

March 19, 2022

HELLO & WELCOME

Tomatoes & Peppers

Central North Texas, Grayson County, Zone 7b

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Grayson County Master Gardener 2019

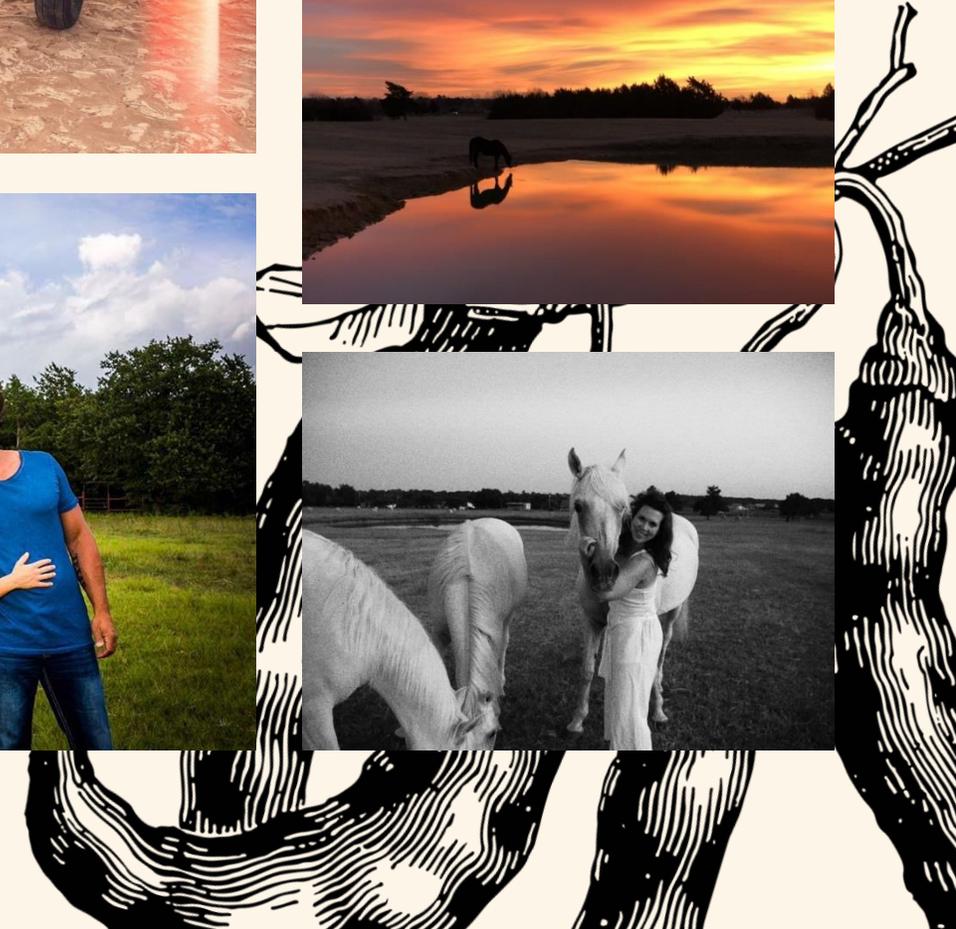
Texas A&M Vegetable AT, Tree AT

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Let me introduce myself...

- Born in Houston, Texas but raised in Sacramento, California
- I had a dramatic shift in life when I met my future husband, I finished university and began living cross continental and traveling around the world with him.
- In 2018, we both agreed to make our ranch in Texas ,home.'
- That is when I decided to become a gardener and the following year became a Grayson County Master Gardener.
- I dove into the deep end of education and have found I am especially passionate about edible gardening and furthermore educating about edible gardening.



A BIT ABOUT MY VEGETABLE GARDEN

- Located on 500 acre horse ranch in Whitesboro, TX
 - Sandy-Sandy Loam Soil
 - Stone 18" Raised Vegetable Garden Beds
 - 12 interior measured 4 x 17' beds
 - 2' person walk ways
 - 6' farm equipment through ways
 - Beds facing North to South, 8+hours of direct sun
 - Drip irrigation with city water
 - Integrative approach to fertility as well as disease and pest control
 - 90%+ filled with plants grown from seeds started indoors or directly sown
-
- A lot of work
 - A lot of joy
 - A lot of rewards



Tomatoes

stats

- Internationally, tomatoes are the most consumed vegetable
- Second most consumed vegetable in the US, behind potatoes
- Americans eat 20.3lbs of fresh tomatoes & 73.3lbs of processed tomatoes, annually per capita.
- China, US, then India rank highest in international production
- In 2015 US produced 2.7 billion pounds of tomatoes, which covers only 40% of domestic demand. Mexico provides the majority of the rest.
- California is by far the largest tomato producer in the US, Texas does not even make the top 10.

other facts

- Tomatoes have many researched health benefits. High in Vitamin A & K, alongside antioxidants, specifically Lycopene.
- Beneficial to the immune system, heart, eyes, lungs, blood vessels, oral health and skin.
- Slight variation in nutritional benefits between fresh & canned
- There are over 3,000 varieties of heirloom tomatoes and more than 15,000 varieties in total.
- Average American consumes 71lbs of ketchup per year.
- If Heinz ketchup pours out more than .028 miles per hour it is considered too runny and rejected in the factory.
- La Tomatine, is an annual tomato festival in the region of Valencia, Spain. Since 1945 local Spanish and visitors from around the world participate in a tomato fight for fun. Recently the average amount of tomatoes thrown is approximately 320,000lbs.
- The record for heaviest tomato stands at 10 lb 12.7 oz in Walla Walla, Washington on July 15, 2020.





Origins & History

origins

- Tomatoes are a relatively young fruit in mainstream consumption.
- Mayans and other Mesoamerican people were the first to domesticate the tomato plant and use the fruit in cooking.
- Spanish colonization (1520s) is how the fruit spread in popularity, through Europe and, more likely first, the Caribbean.
- The tomato was widely consumed in Jamaica and the Caribbean in the early 1700s
- 1771 the word, tomato, first emerged in Jamaica was adopted quickly by British populations
- Regardless of which geographical route the tomato took, it was being cultivated in the Carolinas by the mid 18th century.

