

Importance of Sustainability in Agriculture



May 23, 2023

UF/IFAS Extension

Marion County, FL

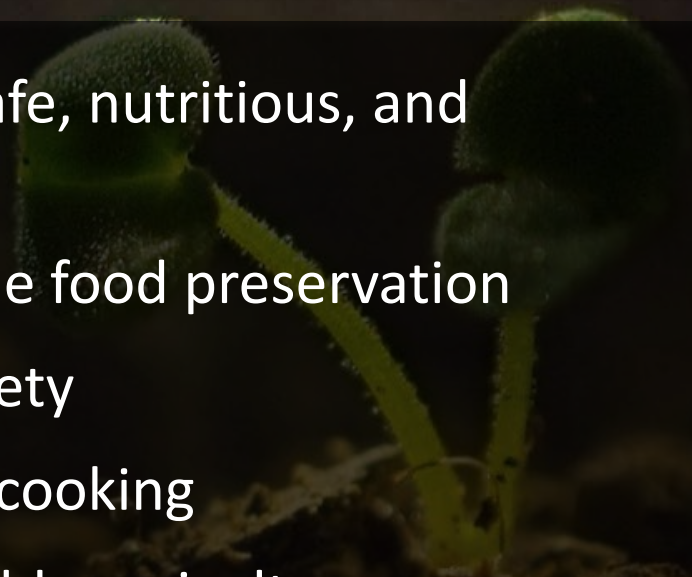
PLANT TO PLATE

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Marion
County
FLORIDA

Objectives to Plant to Plate

- ▶ Increased my knowledge of why a safe, nutritious, and affordable food supply
- ▶ Increased my knowledge about home food preservation
- ▶ Increased my knowledge of food safety
- ▶ Increased my knowledge of healthy cooking
- ▶ Increased my knowledge of sustainable agriculture
- ▶ Increased my knowledge of micro irrigation
- ▶ Increased my knowledge of hydroponics
- ▶ Increased my knowledge of Florida-Friendly Landscaping (FFL)



Marion County/State of Florida

- Over 87% of the population does not consume the recommended five daily servings of fruits and vegetables,
- Statewide average, close to 64% are overweight or obese.
- 13% of county residents are classified as food insecure
- 20% of county children are classified as food insecure
- 16.8% of county residents have diabetes compared to the statewide ratio of 11.7%

Significance Food Farmers

- ▶ Farm Bureau members statewide use Food Check Out week to highlight Florida agriculture and the healthy and nutritious food farmers and ranchers provide us throughout the year.
- ▶ According to the U.S. Department of Agriculture, the average family of four will earn enough money to pay for their entire food supply for one year after seven weeks of working. By comparison, it takes 100 days of work to earn enough income to pay your taxes.
- ▶ American consumers spend less than 10 percent of their disposable income on food, compared to 18 percent in 1960. This is the lowest of any country.
- ▶ Technological advances in agriculture have influenced change in the farm sector. Farmers are able to grow more on less land. Total farm output more than doubled between 1948 to 2011.
- ▶ A single farmer produces enough to feed 155, whereas, in 1960, a single farmer produced enough to feed 26 people
- ▶ Both crop and animal food production are guided by Best Management Practices – state-of-the-art techniques designed and tested by experts at research universities.



PROCLAMATION
BOARD OF COUNTY COMMISSIONERS OF MARION COUNTY, FLORIDA
FOOD CHECK-OUT WEEK
February 13-17, 2023

WHEREAS it is important that Americans have access to and consume healthful foods containing adequate vitamins, minerals, fiber, and other nutrients; and

WHEREAS achieving better nutrition with fewer resources remains a shared concern of our citizens that can be addressed through consumer education and wise shopping strategies; and

WHEREAS Florida farmers and ranchers are unmatched in their ability to consistently produce an abundance of safe, nutritious, and affordable food; and

WHEREAS producers confront significant uncertainties, including inclement weather, damaging insects, and other challenges, on a daily basis; and

WHEREAS Marion County farmers, ranchers, and others involved in agriculture, working together in an environmentally sustainable way, help feed people here in Marion, our state, our nation, and in other countries around the world;

NOW, THEREFORE, The Board of County Commissioners of Marion County, Florida, by virtue of the authority vested in us, proclaim February 13-17, 2023, as Food Check-Out Week. We call upon all Americans to join us in recognizing and reflecting upon the strength of our diverse agricultural production and in celebrating its achievements with appropriate observances and activities.

IN WITNESS WHEREOF, I have hereunto set my hand this 7th day of February 2023.

Recognized
by the
MCBCC

Fruit & Vegetable Gardening



By Mark Bailey

Learning Objectives

- Essential plant needs.
- Variables you can control.
- Site selection: right plant in the right place.
- Vegetable options.
- Fruit options

Growing Philosophy

- Choose plants that are *already* adapted to the environment or to your specific situation.
- Review “EDIS Florida Vegetable Gardening Guide”
- Understand and work with the variables.
- Perennial crops generally require a lot less work than annuals.
- Plant things that fit your tastes and preferences. Will you actually eat what you grew?

Plant Needs

Soil Microbes / OM

Soil pH

Nutrients

Temperature

Light

Drainage & Aeration

Water

Plant Needs

- All variables you can control!

Soil Microbes / OM

Soil pH

Nutrients

Temperature

Light

Drainage & Aeration

Water

Pre-planning

- Create a garden plan that includes the type, location, planting date(s), and general plant profile (ex. Planting depth, etc..)
- Irrigation: drip lines are far more efficient than over-head irrigation. Works for most vegetable crops.
- Can use timer to water regularly. Inexpensive and fairly simple.
- Know what tools, fertilizers, equipment you expect to use.
- Once varieties are selected, begin growing seedlings for near-future transplanting (if applicable).



Site Selection

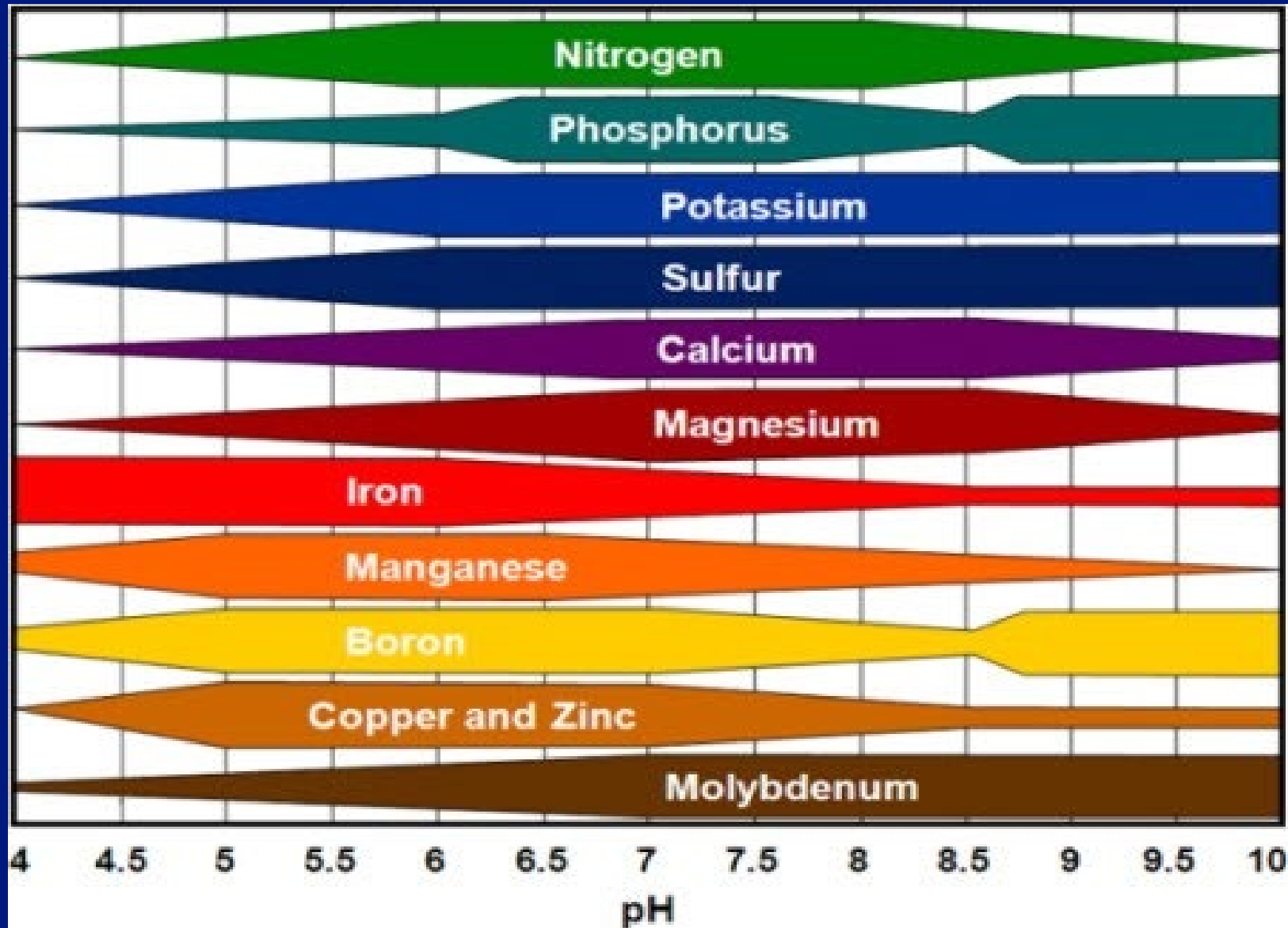


Site Selection

- Don't plant next to large plants or trees – their roots take out a lot of nutrients.
- Choose a well-drained spot.
- Direct sunlight is key for most crops. Consider the time of year.

