening- A system of garden planning where plants are spaced in measured spaces, usually one square foot each, instead of rows.

Trap plants- Plants that lure pest insects away from the other plants in your garden or which lure predator insects into your garden to prey upon the pest variety.

Worm castings- The high quality compost made by worms. See "Vermicompost."

Vermicompost- Using worms to digest vegetable scraps and make high quality compost or "worm castings." Home vermicomposting is typically done in plastic containers.