According to Craig LeHoullier, Epic Tomatoes

history continued

- In 1826, the first ever depiction of the tomato in art was created.
- Tomato popularity boom began in the late 18th century, before then it was considered an offensive plant from appearance, smell and taste.
- Proported health benefits, many exaggerated, of the tomato is suspected to have supported its initial climb in popularity.
- Between the late 18th century and the first WW there was a skyrocketing increase in popularity and interest in the tomato in the US.
- This led to fervorous exploration of breeding and selection to find tomatoes quite similar to the ones we consume today.



Anatomy of the Tomato

Knowledge is know that a tomato is a fruit. -Miles Kington
Wisdom is not putting it in a fruit salad.

With over 15,000 varieties of tomatoes, we have A LOT of options to choose from.

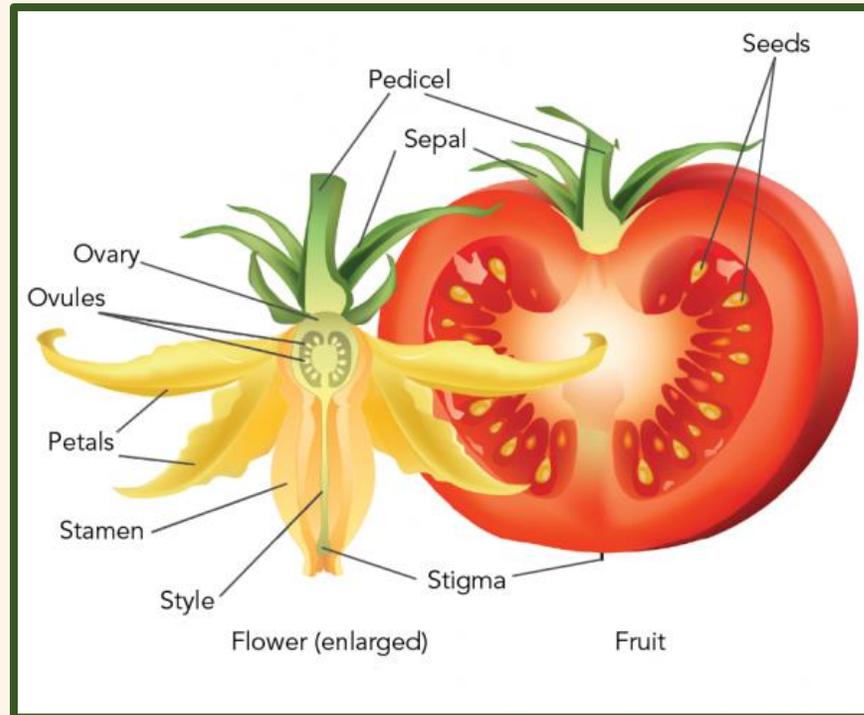
Select specific cultivars of tomato based on YOUR specific desires, needs and abilities.

shapes

- [Round-Globe](#)
- Oval-Deep Globe
- [Rectangular](#)-Egg
- Oxheart
- Heart
- Pear
- Long

sizes

- Huge variety
- Micro
 - Cherry
 - Salad
 - Paste
 - Slicer



uses

Use is very personal and usually dependent on juiciness vs dryness, softness vs firmness and meatiness

- Micro & Cherry = fresh eating (gardener snacks) or salads
- Salad= fresh eating or salads
- Paste= sauce making
- Slicers = fresh eating or sandwiches

Anatomy of the Tomato

continued

COLORS

- Dependant on the skin & the flesh
- Color does not indicate flavor or acidity

red



yellow



orange



purple



pink



brown



green



striped



white



Anatomy of the Tomato

continued

flavors

- There is not a lot of written discussion about the flavor variations of tomatoes.
- Sour, sweet, flavorful, watery, blah grocery store matoes.
- However, [Craig LeHoullier](#) tackled the subject in [Epic Tomatoes](#)

acidity myth

All tomatoes have very similar amounts of acid, it is the individual's perception of acid and the amount of sweetness that counterbalances acidity that dictates a tomato's perceived acidity.

	Mild	Moderate	Intense
Tart 	<ul style="list-style-type: none"> • Bonny Best • Green Grape • Green Zebra • Tiger Tom • Yellow Brandywine 	<ul style="list-style-type: none"> • Black Krim • Black Prince • Green Zebra • Early Girl • New Girl 	<ul style="list-style-type: none"> • Abraham Lincoln • Jaune Flamme • Old Brooks
Balanced 	<ul style="list-style-type: none"> • Aker's West VA • Rahart's Jumbo Red • Ferris Wheel • Persimmon • Roma 	<ul style="list-style-type: none"> • Better Boy • Big Beef • Great White • Kellogg's Breakfast • Lemon Boy 	<ul style="list-style-type: none"> • German Green • Brandywine • Cherokee Green & Purple • Giant Green • Lillian's Yellow • Lucky Cross • Nepal
Sweet 	<ul style="list-style-type: none"> • German Johnson • Gregori's Altai • Pineapple • Ruby Gold • Yellow Pear 	<ul style="list-style-type: none"> • Eva Purple Ball • Yellow White 	<ul style="list-style-type: none"> • Mortgage Lifter • Ponderosa • Sun Gold



Anatomy of the Tomato

continued

growth habit

Indeterminate: a plant that will continue to grow and flower and produce fruit for the duration of the growing season. Needs support, space and possibly pruning.

Determinate: a plant that has a genetic signal to stop vertical growth. Fruit sets to maturity all at one time. Does not usually need support, lots of space or pruning.

Dwarf: a plant that behaves like a very small, slow-growing indeterminate

seed types

Hybrid: seeds collected from fruit that has been *crossed*. Hybridization is a very common occurrence in nature. With regards to seed saving hybridizations makes the earliest generations genetically unstable. Hybrid tomato plants tend to be more vigorous and wiser of a choice, with that said flavor can be compromised.