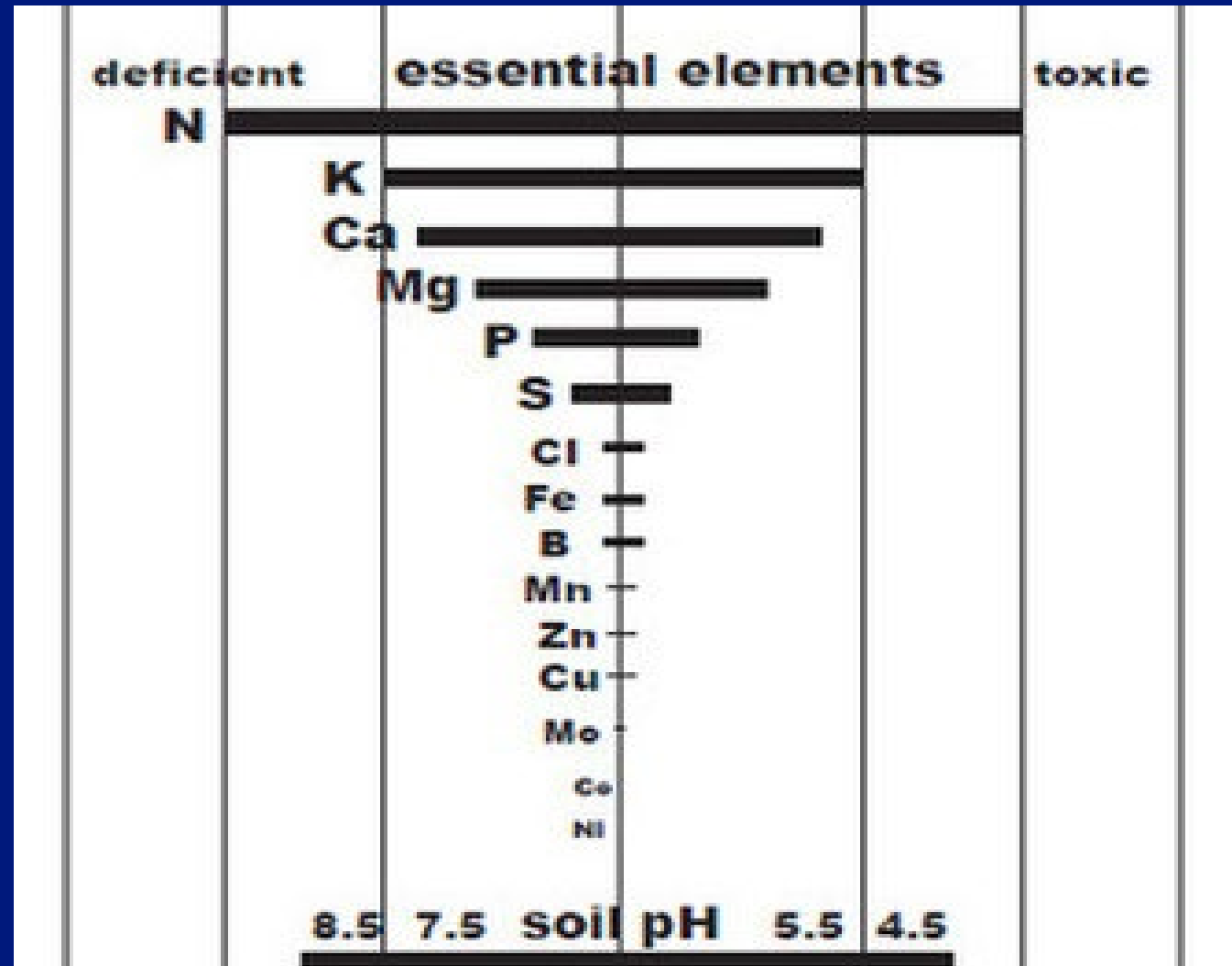


Soil pH? Take a soil test!



Soil Nutrients

- Use fertilizers based upon soil sample results.
- Our soils typically have very high Phosphorus.
- Apply fertilizers typically at the time of planting.
- Use only as needed and ideally split applications of slow release fertilizers.



Soil Preparation & Plant Selection

- A lot of organic matter – can get from nearly any plant material: lawn clippings*, leaves, wood chips, old hay bales*, etc. COMPOST!
- **Soil Test! Take a soil sample prior to planting.** Follow the recommendations.
- Loose soil: Plant roots need oxygen and the ability to easily extend roots through soil. Avoid compaction.
- Choose seeds from reputable vendors and inspect seedlings carefully prior to purchase/planting.

Fertilizers

- Use only as needed and ideally split applications of slow release fertilizers.
- Good to use fertilizers with additional micronutrients to avoid nutrient deficiencies.
- Nitrogen and potassium are quite soluble in the soil.
- Split applications is best.

10-10-10

(N)itrogen (P)hosphorus (K)potassium

GUARANTEED ANALYSIS:	
Total Nitrogen (N).....	10.000%
10.00% Ammoniacal Nitrogen	
Available Phosphorous (P ₂ O ₅).....	10.000%
Soluble Potassium (K ₂ O).....	10.000%
Chlorine, not more than.....	10.000%
SECONDARY PLANT FOODS:	
Boron (B).....	0.020%
Total Copper (Cu).....	0.020%
Total Zinc (Zn).....	0.040%
Total Iron (Fe).....	0.108%
Molybdenum (Mo).....	0.001%
Total Manganese (Mn).....	0.040%
Total Sulfur (S)	7.030%

Vegetable Options

- Greens: collards, kale, kohlrabi, spinach, lettuce, mustard, turnips arugula, broccoli, cabbage, cauliflower, radish, etc. (Brassica)
- Beets, Swiss chard, spinach
- Carrots
- Peas & Beans
- Irish potato
- Florida Vegetable Garden Guide: <https://edis.ifas.ufl.edu/vh021>



Greens

Greens - Tips

- Grows best during the coolest months.
- Quick maturing. Harvest entire plant or by removing outer leaves.
- For warmer months: New Zealand spinach, Malabar spinach, or Swiss Chard.
- Smaller seeds, plant very shallow.
- **Respond well to nitrogen.** Vegetative growth.
- In warmer weather, they tend to bolt, flower, then die.
- Keep protected from extremes when seedlings with frost cloth.

Leafy Greens - varieties



Edible Flowerheads

- Broccoli
- Cauliflower



Turnip, Radish, & Beets

- Edible root
- Beets are related to spinach, while turnips and radish are related to cabbage.
- Extremely fast growth

Radish: 30 days

Turnip: 50-70 days



Carrots

- Plant during cool season.
- Plant very shallow and keep seedbed moist.
- Thin out and harvest as needed.
- Varieties: Imperator, Nantes, Danvers, Chantenay
- Multicolored: Yellowbunch, Purple Haze, and White Satin



Carrots

- Extremely small seeds. Very shallow planting.
- Needs consistent soil moisture around young plants.
- Shade cloth is ideal with this plant.



Sweet Potatoes



Sweet Potato

- **The best choice for most calories per sq ft.**
- Sweet potato are in the morning glory family.
- Require:
 - **high heat**
 - consistent water
 - moderate nutrients
 - loose soil
 - a lot of sun



Sweet Potato



Sweet Potato – the best choice

- Sweet potato are in the morning glory family.
- Require: high heat, regular water, moderate nutrients, loose soil, a lot of sun.
- When to plant: April – June.
- How to plant: from slips (8in~) or directly from the tuber. 3-4 inches deep.
- When to harvest: 120-150 days after planting. Allow to dry for several weeks prior to consuming. Leaves are edible.
- Varieties: Centennial, Beauregard, Vardaman, others...

Sweet Potato Continued

- Sweet potato specifics: Prepare loose soil, ideally in beds.
- Incorporate fertilizer (ex. $\frac{1}{2}$ cup of 10-10-10) into the soil in the immediate area of the sweet potatoes.
- Slips are a segment of vine that grows out of a sweet potato. Plant an 8in~ slip (facing up) about 3-4 inches deep into soil.
- Water at time of planting and continue to irrigate daily to keep the soil moist. The soil does not need to be soaking wet.
- Add an additional $\frac{1}{2}$ cup of 10-10-10 or similar fertilizer 6-8 weeks after planting. Distribute the fertilizer in and around the root zone of each plant.
- Dig sweet potatoes and try to remove all of the tubers from the ground or they will sprout repeatedly.

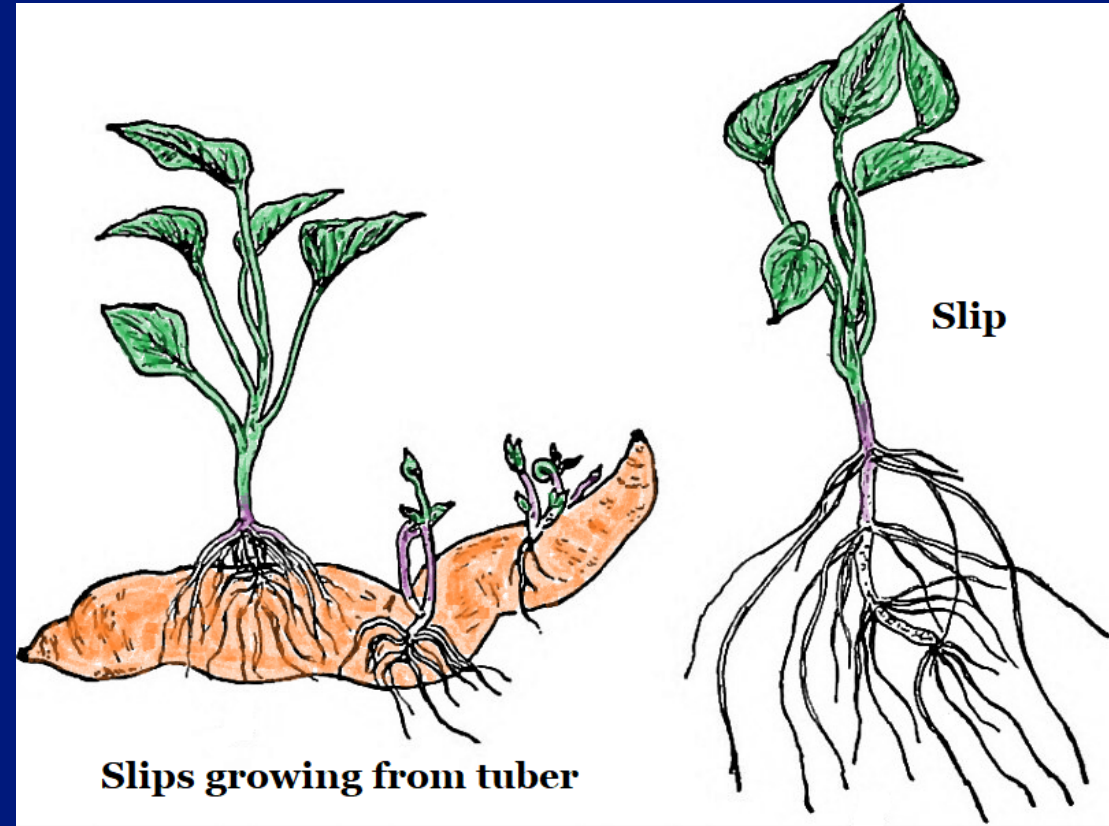
Sweet Potato

- Soaking in water can help prior to planting.
- Rapid production of slips and roots.



Slips

- Slip: a shoot from the tuber that is planted to grow a plant.
- A single tuber can produce dozens of slips.



Sweet Potato Harvest

- When to harvest: Oct-Nov.
- Allow to dry for several weeks (starch → sugar) prior to consuming.



Sweet Potato Harvest



Pumpkin

- Big Max, Connecticut Field, Prizewinner, Jack Be Little, Jack O Lantern, calabaza
- Planting in July is best.
- *Most adapted: Seminole pumpkin Cucurita moschata*
- Planting in late summer is preferred.
- Will need a lot of space.
- Can use trees as trellises.
- Harvest usually in 90 days.
- Similar to butternut squash.



Sugarcane

- Grows well in high heat.
- Related to grass.
- Responds well to fertilizer.
- Harvest in late Oct / Nov.
- Keep cuttings from prior year.
- Plant horizontal – 2ft segments
- Water regularly.
- Need full sun



Cassava

- Shrubby tuber-producing perennial.
- Prefer direct sunlight and rich, well-drained soil.
- High starch content.
- Can easily propagate from cuttings.
- Plant cuttings in 10 inch sections, 4 inch deep.
- **Warning:** Remove bark, wash, and boil to neutralize irritating chemicals



Sorrel Hibiscus

- Good option for summer.
- Calyx is edible
- Great for tea!



Irish Potato

- Planting date: Nov – Feb
- Plant emerges out of “eyes”.
- Can plant small “seed” potatoes or cut out individual eyes, let cure.
- Plant 3-4 inches in bedded soil.
- Require fertilizer for higher yields.
- About 1 cup of 10-10-10 per plant.

High calorie / nutrient dense!



Credit: C. Christensen.

Tomato



Tomato

- Most varieties can be difficult to grow. Use UF-recommended varieties.
- Plant in late spring or mid-late summer from seedlings.
- Do not use excess Nitrogen. Use calcium amendments/spray to reduce blossom end-rot.
- The small **everglades “variety”** is extremely adapted to Florida environment.
- Small fruit and low yield. Excellent flavor.



Snow & English Peas

- Bean family
- Produce their own nitrogen, use low Nitrogen fertilizer
- Varieties: Wando, Green Arrow,
- Sugar Snap, Oregon Sugarpod II
- May need trellis as they climb.
- Cold tolerant.
- Plant no later than March in N. Florida.



Beans



Lance Cheung

Beans

- Warm season only. Plant in late spring or **late summer**.
- Produces own Nitrogen.
- Like full sun.
- Bush beans: (snap): Bush Blue Lake, Contender, Roma II, Provider, Cherokee Wax , (shell): pinto, red kidney, black bean, navy, garbanzo
- Pole beans: McCaslan, Kentucky Wonder, Blue Lake
 - Note: needs trellising.
- Lima beans: Fordhook 242, Henderson, Jackson Wonder, Dixie (Speckled) Butterpea, Early Thorogreen



Fruit Options

- Figs
- Muscadine grapes
- Loquats
- Blueberries
- Mulberry

Figs



Figs

- Rapid growth, very large trees.
- Plant in well drained soil.
- Needs full sun.
- Fertilize young plants 1/2lb in late winter, summer, and late summer.
- Varieties: Alma, Black Spanish, Brown Turkey, Conadria, Celeste, Jelly, Osborne Prolific, Pasquale, Tena, and Ventura



Muscadine Grapes



Muscadine Grapes

- Native to Florida.
- Plant during cool, dormant months.
- Needs: trellising, irrigation lines, full sun, fertilization.
- Must plant either self-pollinating or compatible varieties.
- Many varieties: Alachua, supreme, triumph, carlos, noble, welder, fry, southern home, etc.
- See link for list: <https://edis.ifas.ufl.edu/hs100>



Loquats



Loquats





Loquats



Loquats

- Not to be confused with Kumquats. There is no relation.
- An extremely tough plant, well adapted to this area.
- Plant in full sun in spring or fall ideally.
- Pick fruit when fully yellow or orange. Will become slightly soft when ripe.

Loquats

- This plant requires the least amount of work for the greatest possible yield.
- Varieties: Novak, Champagne, MacBeth, Gold Nugget, Thales, and many others.
- All fruit contain one or more seeds.



Blueberries



Blueberries

- Blueberries are naturally **very** shallow rooted, need to be planted shallow.
- Typically blueberries are planted into a pine bark + soil mix.
- **Need low pH!**
- **Need chill hours. Less chill hour varieties are best.**
- Weed often, use thick mulch, use a weedmat (3ft across) can be used prior to planting.
- Orientation of the rows best north to south to maximize sunlight.
- Drip lines on both sides of the plant is ideal.
- Plant spacing, generally, is 3ft for southern highbush blueberries and 5ft for rabbiteye blueberries.

Blueberries

- Southern Highbush:
- More difficult to grow, available early in the year, risk of freeze damage, many high quality varieties to choose from, plants decline substantially after 5 years of production.
- Rabbiteye:
- Easier to grow, available later in the year, less risk of freeze damage, less available varieties, plants usually last more than 5 years, must have other rabbiteye varieties nearby to pollenate.

Mulberry



Mulberry

- Ripens late spring and summer.
- Plant in full sun, away from paved surfaces – can stain.
- Grow rapidly and very tall.
- Requires minimal maintenance, water, or fertilizers.
- Tastes similar to a blackberry.
- Varieties: Native red mulberry. Black, white, Persian var



Passionfruit



Passionfruit



- *Passiflora edulis* (includes *var. flavicarpa*)
- Note: Passionflowers (*P. caerulea* and *P. incarnata*) are susceptible to caterpillar attack and poor quality fruit.
- A close relative with similar characteristics of Passionfruit is a Giant Grandilla (*P. quadrangularis*)



Planting & Fertilization

- Best planted in full sun and when frost is no longer a concern
- Prefers slightly acid soils (5.5-6.5 pH)
- A soil with good drainage is important to prevent death or disease
- A wide, shallow hole should be dug and filled with well-drained, organic-rich soil. Compost is excellent for this.
- A good time to perform the first fertilization is after pruning
- 5lbs~ of fertilizer (low nitrogen, high potassium) total per year per vine. Split applications.

Fruit

- Prune plants in late winter, once chance of frost has passed
- Fruit occurs on new growth
- Will readily grow up trees, their natural growth habit
- Fruit will drop once they change color and are ripe
- Fruit can be eaten fresh or turned into jams, jellies, or added to other foods as flavoring



Trellis Designs



Pest Control

- Some damage should be considered acceptable.
- Spraying pesticides is not always necessary or the best solution.
- Many effective actions can be taken to prevent or mitigate pests without pesticide use.
- Correctly identify a source of a problem and understand the pest before taking action.
- Many pesticide options, though many affect natural predators too.
- Follow the pesticide label.



Weed Control

- Expect weeds.
- Focus on preventing weeds: mulch (plastic or “green”)
- Eradicate them before they over take your garden.
- Solarization can help.
- Keep garden bed covered (plastic or green mulch growing as a cover crop)
- Use clean soil or compost that’s free of weed seeds.



Additional Growing Tips

- Shade cloth can reduce the intensity of sun on young plants. Remove once established.
- Frost cloth in cool season (self explanatory)
- Frequent watering – enough to keep soil moist, but not soaked
- Excess temp. and nitrogen can encourage bolting.
- Rotate plant types for each growing season to break disease/pest cycles.
- Build up a compost pile and use for garden.
- If you need to apply pesticides constantly, that crop is not sustainable: change variety or change practices.



Questions?

- For more information please call:

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2232 NE Jacksonville Rd.
Ocala, FL 34470

Phone: 352-671-8400

- Email: ironhill@ufl.edu



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DIY Home Hydroponics

Jeremy Rhoden

UF/IFAS Extension, Marion County

Urban & Residential Horticulture Agent

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What is Hydroponics?

- Put simply: Growing plants (primarily crops) in a soilless media with added nutrients.
- Hydroponic Medias:
 - Perlite
 - Rice Hulls
 - Coconut Coir
 - Steel wool
 - Expanded Clay Pellets
 - Composted Pine Bark
 - Sand



Why Hydroponics?

- Quality soil not needed
- Faster growing crops
- Less space
- Can grow anytime
- Used in any location
- Less water
- No weeding or herbicides
- Reduce or eliminate the need for pesticides



Why Hydroponics?

- Reduce or eliminate agricultural runoff
- Easy to adjust nutrient content
- Clean
- Easier than growing in soil
- Simple to master
- Easier to maintain soilborne pathogens
- Reduced contamination of crops
- Increase ability to grow crops for specific characteristics



Nutrition Comparison

Soil

- Plant nutrients are found naturally scattered throughout the soil in multiple forms
- All soils are different and can have excess or deficiencies
- General all-purpose fertilizers are meant for soil applications and often lack micro-elements

Hydroponics

- ALL nutrients must be provided to the crop
- Nutrients availability is consistent, so growth occurs faster
- Must use Hydroponic specific fertilizers that contain all 17-elements

Nutrition

- Fertilizers are available for specific crop requirements
 - i.e. Tomatoes, Peppers, etc.
- Follow the label recipe
- Label is law



Types of Hydroponics

- Kratky/Wicking System
- Deep Water Culture/Floating
- Media Beds
- Vertical Gardens
- Top Drip System
- Nutrient Film Technique (NFT)



Kratky Method



Media Beds



Vertical Gardens



Top Drip System



VertiGro Table-Top Garden

Dutch (Bato) Buckets



Nutrient Film Technique (NFT)



Deep Water Culture/Floating



Float Bed Hydroponics

Pros

- Easiest type of hydroponics
- No electric or running water required
- Affordable
- Indoor or outdoor use
- Can easily be amended to Deep Water Culture (DWC) with an air pump
- Set it and forget it!
- Great for beginners!

Cons

- Fewer crop options

Let's Get Started!



In Your Kits

5-Gallon Bucket

Floating Raft

Three 3" Netted
Planting Cups

4 Rockwool
Cubes

Lettuce Seeds

Bag of Maxi-Gro
Nutrients 10-5-
14 (4-Tbsp.)

Instructions &
Tips

Sowing Seeds



Saturate your Rockwool cubes



Place one seed in each cell of your Rockwool cubes.



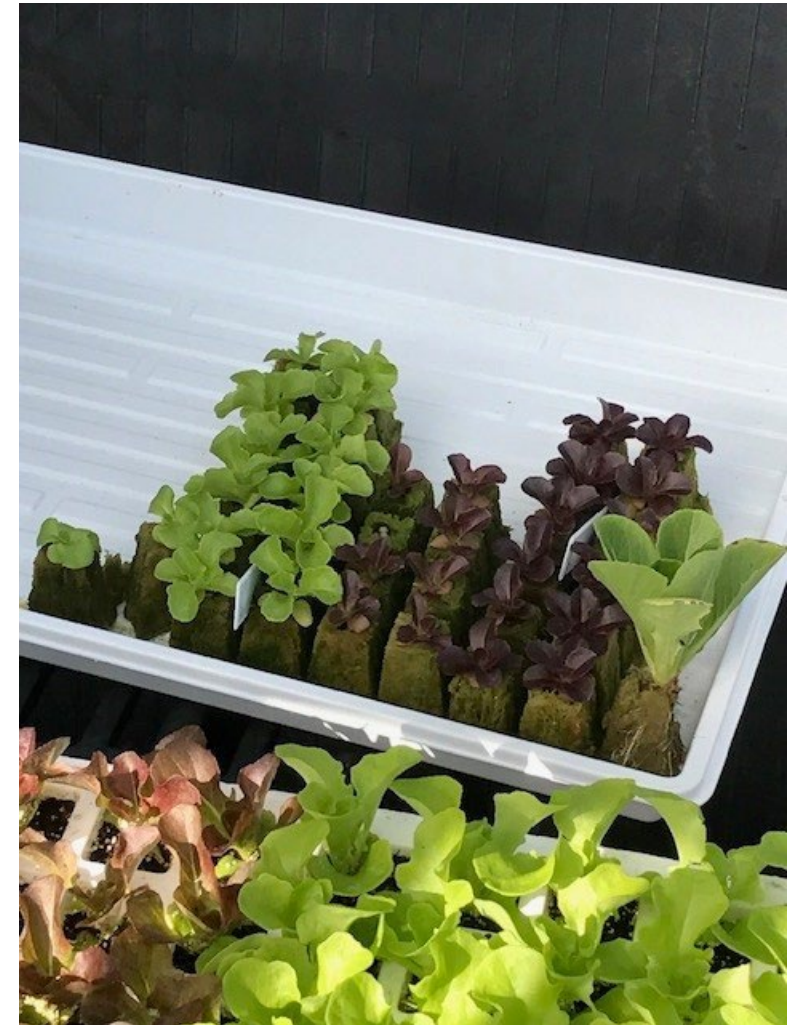
Keep the rockwool saturated until all seeds have been germinated (week 1).