Open Pollinated (OP): Genetically stable seeds. Seeds can be collected if cross-pollination is prevented.

Heirloom: An OP seed that has a history or story. It is a loosely defined term that changes. Generally anything developed before the 1950's.

leaf shape

Regular-Leaf (RL): most common, multi-lobed, serrated, often toothed branching off the stem

Potato-Leaf (PL): broader, smoother, thicker, single leaves, missing many lobes and serrations. Exclusive to heirlooms.

Further Variations

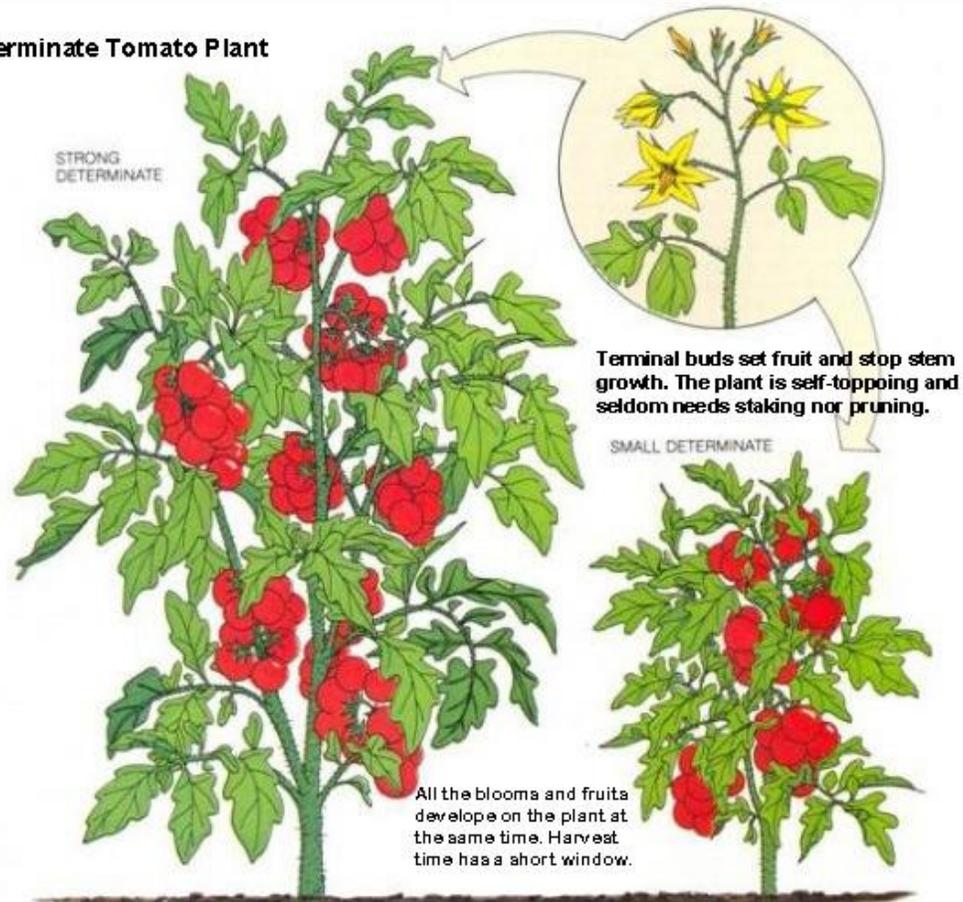
- **Rugose:** rippled
- **Angora:** very hairy
- **Wispy:** fine, more sparse and more curled, associated with heart-shaped tomato plants
- **Fine:** delicate and small, associated with dwarf varieties

Anatomy of the Tomato

continued

growth habit

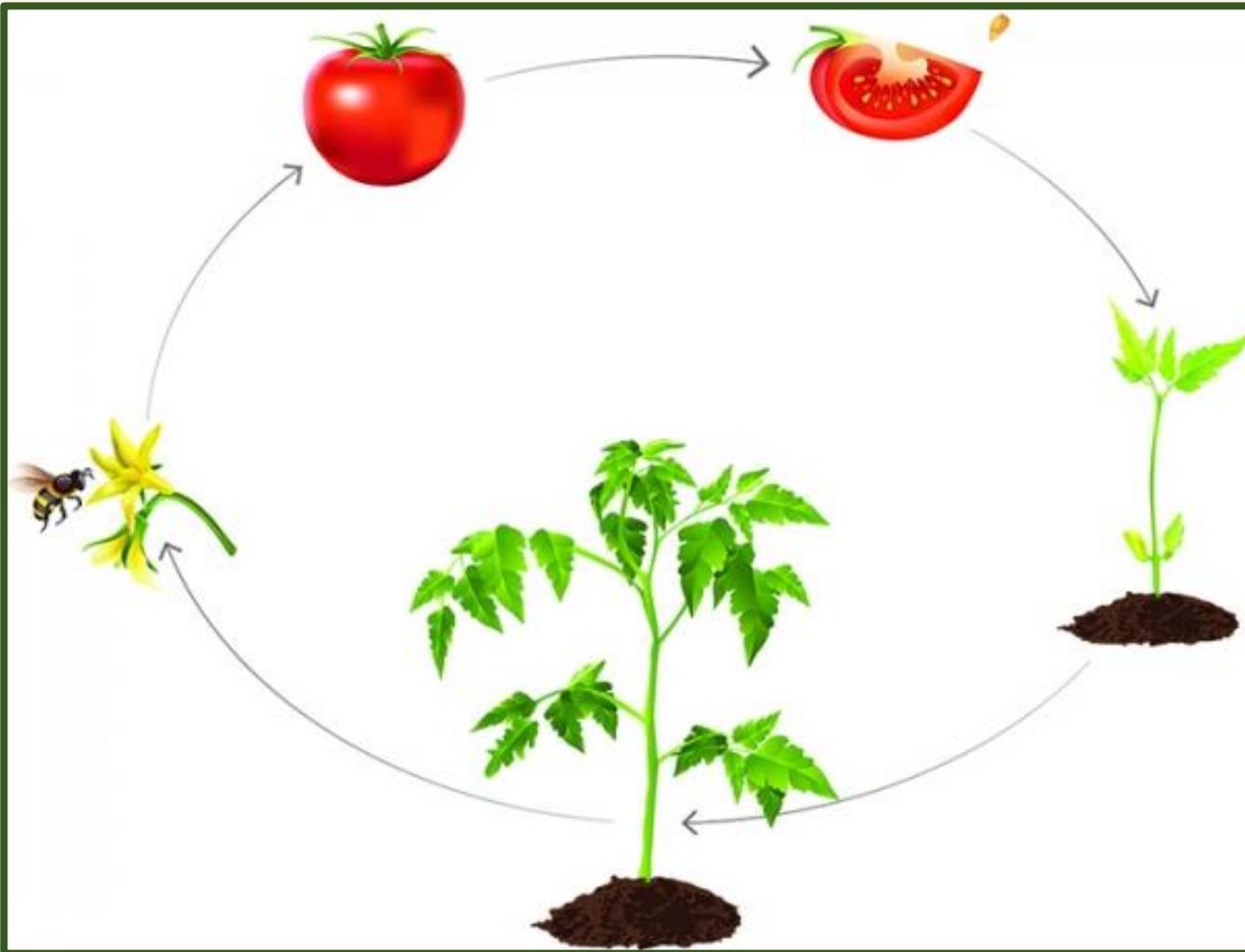
Determinate Tomato Plant



leaf shape



Growing Basics



- Tomatoes tend to be pretty forgiveable plants.
- There is such a huge variety of varieties, you can certainly find a tomato that suits your desires, needs and abilities.
- Require 8+ hours of direct sunlight
- Respond well to preventative steps in regards to pests and disease
- Indeterminate varieties require stakes or trellising and usually, pruning.
- Extra sensitive to Glyphosate-Round up
- Can be harvested at maturity not necessarily fully ripe.

Growing Basics

continued

soil

Ideal soil is deep, easy to crumble, **well-draining, and rich with organic matter.**

Ideal soil is a slightly acidic for tomatoes.

An annual layer of compost is highly recommended.

Vegetable garden appropriate mulch is also recommended, such as straw or composting mulch

irrigation

All plants do not necessarily care HOW they are irrigated.

Tomatoes will not grow well in water-clogged soil.

Bottom water in the mornings. This allows the foliage to dry completely.

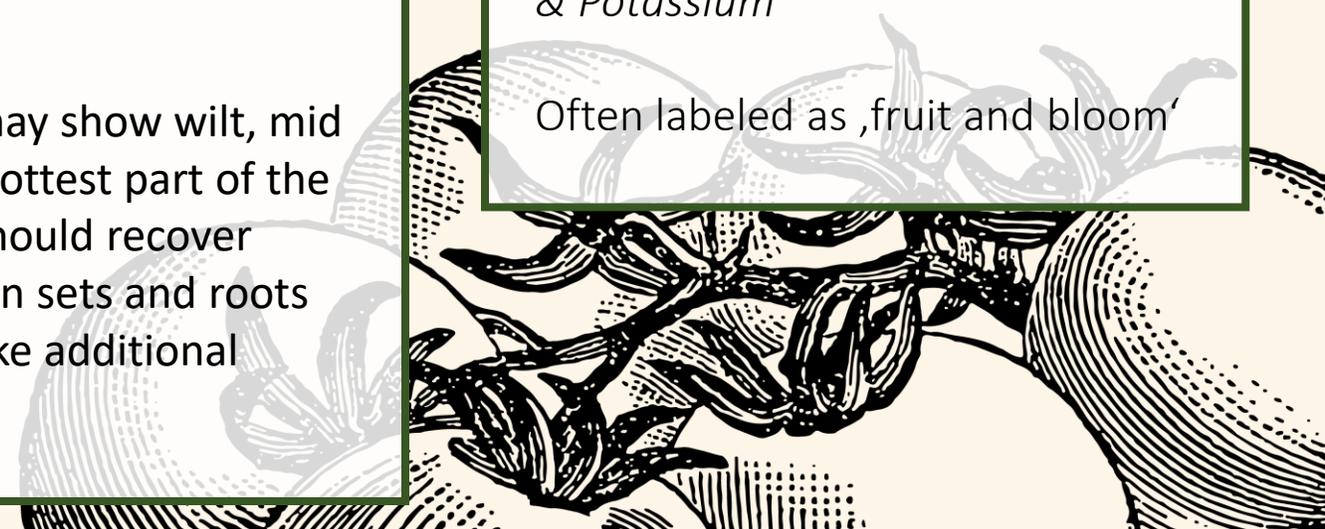
Tomato plants may show wilt, mid day during the hottest part of the summer. They should recover quickly as the sun sets and roots are able to uptake additional water.

fertilization

Soil rich in compost should support most of the needs of the tomato plant.