Check on your seedlings daily. Water at minimum every 1-2 days after they have germinated.



In four weeks, transfer seedlings into netted cups of Floating Bed System.



Tips for Sowing Seeds



Allow them to dry out a little, but do not allow seedlings to wilt too much.



Fertilize twice a week – steal nutrient solution from your Float Bed System.



Try not to water too heavy on top of the seedlings, it can bring the stems.



Do not leave too much excess water in the bottom of the tray; it will promote root rot.

Creating a Float Bed System

Items you will need:

- Container of choice
- Jigsaw with long blade
- Drill
- Hole-saw bit
- Netted hydroponic cups
- 2" thick Styrofoam
- Permanent marker



Creating a Float Bed System

- Many containers can work for a float bed system.
- Ideally, you want to use a container the keeps a consistent width from top to bottom.
- Additionally, ensure that it is strong enough to hold water for a long time.



Creating a Float Bed System

- Use the permanent marker to trace the 2" piece of Styrofoam to fit the smallest diameter of your container.
- Use the jigsaw to cut the Styrofoam. Make sure the blade stays flat around the perimeter.
- Ensure your Styrofoam piece fits properly in your container.



Creating a Float Bed System

- The hole-saw size should be based on the diameter of the bottom of the netted cup.
- Use the hole-saw to make your desired number of cells.
- Keep in mind what type of crops you intend to grow in your system.



Creating a Float Bed System



- Place the netted cups in place to be 1cm below the Styrofoam.
- Mix your nutrients and water into the container following nutrient recipe on label.
- Place the raft on top of the solution.
- Place 4-week-old seedlings in the netted cups standing straight up.

Creating a Float Bed System

- Wait 4-5 weeks to harvest or whenever your lettuce reaches full size.
- Enjoy!
- Repeat the process with your second batch of lettuce seedlings.



Tips



The first two weeks are the most critical. Make sure the rockwool stays standing in the netted cup.



Lettuce, spinach, and herbs are great for floating beds.

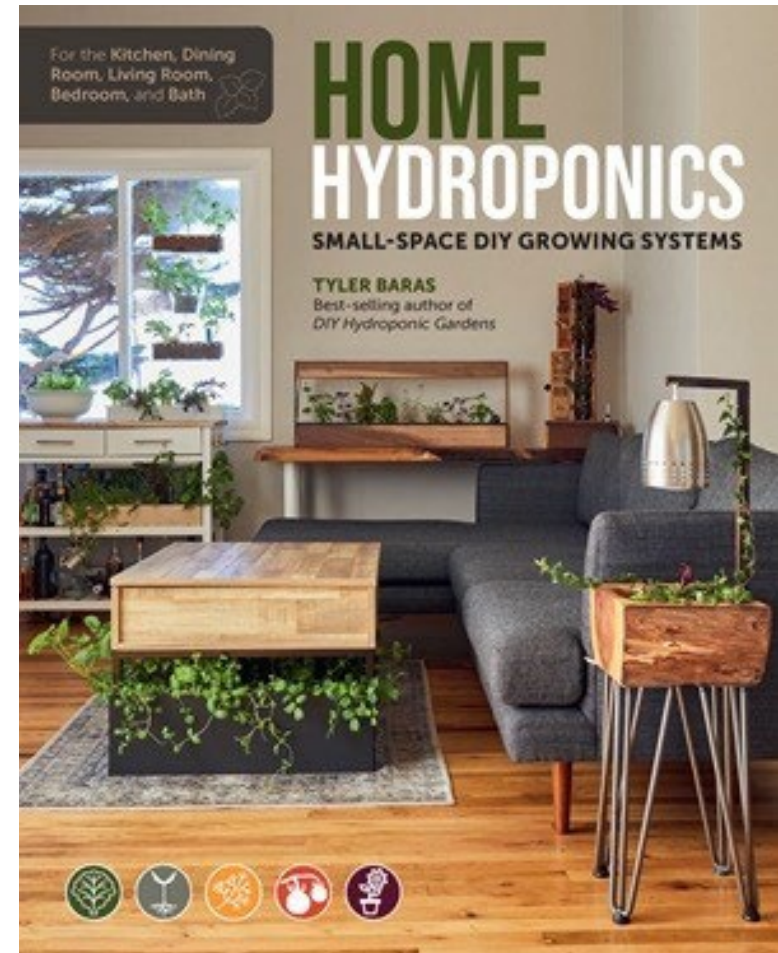
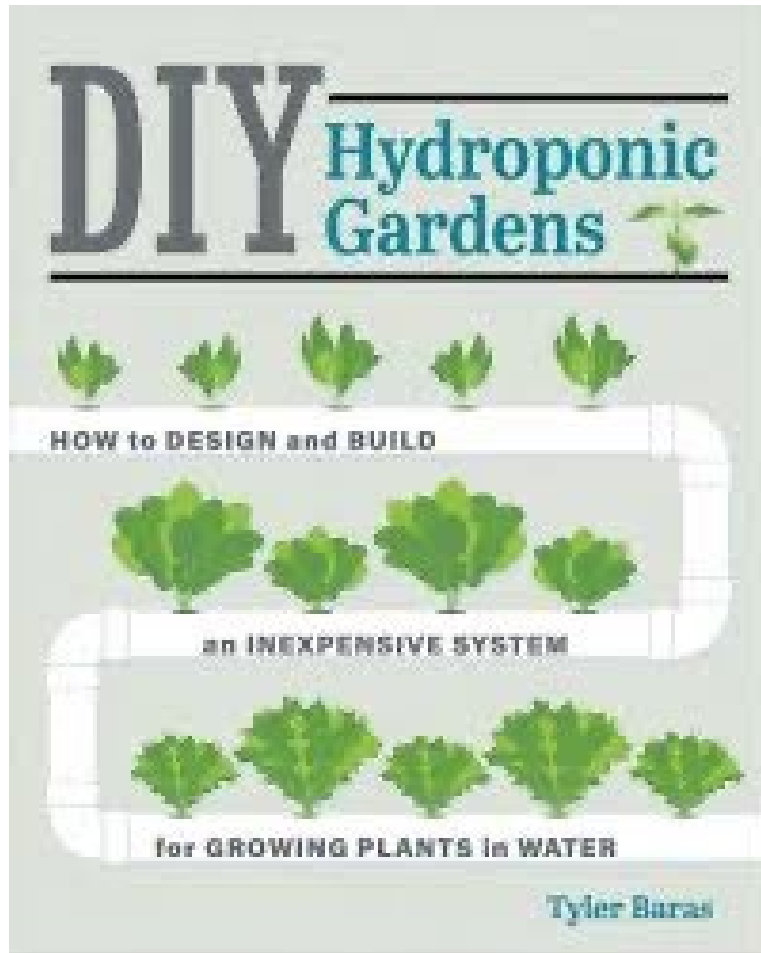


Optional: If growing indoors, you will want to provide lighting for your plants. Most plants need about 16-hours of artificial lighting daily for growth. Spinach only needs 12-hours.



Algae is not a problem, unless it becomes severe (entire inside of the bucket is full of algae).

Recommended Books



Questions?

DIY Home Hydroponics

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UF/IFAS MARION COUNTY
EXTENSION SERVICE

EDIBLE ORNAMENTALS FOR YOUR LANDSCAPE



Florida-Friendly Landscaping™ PROGRAM



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EDIBLE ORNAMENTALS FOR YOUR LANDSCAPE

- What is an edible ornamental landscape?
- The FFL principles in practice
- Considerations for containers
- Herbs & Spices
- Vegetables & Greens
- Citrus
- Shrubs
- Trees
- Edible Flowers



AN EDIBLE LANDSCAPE

Intermixes non-edible ornamental plants with edible plants that are attractive and suitable for the landscape

- May be native or non-native, as long as it is Florida-friendly
- Not invasive exotic
- Attracts wildlife
- Diverse, attractive, and low-maintenance
- Drought tolerant

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ENH1214

Landscape Design with Edibles¹

Gail Hansen²

A VISUALLY APPEALING EDIBLE landscape is created from the artful combination of edibles and traditional ornamentals in the garden. Although basic design principles apply, the substitution of edible plants for ornamental plants can present some challenges and opportunities. The principal challenge is maintaining a healthy-looking garden year-round with the short life span of most edibles. The key to making gardens last is to mix evergreen ornamentals, flowers, and traditional short-season edibles with long-season edibles and nontraditional edibles, such as berry shrubs, fruiting trees, and ground-covering herbs. The large varieties of new edibles on the market provide opportunities to select edible plants for

colorful containers and planters to provide interest and beauty when the plants are not taking center stage. There are twelve important ideas to consider when creating a successful edible ornamental garden.

Twelve Ideas to Create an Edible Landscape

1. Combine reliable, low-maintenance ornamentals with edible plants. Use evergreen ornamentals in the same way that they are used in a typical landscape—to maintain enough green structure in the landscape so cool-season bare areas are not noticeable. A colorful mix of landscape plants, trees, flowers, herbs, and vegetables

<https://edis.ifas.ufl.edu/ep475>

Edible Ornamental Landscaping Guide for North-Central Florida¹

Amanda Marek, Mark Bailey, and Gail Hansen²

Edible ornamental landscaping is the “artful combination of edibles and traditional ornamentals in the garden” (Hansen 2019). Well-designed edible ornamental landscapes, also called foodscapes, provide landowners with aesthetically pleasing, multipurpose gardens that provide food, color, and cover year-round. Not only can these landscapes provide a source of healthy, locally grown food in urbanized communities, they can also promote energy and water conservation, improve food security, and provide wildlife habitat (Çelik 2017). By converting conventional yards into sustainable, edible ornamental landscapes that utilize the principles of Florida-Friendly Landscaping™, we may quell some of the health and environmental impacts of rising population growth and urbanization (Çelik 2017).

The purpose of this publication is to guide Floridians on how to design, install and maintain their edible ornamental landscape using reliable plants suitable for north-central Florida and the best management practices of Florida-Friendly Landscaping™.