When supplementing fertilization, tomatoes in general need relatively less N and more P & K.
Less Nitrogen, More Phosphorus & Potassium

Often labeled as ,fruit and bloom'

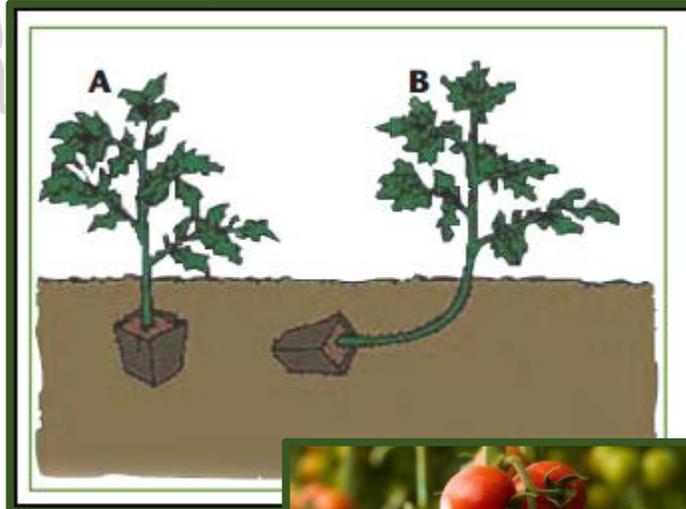


Growing Basics

continued

planting

- Plant outside only after day & night temperatures are consistently warm.
- Cooler weather will stunt growth.
- Plant on a day with mild weather, towards the end of the day.
- Strip the lower stem of foliage and plant slightly deeper.
- For leggy plants, plant very deeply, manipulate them into a curve manually or let them lay on their side for a day. They will naturally rise up to the sun, avoiding accidental damage.



more planting

- Plant spacing will depend on variety but generally:
 - Vertical (indeterminate)-3ft
 - Caged (determinate)-2ft
- Not strictly necessary but an application of mycorrhizal will aid in root development.
- Placing a cracked egg or egg shell pieces is an old trick to stem off blossom rot.
- Deeply water upon planting, keep in mind how you planted and where the roots are.
- Cutworm collars can be made of paper or aluminum foil to prevent fatal damage when planting.

Growing Basics continued

support

- Most indeterminate varieties require some type of growth support or trellis.
- Many determinate varieties benefit from some type of support.

Benefits

- Space
- Air circulation
- Ease of pest management
- Ease of harvest

trellis tutorials

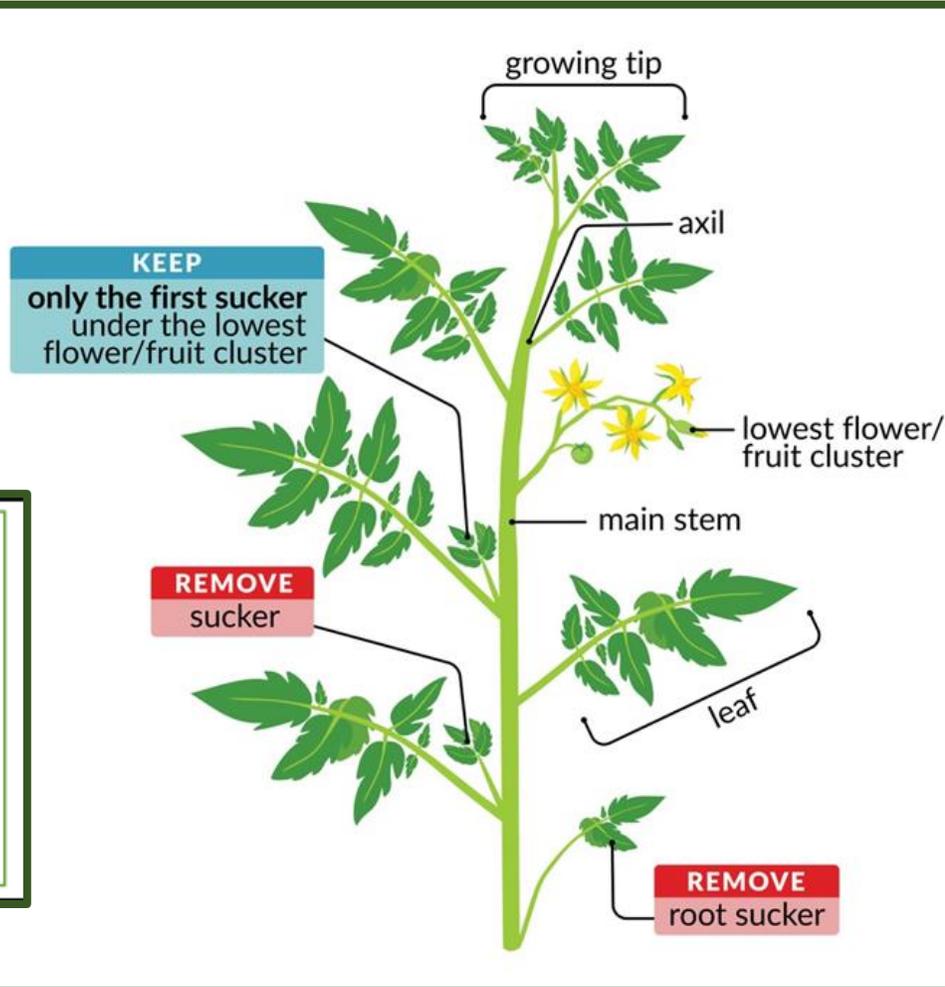


Growing Basics continued

To prune or not to prune? That is the mato question.

pruning

- You **do not** have to prune indeterminate or dwarf varieties.
- Depending on your preferences, you may choose to prune indeterminate varieties.
- Consider 'topping off' both varieties, depending on their growth and vigor.

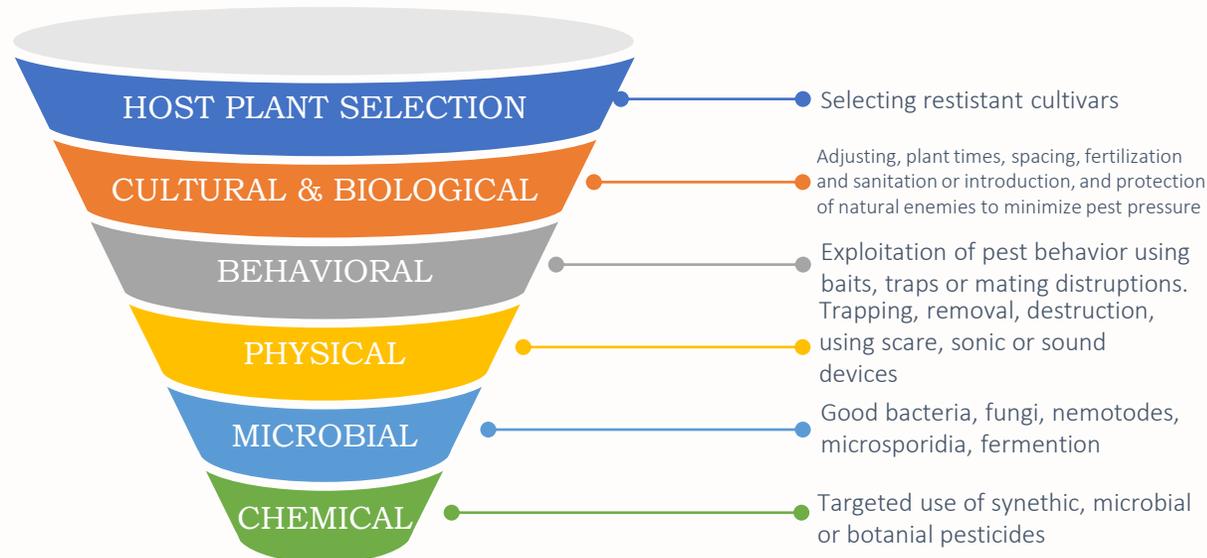


Common Pests & Control

IPM

Science based approach that combines a variety of techniques. By studying the biology, anatomy, life cycles and how pests interact with their environment, pest management can be improved along with lower cost and lower risk to people and the environment.

Integrated Pest Management



steps

- 1. Prevention:** Many pests can be controlled with preventative steps. This is the most important step.
- 2. Identify & Monitor:** Determine the agent and its abundance, ask for help.
- 3. Evaluate:** Do we need to act? What is the most effective, necessary action with the most minimal impact on people and the environment?
- 4. Action:** Implement method of choice.
- 5. Monitor:** Continue to monitor, further treaments may or may not be necessary. If pest population increases it may be time to increase the level of action.

Common Pests & Control

continued

prevention

- Choose pest resistant cultivars
- Ensure well-draining soil
- Ensure adequate sun and air circulation
- Ensure proper fertilization
- Water consistently, preferably in the morning
- Prune with a purpose
- Remove and destroy infected plant material
- Apply a preventative garden-spray weekly or bi-weekly
- [Texas A&M Tomato Disease Info](#)



Flea Beetle

- Manually remove, hand or pressurized water
- Floating row covers
- Companion plants: strong odor repels, nasturtium traps
- Application of Sevin, Neem Oil, Insecticidal Soap

Tomato Horn Worm

- Manually remove, hand or pressurized water
- Floating row covers
- Companion plants: strong odor repels, nasturtium traps
- Application of B.T., Sevin, Neem Oil
- Use Black light at night to find

Common Pests & Control

continued

all-good garden spray

2 Gallons of Water
2.5 tsp Insecticidal Soap or
Castile Soap
3.25 oz Neem Oil

Mix ingredients together.
Spray, preferably, pressurized.
*Pay attention to underside of
leaves.*

Weekly or bi-weekly application



White Fly

- Manually remove, hand or pressurized water
- Avoid overwatering
- Floating row covers
- Predator insects: Lady beetle, green lacewings, damsel & pirate bugs
- Companion plants: strong odor repels, nasturtium traps
- Application of Spinosad, Neem Oil, Insecticidal Soap

Psyllid

- Manually remove, hand or pressurized water
- Floating row covers
- Predator insects: damsel & pirate bugs, as well as lady bugs
- Companion plants: strong odor repels, nasturtium traps
- Application of Spinosad, Neem Oil, Insecticidal Soap

Common Diseases & Control

prevention

- Choose disease resistant cultivars
- Ensure well-draining soil
- Ensure adequate sun and air circulation
- Ensure proper fertilization
- Water consistently, preferably in the morning
- Prune with a purpose
- Remove and destroy infected plant material
- Apply a preventative garden-spray weekly or bi-weekly



Blossom-End Rot

Causes bottom end of tomato to rot. Associated with calcium deficiencies and inconsistent watering & weather

- Maintain consistent watering
- Mulch to maintain consistent moisture
- Avoid high levels of nitrogen
- Well-draining soil
- Remove damaged fruit

Mosaic Virus

Viral disease that causes young growth to be narrow and twisted.

- Highly infectious
- Garden hygiene is important
- Tobacco is common host plant, therefore smokers can cause transmission.
- No treatment, infected plants should be destroyed



Common Diseases & Control

continued

Early Blight

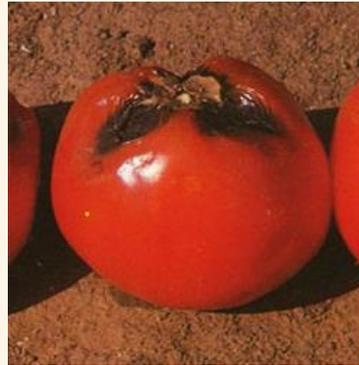
Fungal disease that starts with dark concentric spots that causes leaf drop. Associated with uncontrolled humidity and warm temperatures.

- Maintain consistent watering
- Maintain consistent air circulation
- Regular application of preventative fungicide
- Remove damaged plant material
- Crop selection

Late Blight

Fungal disease that starts with grey, moldy spots, Associated with consistently damp weather.

- Maintain consistent watering & air circulation
- Regular application of preventative fungicide
- Remove damaged plant material
- Crop selection



Powdery Mildew

Fungal disease that causes white spots or white dusting. Can be managed with relative ease.

- Maintain consistent watering & air circulation
- Regular application of preventative fungicide
- Remove damaged plant material
- Crop selection

Cracking

Results of rapid, unsustainable fruit growth. Associated with uneven watering or wet weather. Monitor fruit closely as it will either fail and rot on plant or upon successful harvest with be quick to ripen and rot.

- Maintain consistent watering
- Well-draining soil
- No true preventative or reparative measure

Harvest

ripeness

When a tomato reaches full size and the fruit becomes pale green, it will begin the ripening process. An internal process of ethylene gas production and release commences.