Florida-Friendly Landscaping™ with Edibles

The Florida-Friendly Landscaping™ (FFL) program (<https://ffl.ifas.ufl.edu/>) is a statewide initiative to promote attractive, low-maintenance landscapes that conserve water, protect water quality, and provide wildlife habitat. The nine

principles of FFL can be applied to any landscape, including edible ornamental landscapes, to reduce maintenance costs, irrigation, and the need for chemical pesticides and fertilizers (see *Edible Landscaping Using the Nine Florida-Friendly Landscaping™ Principles* at <https://edis.ifas.ufl.edu/publication/EP594>).



Figure 1. A lovely loquat tree is center stage in this residential backyard with other ornamental plants.
Credits: A. Marek, UF/IFAS



<https://edis.ifas.ufl.edu/publication/EP618>

1. This document is ENH1354, one of a series of the Environmental Horticulture Department, UF/IFAS Extension. Original publication date February 2022. Visit the EDIS website at <https://edis.ifas.ufl.edu> for the currently supported version of this publication.

2. Amanda Marek, Florida-Friendly Landscaping Extension agent I, UF/IFAS Extension, Marion County; Mark Bailey, sustainable agriculture Extension

DESIGN CONSIDERATIONS

- The #1 Principle of Florida-Friendly Landscaping™ is Right Plant, Right Place



<https://ffl.ifas.ufl.edu/>

**Plants suited for the site conditions will need less care and maintenance
to be attractive and productive**

FLORIDA-FRIENDLY LANDSCAPING™ IN PRACTICE

1. Right Plant, Right Place

- Match plants to your light, soil & water conditions
- Test your soil pH
- Know the mature size of the plants to allow space
- Select low-maintenance, hardy, non-invasive plants

DESIGN CONSIDERATIONS

- **Light and temperature**

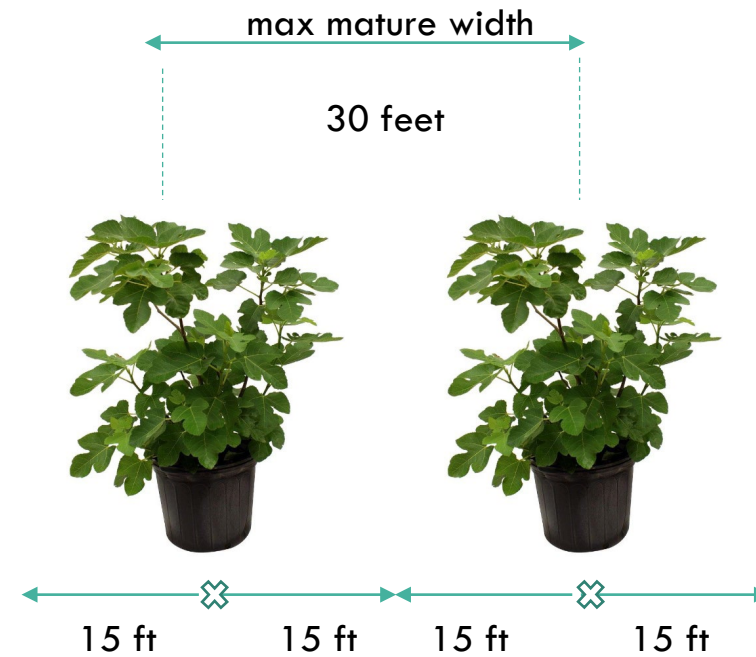
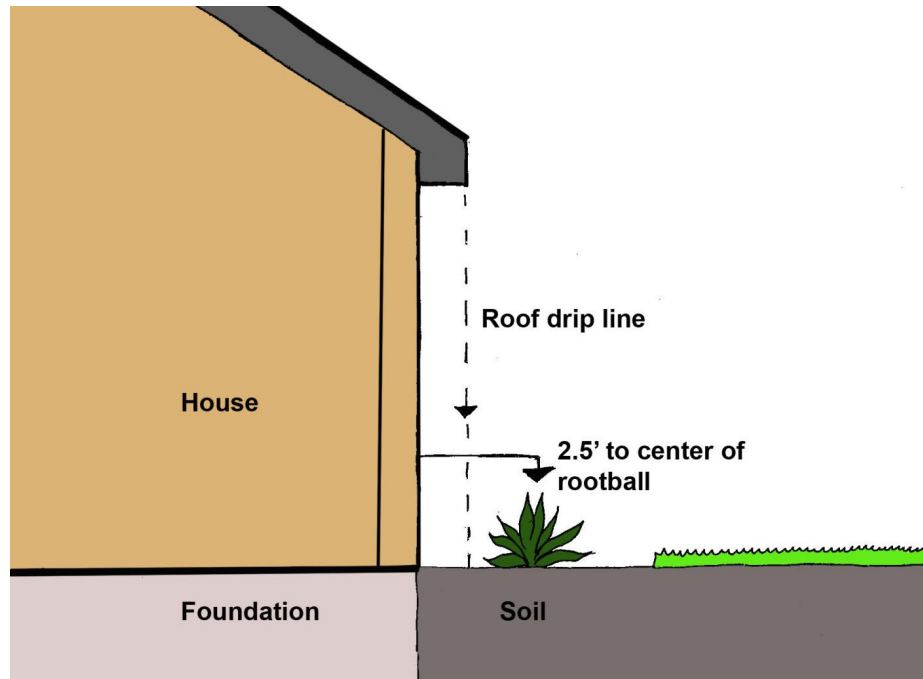
- Choose varieties suitable for your cold hardiness zone
- Select low-chill varieties (ex. blueberries)
- Plant less cold-hardy plants on the S – SW side of your property, near pavement or large trees
- Many edibles will prefer full sun
- Keep in mind changes in light conditions when plants mature



DESIGN CONSIDERATIONS

- Soil pH and nutrients – Don't Guess, Get a Soil Test!
 - Having the pH correct is critical for edible plants
 - <https://sfyl.ifas.ufl.edu/agriculture/soil-testing/>
- Spacing – know the mature size of a plant before you plant it
 - Good spacing allows for better air flow and sunlight = fewer pests, diseases & better production
 - Give vines plenty of space to avoid smothering
 - Maintain shrubs about 3 feet from buildings
 - At least 15 feet of distance for small / med trees
 - Measure spacing from the center of one plant to the center of the next

Ex: Brown Turkey Fig. Mature width is 15 – 30'. How far apart should they be spaced?



FLORIDA-FRIENDLY LANDSCAPING™ IN PRACTICE

2. Water Efficiently

- Microirrigation uses water efficiently to the roots; reduces disease pressure
- Reduce irrigation once established

3. Fertilize Appropriately

- Healthy, fruiting and flowering plants may not need fertilizer
- Some edibles appreciate fertilizer before or during fruit-set
- Don't fertilize before a heavy rain
- Test your soil

4. Mulch

- Use organic mulch like pine bark or melaleuca
- 2-3" for best weed suppression away from trunk



FLORIDA-FRIENDLY LANDSCAPING™ IN PRACTICE

5. Attract Wildlife

- Plant pollinator and host plants to optimize fruit-set
- Have tolerance for some wildlife damage

6. Manage Pests Responsibly

- Identify the pest first
- Allow natural predators to do the work for you
- Use the least toxic control methods first
- Always read and follow the label
- Avoid landscape chemicals on edibles



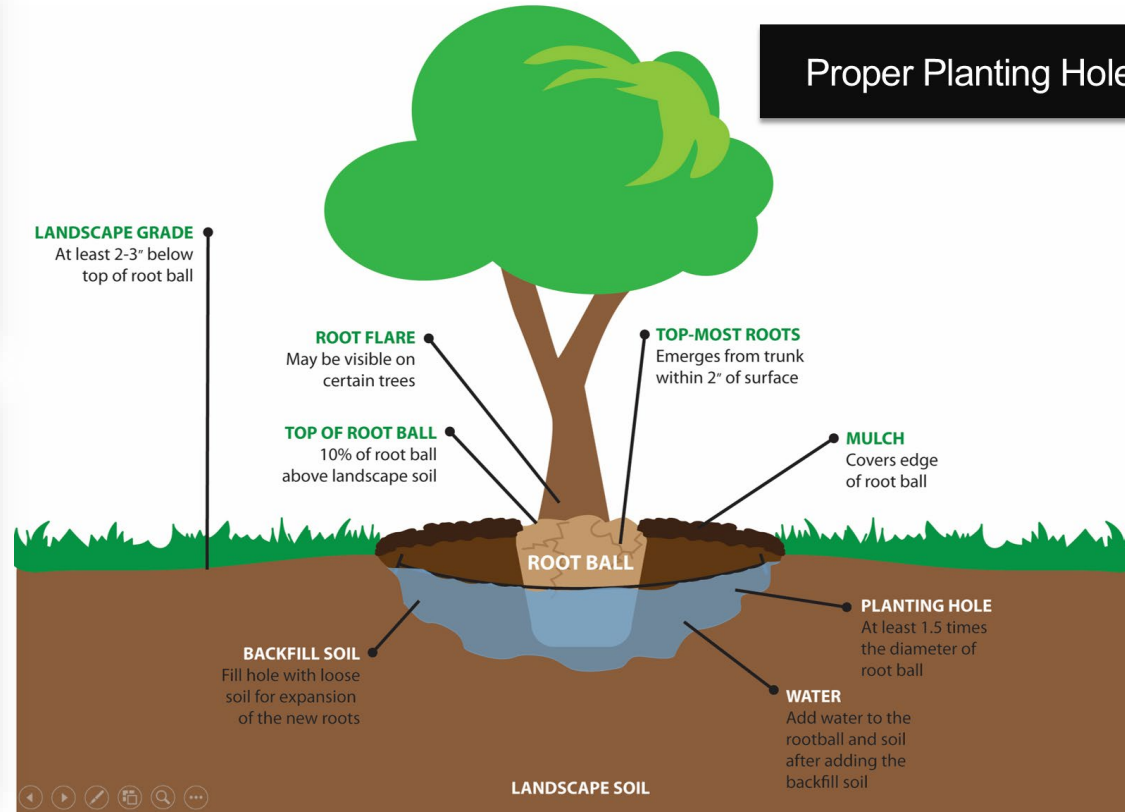
DESIGN CONSIDERATIONS

- Evergreen vs Deciduous
 - Intermix winter annuals or evergreen plants that don't lose their leaves with deciduous plants to avoid bare areas in winter
- Seasonality
 - Have a diversity of plants that produce blooms and/or fruit in different seasons for year-long interest & color
- Always get HOA approval first!



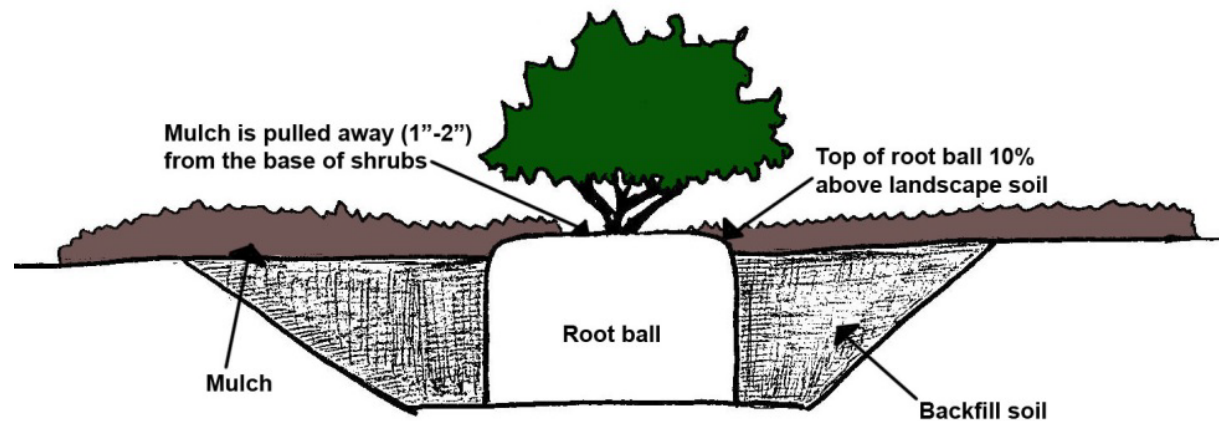
Beautyberry are a lovely native, edible plant, but will be bare in winter

WHEN IT'S TIME TO PLANT



WHEN IT'S TIME TO PLANT

- Water regularly until plant is “established” – can sustain itself without water from you
- Mulch is our friend
 - Maintain 2-3 inches of mulch around drip line
 - Keep mulch a few inches from the trunk or base



CONTAINERS

- Plants in pots will need extra maintenance
 - Cover in freezes or plan to move indoors
 - Hand water or microirrigation
 - Change out soil every few years
- Do not overwater! Allow soil to dry out between waterings
- Avoid overcrowding or pots too small



Photos credit: ffl.ifas.ufl.edu

CONTAINERS

- Good drainage is essential
 - Multiple drainage holes
 - Add gravel, lava rocks to bottom of pot
- Avoid heavy, dense potting mixes
 - 1 part sand, 1 part peat moss, 1 part bark or perlite
- Use complete, slow-release fertilizers after new growth
- Excellent for annuals or smaller perennials
 - Trees and shrubs may outgrow container or have shorter life spans



Bay tree in container. A. Marek, UF/IFAS

FRUIT CROPS GOOD FOR CONTAINERS

Tropical Fruits	Citrus	Temperate Fruits
Avocado	Calamondin	Blackberry
Banana	Key Lime	Blueberry
Barbados Cherry	Kumquat	Fig
Guava	Lemon	Strawberry
Papaya	Limequat	
Passion Fruit	Tahiti Lime	
Pineapple		

Credit: J. Williamson & L. Jackson,
<https://edis.ifas.ufl.edu/publication/mg243>

Container Gardening: Recommended Varieties and Spacing

Crop	Minimum Container Volume	Container Depth	Plant Spacing	Recommended Varieties
Beans, bush	2 gall/3 plants	8-10"	6-8"	Bush: <i>Snap:</i> Bush Blue Lake, Contender; <i>Shell:</i> Pinto, Red Kidney, Black Bean, Navy; <i>Lima:</i> Fordhook 242, Henderson, Jackson Wonder Pole: Kentucky Wonder, McCaslan, Blue Lake
Beans, pole	5 gall/2 plants	12-16"	3-4"	
Broccoli	5 gall/plant	12-18"	12"	Early Green, Calabrese, Waltham, De Cicco, Broccoli Raab
Carrots	5 gall/12 plants	12-18"	2-3"	Danvers, Nantes, Chantenay, Tiny Sweet
Collards	3-5 gall/plant	12-18"	12"	Georgia Southern, Vates, Top Bunch
Corn, sweet	15 gall/3-6 plants	12-16"	4-6"	Trinity, Silver Queen, Sweet Riser, Early Sunglow
Cucumbers	5 gall/plant	12-18"	12-16"	Space Master, MarketMore 76, Straight Eight, Boston Pickling
Eggplant	5 gall/plant	12-18"	18-24"	Black Beauty, Dusky, Long, Florida Market, Ping Tung, Rosita
Kale	3-5 gall/plant	12-18"	12"	Vates Dwarf Blue Curled, Tuscan, Winterbor, Lacinato (Dinosaur)
Lettuce	2 gall/plant	6-8"	4"	Tom Thumb, Ruby, Salad Bowl, Buttercrunch, New Red Fire (grow non-heading types)
Mustards	2 gall/plant	8-10"	2-6"	Florida Broadleaf, Tendergreen, Mizuna
Okra	3-5 gall/plant	12-18"	6-10"	Clemson Spineless, Emerald, Cajun Delight
Onions, bulbing	2 gall/plant	12-18"	4"	Bulbing: Granex (yellow) Bunching: Evergreen, White Lisbon
Onions, bunching	1 gall/12 plants	6-8"	1-2"	
Peppers	3 gall/plant	12-18"	12"	<i>Sweet:</i> Red Knight, Jimmy Nardello, Aji Dulce, Sweet Banana, Giant Marconi <i>Spicy:</i> Jalapeño, Thai, Hungarian, Habanero, Lon Cayenne
Potatoes	5 gall/3 plants	12-18"	8"	Red Pontiac, Yukon Gold, Gold Rush
Potatoes, sweet	5 gall/plant	18-24"	10-12"	Centennial, Beauregard, Vardaman
Radishes	2 gall/12 plants	6-8"	1-2"	Cherry Belle, White Icicle, Sparkler, Champion, Daikon
Spinach	2 gall/3 plants	4-6"	3-5"	Melody, Bloomsdale Longstanding, Tyee, Space
Squash	5-7 gall/plant	18-24"	24-36"	<i>Summer:</i> Early Prolific Straightneck, Summer Crookneck, Black Beauty Zucchini <i>Winter:</i> Spaghetti, Waltham, Table Queen & King, Butternut
Swiss Chard	1 gall/plant	10-12"	4"	Bright Lights, Fordhook Giant, Red Ruby
Tomatoes	5 gall/plant	18-24"	18-24"	Small: Sweet 100, Tiny Tim, Juliet, Sun Gold, Black Cherry, Small Fry Large: <i>Determinate:</i> Early Girl, Patio, Celebrity; <i>Indeterminate:</i> Better Boy, Beefmaster; <i>Heirloom:</i> Cherokee Purple, Mortgage Lifter, Brandywine
Turnips	1 gall/plant	12-18"	2-4"	Purple Top White Globe, Hakurei, Tokinashi
Watermelon	5-7 gall/plant	18-24"	24-36"	Small: Sugar Baby, Mickeylee; Large: Jubilee, Crimson Sweet, Charleston Grey 133





HERBS & SPICES

- Many herbs do very well in North Central Florida
- May be self-seeding annuals or perennials: rosemary, thyme, oregano, chives, mint, etc.
- Herbs – leafy parts ; Spices – seeds, berries, bark, stems, roots
- Most require full sun and well-drained soil
- The flowers of many herbs are highly attractive to pollinators
 - Ex. Basil, rosemary, mint, cilantro
- Dill, parsley and fennel are host plants for black swallowtail butterflies

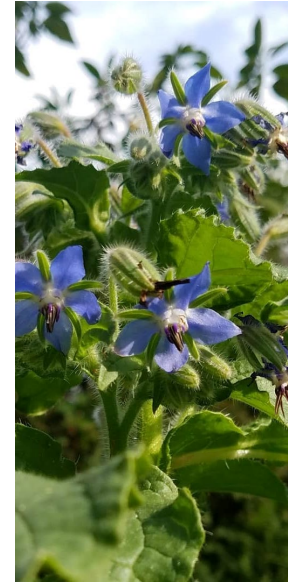


Cilantro in bloom. Seeds are called coriander.
A. Marek, UF/IFAS

HERBS & SPICES

- Basil
 - African Blue
 - Holy (or Tulsi)
 - Thai
 - Amaze|™ Basil
 - Pest Besto™
- Borage
- Chives
 - Onion
 - Garlic
- Cilantro / Coriander
- Dill
- Fennel
- Ginger & turmeric
- Lavender – ‘Phenomenal’
- Lemon Balm
- Marjoram
- Mint
- Oregano
- Parsley
- Rosemary
- Sage
- Society Garlic
- Tarragon - Mexican
- Thyme

Borage. UF Ethnoecology



Onion chives. A. Marek, UF/IFAS



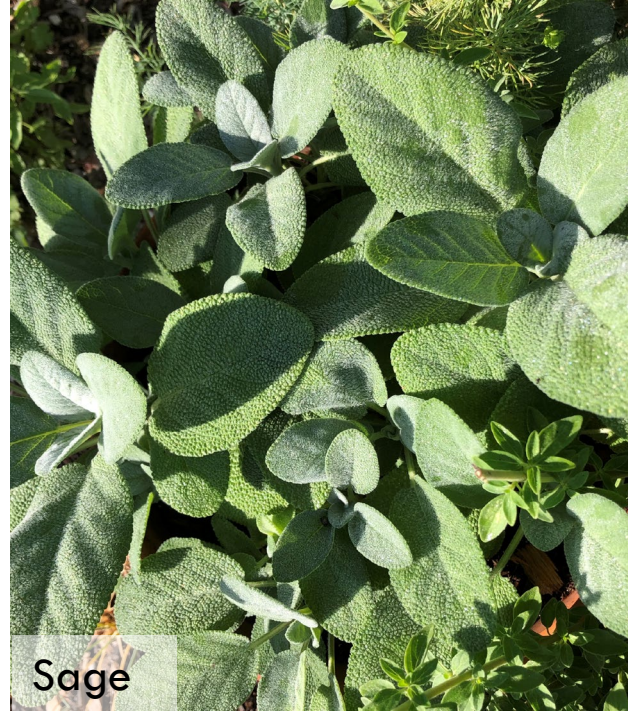
African Blue Basil in bloom. A. Marek, UF/IFAS



Dill



Thyme



Sage



Amazel™ Basil



Rosemary



Holy Basil



VEGETABLES & GREENS



VEGETABLES & GREENS

Some vegetables and greens that are particularly ornamental:

- Kale
 - Dinosaur aka Tuscan kale: cool-season crop; nutritious, dark, green-gray leaves
 - Ornamental kales: bitter tasting, best as garnishes. Ex. 'Pigeon Purple' and 'Glamour Red'
- Spinach
 - Okinawa: purple undersides, orange flowers, heat-tolerant, sun/partial shade
 - Malabar: heat-tolerant, attractive vine with succulent leaves, 'rubra' has red stems and more compact
 - Surinam aka Jewels of Opar: beautiful pink bloom, unique seeds, part shade