Aspects of ripeness:

- Peak Flavor
- Texture
- Aroma
- Color

can i pick it?

Dependent on several factors:

- Variety
- Weather
- Pest pressure
- Kitchen's empty
- Intended use

harvest....



48 hrs later



picking tips

- Tomatoes can already be harvested at the '*breaker stage*'
- Tomato will continue to ripen off the vine
- Pick as early as ½ Pink & ½ Green, or use 50% full color as rule of thumb
- You can speed up or slow down ripening process by storage temperature
- Bring a basket and use shears.
- Remove any diseased or rotting fruits.

Varieties

All Mar's



All Bumblebees



All Cherokees



Better Boy



Early & New Girl



Yellow Pear



Sungold



San Marzano



Lillian's Yellow



Costoluto Genovese





Easy Gardening

ATOES • TOMATOES • TOMATOES • TOMATOES •

Joseph Masabni, Assistant Professor and Extension Horticulturist, The Texas A&M University System

Tomatoes are the most popular garden vegetable crop in Texas. They are a good source of vitamin A and fair source of vitamin C. Fresh tomatoes are popular in salads, on sandwiches and sliced. They can be cooked and used in many ways.

Varieties

Texas gardeners can grow a variety of small- and large-fruited tomatoes:

Small fruit

- Presto
- Saladette
- Red Cherry
- Small Fry

Large fruit

- Big Set
- Bonus
- Homestead
- Terrific
- Bingo
- Carnival
- Spring Giant
- Walter

Site selection

Tomatoes grow well in most Texas areas if planted in soil that drains well. They need at least 6 hours of sunlight each day.

Soil preparation

Work the garden soil only when it is dry enough not to stick to the garden tools. Several weeks before planting, work the top 8 to 10 inches of soil. Remove all rocks and trash from the soil and rake it to break up large clods.

Tomatoes grow best in soils that have lots of organic matter. If possible, spread 2 to 3 inches of organic material such as compost, leaves, or rotted hay over the planting area. Mix this organic material into the top 4 to 6 inches of soil.

Planting

Most families need only a few plants, so it is best to buy plants and not grow them from seed. Buy healthy, green plants that are 6 to 8 inches tall.

Do not set out tomato plants until all danger of frost has passed. Transplant fall tomatoes in the garden about 100 days before the first expected frost.

If possible, set out tomatoes on raised

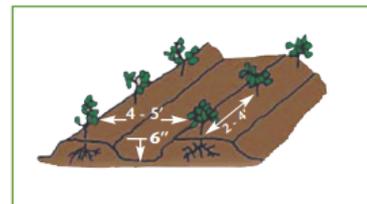


Figure 1. Plant tomatoes on beds raised to about 6 inches.

beds of soil that are about 6 inches high (Fig. 1). Make the transplant holes 3 to 4 inches deep and 2 to 4 feet apart in the row. For staked or caged plants, space the rows at least 3 feet apart. For unsupported plants, leave 4 to 5 feet between the rows.

Transplant your tomatoes in the evening or on a cloudy day to keep them from drying too much and wilting. Before placing transplants into the soil, fill the transplant holes with water and let it soak in.

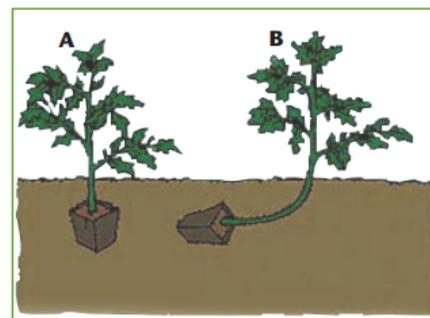


Figure 2. Plant tomatoes slightly deeper than they were first growing (A). If the plants are leggy, set them as shown (B).

Plant each transplant slightly deeper than it had been growing (Fig. 2). Pack the soil loosely around the plant. Leave a slightly sunken area around each plant to hold water.

If you plan to grow single plants, dig a hole 2 feet wide and 10 inches deep. Refill the hole with half soil and half organic matter. For this type of planting, mix 2 level tablespoons of fertilizer into this planting area.

Fertilizing

Add 2 to 3 pounds of fertilizer such as 10-10-10 for every 100 square feet of garden area. Spread the fertilizer evenly over the area, and then mix it into the top 3 to 4 inches of soil.

Watering

Water the tomato plants slowly and deeply to help them develop a strong root system. Do not let the tomatoes wilt severely, or yields and fruit quality will be low.

Care during the season

For the highest yields, place mulch around the tomato plants. Spread a 2- to 3-inch layer of organic material such as compost, leaves, or hay around the growing plants. Mulching will help stop weed growth and water loss from the soil.

You can let tomatoes grow on the ground or support them with stakes or cages. When you stake tomatoes, put the stake in shortly after transplanting to lessen root damage. A 6-foot-long

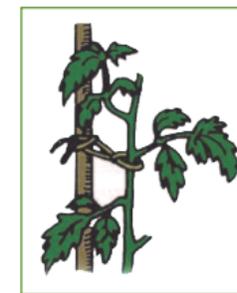


Figure 3. Loosely tie the tomato plants to support stakes.

stake set 10 inches deep in the soil will work well. As the plant grows taller, tie it loosely to the stake every 12 inches with pieces of rag or twine (Fig. 3).

Prune the staked tomatoes to produce a more orderly vine. Remove the small shoots that grow out of the point where each leaf joins the main stem (Fig. 4). Remove the shoots by bending them sideways until they snap.

To develop the plant into two main vines, remove all but the lowest shoot. It will develop into a second branch.

Caging is another way to train tomato plants. You can make a good cage with a piece of concrete reinforcement wire 5 feet tall and 6 feet wide. Put the cages over the young plants. Push the cages down into the soil to keep them from blowing over. Using this method, you can give the vine



Figure 5. Cages made from reinforcing wire give good support to tomato plants.

support without having to tie it (Fig. 5).