VEGETABLES & GREENS

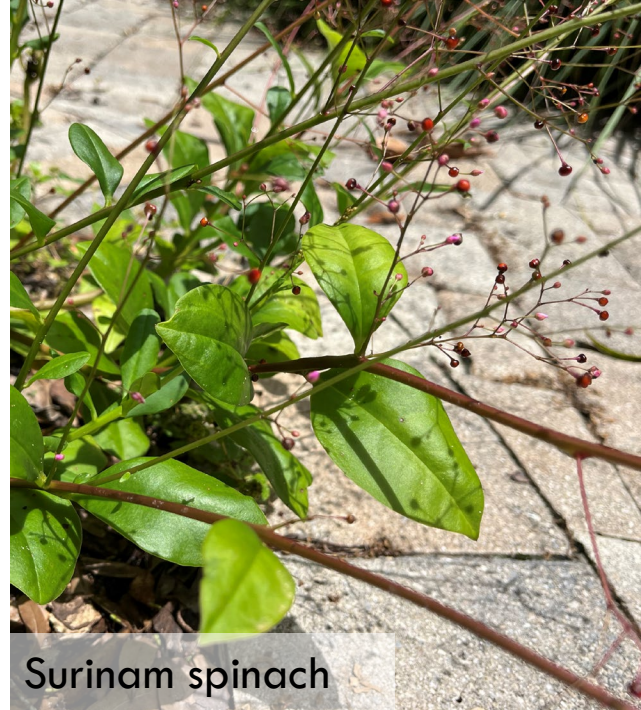
- Swiss Chard – heat tolerant, full sun, very colorful stems and leaves
 - 'Bright Lights' – aka Rainbow Chard, multi-colored stems and leaves
 - 'Bright Yellow' – dark yellow stems
 - 'Fordhook Giant' – large, wavy green leaves, white stems
 - 'Ruby Red' – red stems and leaf veins
- Ornamental Pepper (*Capsicum annuum*)- warm-season crop, annual or perennial in 9B or south, multi-colored peppers, known to be extremely hot



'Red Giant' Mustards



'Dinosaur' Kale



Surinam spinach



Ornamental pepper



Rainbow Chard



Malabar Spinach

VEGETABLES & GREENS

- Romanesco Broccoli – cool-season
- Mustard Greens – cool-season, full/partial sun
 - ‘Red Giant’ – large, purple foliage
- Cauliflower – cool-season only, full sun
 - ‘Violet Queen’ and ‘Graffiti’ - purple heads
 - ‘Cheddar’ - orange
 - ‘Flame Star Hybrid’ – yellowish orange

Romanesco Broccoli. UF/IFAS



Cauliflower in colors. Kiki Fontenot/LSU AgCenter





CITRUS

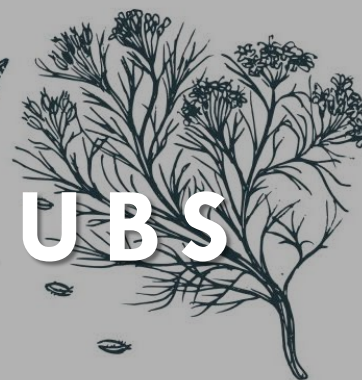
CITRUS

- Citrus Greening is a fatal bacterial disease to all citrus spread by the Asian citrus psyllid
- To prevent infection, grow citrus under tents or in containers under lanais
 - Key Lime
 - Kumquat
 - Lemon ex. dwarf Meyer Lemon
 - Limequat
 - Tahiti Lime
- New citrus varieties showing promise:
 - Sugar Belle® mandarin hybrid
 - Finger limes



Finger lime. Credit: Cristina Carriz, UF/IFAS

SHRUBS



SHRUBS

- Darrow's Blueberry (*Vaccinium darrowii*)
– evergreen, perennial, native blueberry; grows 2' tall and wide; new foliage is purple with small but tasty fruit; full sun, acidic soils
- Pineapple – a perennial bromeliad, cold-sensitive, may grow 3-6' tall and wide, grow well in containers, full-sun
- Rosemary – a perennial, evergreen, herb; flowers attractive to pollinators; can be pruned to size, grows up to 6' tall and 5' wide



SHRUBS

- Dwarf yaupon holly – an excellent, hardy, evergreen, perennial shrub; leaves used to make naturally caffeinated teas
 - ‘Bordeaux’ dwarf yaupon grows 2-3’ tall and 3 -5’ wide – no berries
 - ‘Nana’ grows 3-5’ tall and 3-6’ wide, occasional red berries
 - ‘Schillings’ or ‘Schellings’ grow 4-7’ tall and 6-10’ wide – no berries
- Roselle hibiscus – aka Cranberry hibiscus or sorrel; an annual flowering bush with attractive flowers and foliage; edible calyx; 5-7’ tall and wide, full sun



TREES



TREES

- Loquat – very hardy evergreen tree, 25' tall x wide; orange pear-like fruit ripens in winter / early spring; full sun, well-drained soils
- Fig – deciduous, broad-leaved tree, usually multi-trunked; can grow 25' tall x wide; fruit ripens in summer; select closed-eye cultivars like Brown Turkey or Celeste; full sun, well-drained soils
- Japanese Persimmon – deciduous, usually grows to 8' tall x wide; bright orange fruit ripens in fall – winter; select non-astringent cultivars; full sun



TREES

- Mulberry – deciduous, native red mulberry & non-native black; grow rapidly and large; many different cultivars, black considered most desirable fruit and grow smaller (~ 40'); Dwarf Everbearing black grows up to 15'; dark fruit ripens late spring – summer
- Pineapple Guava – attractive, evergreen tree related to guava; beautiful red & white edible flowers in spring, round fruit ripens in summer; pruned as shrub or grown as tree up to 15' tall x wide; full to partial sun



TREES

- Yaupon Holly – native evergreen tree grows 15 – 25' tall x wide, females have red berries in winter; naturally caffeinated leaves; weeping or standard; full to partial sun
- Chickasaw or Flatwoods Plum – deciduous, native plums usually grow 15 – 20' tall, full to partial sun; Chickasaw prone to forming suckers; orange or purple (flatwoods) edible fruit in late spring – summer following white blooms before leafing out



John Ruter, UGA



Shirley Denton

EDIBLE FLOWERS



EDIBLE FLOWERS

- Portulaca – aka purslane or moss rose; succulent annual ground cover, great for containers, full sun, beautiful flowers in many colors; edible leaves, stems and flowers in moderation
- Pineapple sage (*Salvia elegans*) – perennial in the mint family, red blooms late summer to early fall, highly attractive to butterflies and hummingbirds, flowers are edible and smell like pineapple
- Nasturtium – brightly colored orange, red and yellow flowers; edible leaves, pods and flowers, self-seeding annual, trailing and dwarf compact forms, full to partial sun



RESOURCES

- Natural Products for Managing Landscape Pests: <https://edis.ifas.ufl.edu/publication/IN197>
- Container Gardens for Outdoor Spaces: <https://edis.ifas.ufl.edu/publication/EP326>
- Container Size Matters When Growing Veggies: <https://nwdistrict.ifas.ufl.edu/hort/2020/01/27/container-size-matters-when-growing-veggies/>
- Growing Fruit Crops in Containers: <https://edis.ifas.ufl.edu/publication/mg243>
- Herbs & Spices in the Florida Garden: <https://edis.ifas.ufl.edu/publication/VH020>
- Citrus Culture in the Home Landscape: <https://edis.ifas.ufl.edu/publication/HS132>
- Peppers: <https://gardeningsolutions.ifas.ufl.edu/plants/edibles/vegetables/peppers.html>
- Pineapple Growing in Florida: <https://edis.ifas.ufl.edu/publication/MG055>
- Vegetable Growing Guide: <https://edis.ifas.ufl.edu/publication/VH021>
- Dwarf Hollies: <https://gardeningsolutions.ifas.ufl.edu/plants/trees-and-shrubs/shrubs/dwarf-hollies.html>
- Florida Association of Native Nurseries: <https://www.fann.org/>
- Roselle: <https://gardeningsolutions.ifas.ufl.edu/plants/edibles/vegetables/roselle.html>
- Pineapple sage: <https://plants.ces.ncsu.edu/plants/salvia-elegans/>



Thank you for coming!

Any questions?

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Plant to Plate: Nutrition, Tasting Test, Cooking and Preservation tips

UF UNIVERSITY of
FLORIDA

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Objectives



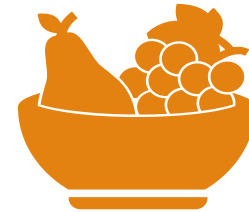
Measure your
F/V intake rate



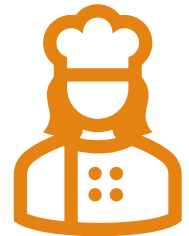
Learn about
nutritional value
of foods, and
learn about
seasonal eating



Learn ways to
include these
foods into the
diet



TASTE TEST



Herb
preservation
tips



Veggie Meter®

- Approved by the USDA
- Measures your intake of fruits and vegetables (more specifically, the carotenoids in the skin)
- Carotenoids/pigments: Components found only in plants that give plants their colors (orange, red, yellow)
- Carotenoids provides health benefits (potent antioxidant and anti-inflammatory, higher intakes linked to reduced mortality due to reduced oxidative stress, and cancer preventive; eye health).
- We cannot synthesize these substances. The major food sources are range, yellow, red, and green produce.
- Bioavailability (lipid/ 1tbs of olive oil, blending, heating, chopping, pureeing)

(Hammond & Renzi, 2013)

Antioxidant properties

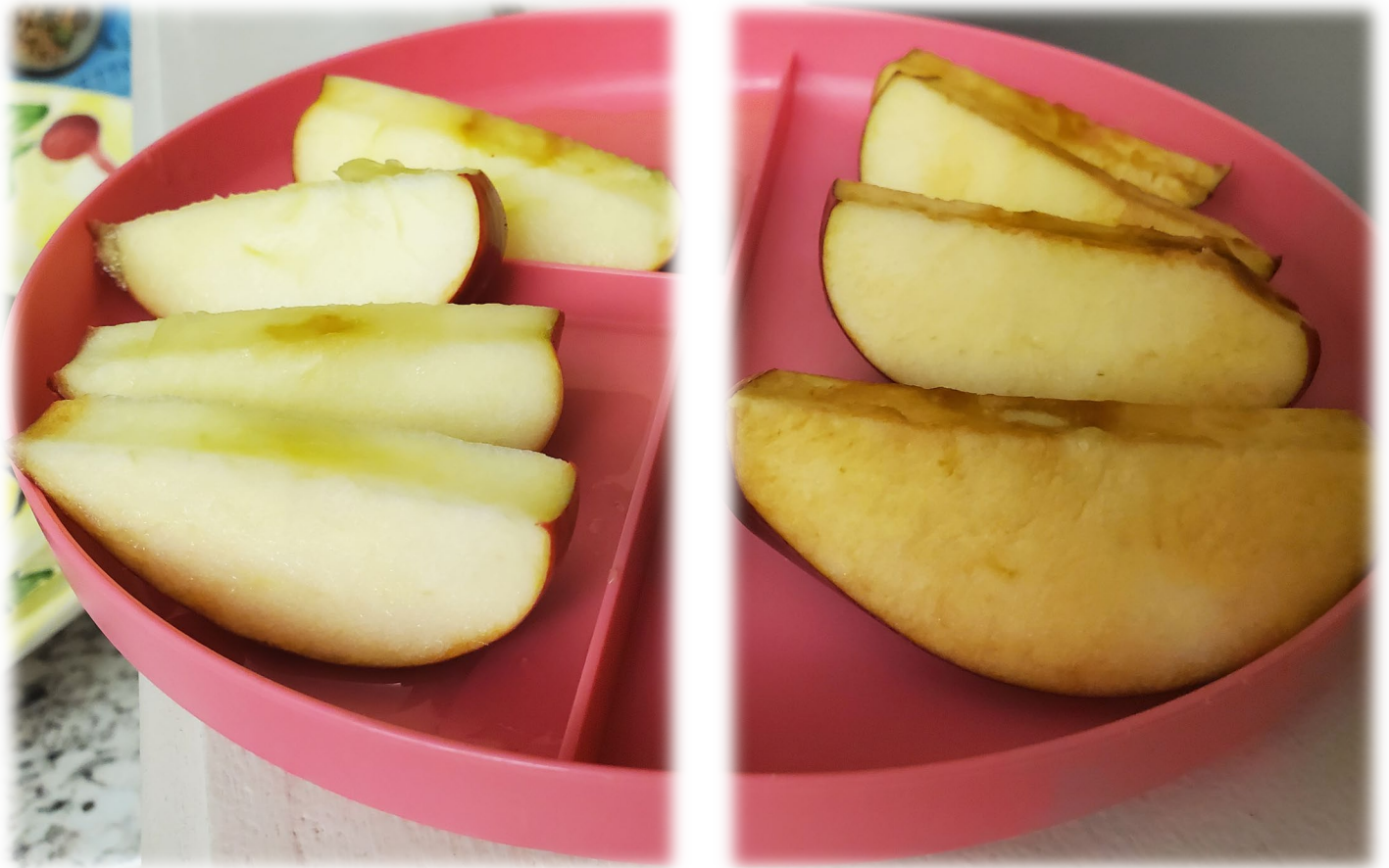
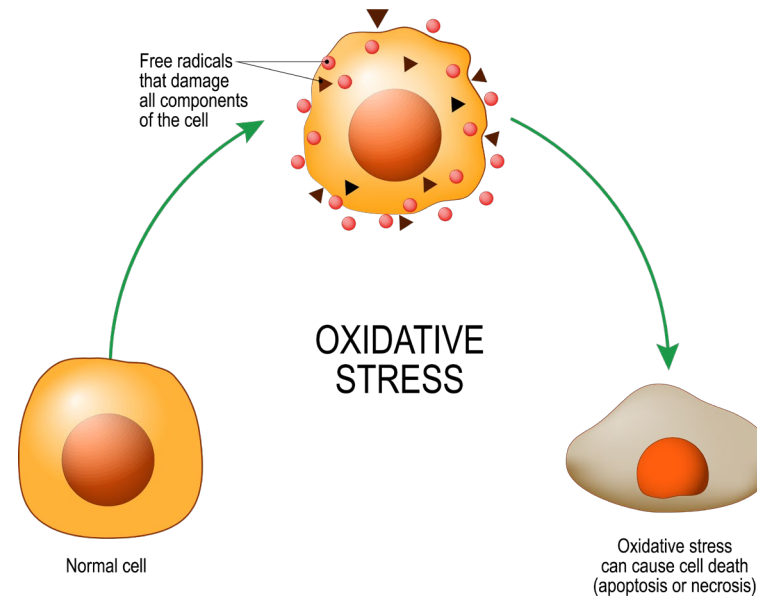


Image credit: Rebecca Elliott

Antioxidants



Byproducts of metabolism

Image Credit: Getty Images

“...Excessive free radicals contribute to chronic diseases including cancer, heart disease, cognitive decline, and vision loss...”

Harvard T.H. Chan, School of Public Health. (n.a.). Antioxidants. Retrieved from <https://www.hsph.harvard.edu/nutritionsource/antioxidants/>



Marion County Seasonal Foods

Vegetable: Sweet Potato

Fruits: Mulberries, Blueberries, Loquats, Passion Fruit

Herbs: Rosemary, African Blue Basil, Lemongrass

Sweet Potato

- Carotenoid supplementation versus whole food ingestion
- Rich in b-carotene and a-carotene (anti-inflammatory / cancer protective effect)
- Glycemic Index: Potatoes x Sweet potatoes
- Glycemic Index: (Steaming, baking, microwaving, frying)

Low GI : 1 to 55. Medium GI : 56 to 69. High GI : 70 and higher.

Culinary uses



Images retrieved from PCRM https://www.pcrm.org/good-nutrition/plant-based-diets/recipes?recipe_keys=sweet+potatoes



Loaded Sweet Potato

Nutrition Facts

Per potato

Calories: 268 kcal

Fat: 1 g

Saturated Fat: <0.5 g

Calories From Fat: 3%

Cholesterol: 0 mg

Protein: 12 g

Carbohydrates: 42 g

Sugar: 13 g

Fiber: 14 g

Sodium: 516 mg

Calcium: 101 mg

Iron: 3.1 mg

Vitamin C: 31 mg

Beta-Carotene: 17,529 mcg

Vitamin E: 2.7 mg



FRUITS

Mulberries

Have you ever had mulberries?



Image by Mark Bailey

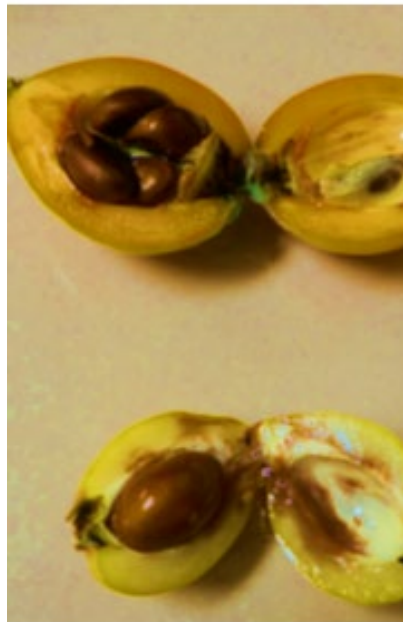
NUTRITION FACTS RAW MULBERRIES		MULBERRIES (1 CUP / 149G / X UNITS)
Calories		70
Carbohydrate		18g / 7%
Vitamin C (adult male 90mg/d) (Male and female 9-13y 45mg/d)		51mg / 57%
Non-Heme Iron		2.59mg / 14%
B2 (Riboflavin) Cell growth/development and turn food into energy - https://ods.od.nih.gov/factsheets/Riboflavin-Consumer/		0.141mg /11%
Fiber		2.38g / 8%
Water		122.75g / 82%

How to incorporate into the diet?

- ❖ Eat raw
- ❖ Oatmeal
- ❖ Cereal
- ❖ Salads
- ❖ Yogurt
- ❖ Smoothies
- ❖ Ice cream
- ❖ Sauce



Loquats



Have you ever had Loquats?

Nutrition Facts Raw Loquats	Loquat (1 cup / 150g / X units)
Calories	70
Carbohydrate	18g / 7%
Vitamin A	113.24mcg / 13%
Vitamin B6 (Pyridoxine) PTN, CHO. Fats metab.; Neurotransmitters Systesis. https://www.hsph.harvard.edu/nutritionsource/vitamin-b6/	0.149mg / 11%
Manganese	0.221mg /10%
Fiber	2.5g / 9%
Water	129.23g / 86%
Phytosterols	2.98mg

How to incorporate into the diet?

- ❖ Eat raw as a snack, as a dessert
- ❖ Oatmeal / cereal
- ❖ Smoothies
- ❖ Salads
- ❖ On top of yogurt
- ❖ Jam (prefer options above, jams usually contain too much sugar)



Preservation techniques



FREEZING



Wash the fruits



Blot dry with paper towel



Place them on a rimmed baking sheet and freeze for at least 2 hours



Then place the fruits in Ziploc bags, label and date the bags. Enjoy for 6 months.



Image credit: Rebecca Elliott

Passion Fruit (Maracujá)

Nutrition Research on Passion fruit

Seeds: “...antioxidant effects, improvement of skin condition, fat-burning promotion effects, and hypoglycemic effects.”

Pulp: Anti-depressant; reduces anxiety

Rind: Can be turned into flour

Kawama et al. (2021)





How to incorporate into the diet?

EAT RAW



Passion Fruit Mousse

IRRESISTIBLE

Image credit: Getty Images / 806339096

► On top of
yogurt/Cereal

Image credit: Getty Images / 173696664



Juices/Drinks

Image credit: Getty Images / 657786806



Sauces + Salad dressing



Taste test
Raise Your Hand If You Ever Tried Passion Fruit



FRUITS: Mulberries, Loquats, Passion fruit



HERBS: Rosemary, African Blue Basil, Lemongrass



TEA: Yaupon holly

HERBS: Use as a substitute for fat, sodium, and sugar

ROSEMARY

- ❖ Since it is a less delicate herb, it can be added in the last 20 minutes of cooking
- ❖ Soups (pea and vegetable), beans, mushrooms, cauliflower, turnips, roasted potatoes, braised cabbage, green beans and whole-grain breads.
- ❖ Dumplings, eggs, game meats, lamb, veal, poultry, fish, barbeque sauce, chicken, beef.

BASIL

- ❖ Pasta and grains
- ❖ Tomato soup, tomatoes,
- ❖ Caprese salad, salads, omelets and pesto.
- ❖ Poultry / Seafood

LEMONGRASS

- ❖ Soups
- ❖ Curries
- ❖ Stir fries
- ❖ Marinades
- ❖ Salads
- ❖ Teas



Storing herbs

- ❖ Wash them before storing or cooking / Remove ties or rubber bands before storing
- ❖ Store in the warmest part of the refrigerator to avoid freezing
- ❖ Rinse small portions under cool, running water
- ❖ Spin dry them in a salad spinner



FRUITS: Mulberries, Loquats, Passion fruit



HERBS: Rosemary, African Blue Basil, Lemongrass



TEA: Yaupon holly, Lemongrass

TEA

Yaupon Holly = Rich in antioxidants



Lemongrass = Rich in vitamin A and reportedly medicinal benefits.



Image credit by Mexido de Ideias/ Stela Morato



Herb Preservation Technique Demonstration

Thank you!



References

CDC. (2017). Only 1 in 10 Adults Get Enough Fruits or Vegetables. Retrieved from <https://www.cdc.gov/media/releases/2017/p1116-fruit-vegetable-consumption.html#:~:text=Depending%20on%20their%20age%20and,of%20a%20healthy%20eating%20pattern>.

Hammond, B. R., Jr, & Renzi, L. M. (2013). Carotenoids. *Advances in nutrition (Bethesda, Md.)*, 4(4), 474–476. <https://doi.org/10.3945/an.113.004028>

Kawakami, S., Morinaga, M., Tsukamoto-Sen, S., Mori, S., Matsui, Y., & Kawama, T. (2021). Constituent Characteristics and Functional Properties of Passion Fruit Seed Extract. *Life (Basel, Switzerland)*, 12(1), 38. <https://doi.org/10.3390/life12010038>