Tomatoes growing in cages do not need to be pruned.

When the first fruits are about



Figure 4. Prune tomatoes by removing the suckers or small side shoots.

1 inch in diameter, scatter 1 level tablespoon of fertilizer around each plant. Scatter it about 6 inches from the stalks. Work it lightly into the soil. Water the plants after fertilizing.

Fertilize the plants every 3 to 4 weeks with 1 to 2 level tablespoons of fertilizer.

To control weeds, you may cultivate or hoe around the plants. Work the soil only deep enough to kill the weeds but shallow enough not to damage the tomato plant roots.

Insects and diseases

Many insecticides are available at garden centers for homeowner use. Sevin is a synthetic insecticide; organic options include sulfur and Bt-based insecticides. Sul-

Name and description	Control
 <p>Flea beetle</p> <p>1/8 inch long; bronze-black, blue, or green, with light markings; jumps quickly; eats holes in leaves</p>	Sevin
 <p>Hornworm</p> <p>A 3-inch-long caterpillar with a horn on the back end; green with stripes on the side</p>	Bacillus thuringiensis (Dipel, Thuricide, Biotrol)
 <p>Psyllid</p> <p>1/8 inch long; pale green or yellow; adults are banded black and white</p>	Sulfur dusts, permethrin, insecticidal soaps
 <p>Whitefly</p> <p>Adults are white; nymphs do not move</p>	Pyrethrin, malathion, insecticidal soaps

fur also has fungicidal properties and helps in controlling many diseases. Neem oil, sulfur, and other fungicides are available for use.

Harvesting

For best quality, pick tomatoes at full color. If you pick them when they are pink,

let them ripen at room temperature. They may be stored in the refrigerator after they reach full color.

Acknowledgments

This publication was revised from earlier versions written by Sam Cotner, Professor Emeritus and former Extension Horticulturist.

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Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Edward G. Smith, Director, Texas AgriLife Extension Service, The Texas A&M University System.

Revision

Peppers

stats & facts

- US per capita consumption of Bell peppers is 11.4lbs
- US per capita consumption of Chile peppers is 7.7lb
- US is 5th largest international producer of peppers, behind China, Mexico, Turkey & Indonesia
- California is by far the largest state producer.
- Bell peppers are normally grown in green house.
- Chile peppers are normally grown in field.
- Black pepper is the world's most used spice

other facts

- [Peppers](#) are a nutritional powerhouse. Low in calories, and all varieties are excellent sources of vitamins A & C, potassium, folic acid and fiber.
- [Spicy peppers](#), with high levels of capsaicin, have the additional benefit of increasing blood flow and metabolism, reducing migraine pain, as well as clearing the sinus and soothing pain.
- Peppers are one of the few crops that are considered a vegetable, a spice, a medicinal plant and an ornamental.



- Nearly all domesticated peppers are of the Capsicum species
- Spicy capsicums are called chile or hot peppers, *not chili peppers*.
- Non-spicy capsicums are called bell or sweet peppers
- November is National pepper month, because end of summer and fall is normally the greatest harvest time.
- [,Hottest Little Festival'](#) in Palestine, Texas, every year at the end of Oct.



Origins & History

origins

- Peppers are an ancient agricultural crop.
- Chile peppers are believed to be one of the oldest domesticated crops in the Americas starting in Bolivia and throughout South and Central America.
- Scientific evidence supports the chile pepper was domesticated over 6,000 year ago.
- First carbon dated proof of pepper domestication dates to 1200 A.D in American Southwest/ Mexico Northwest
- Black pepper spice and the Chile peppers we know today are not in the same genetic family.
- In 1492 Christopher Columbus, on one of his expeditions around the world, first tried a Capsicum Chile Pepper and described them as similarly tasting to the black pepper he was already familiar with. The connection stuck.

history continued

- Trade routes established between India and South America brought the Chile pepper across the ocean and eventually to Europe and China during the 15th century
- The first shipment of Tabasco pepper sauce was made in 1869 for \$1 a bottle, \$17 today.
- \$200 million of Tabasco is sold every single year.
- 1912 the Scoville scale was developed to measure the heat level of the chile pepper
- 1971 was the first Hatch Chile Festival in NM
- Dr. Paul Bosland founds the Chile Pepper Institute at New Mexico State University in 2002
- The 2000's saw a heat race in breeding, as of 2022 the hottest pepper in the world is the Carolina Reaper with 2.2 million Scoville units.

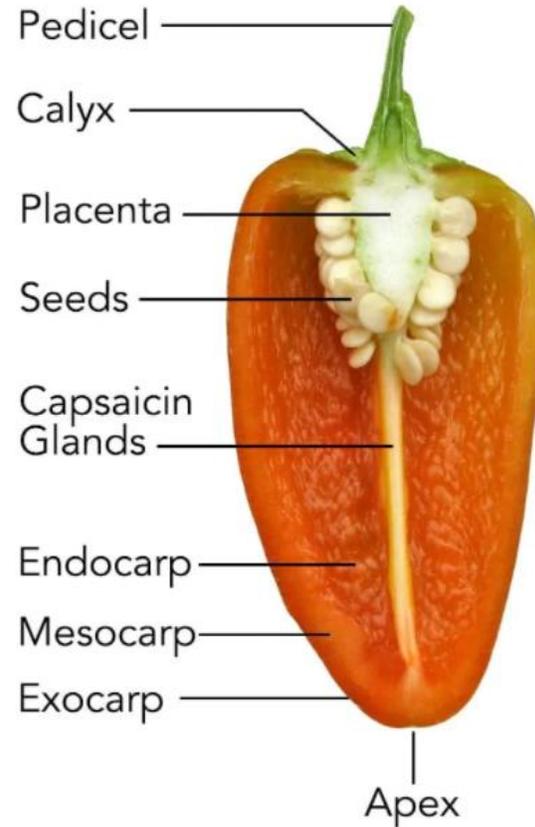
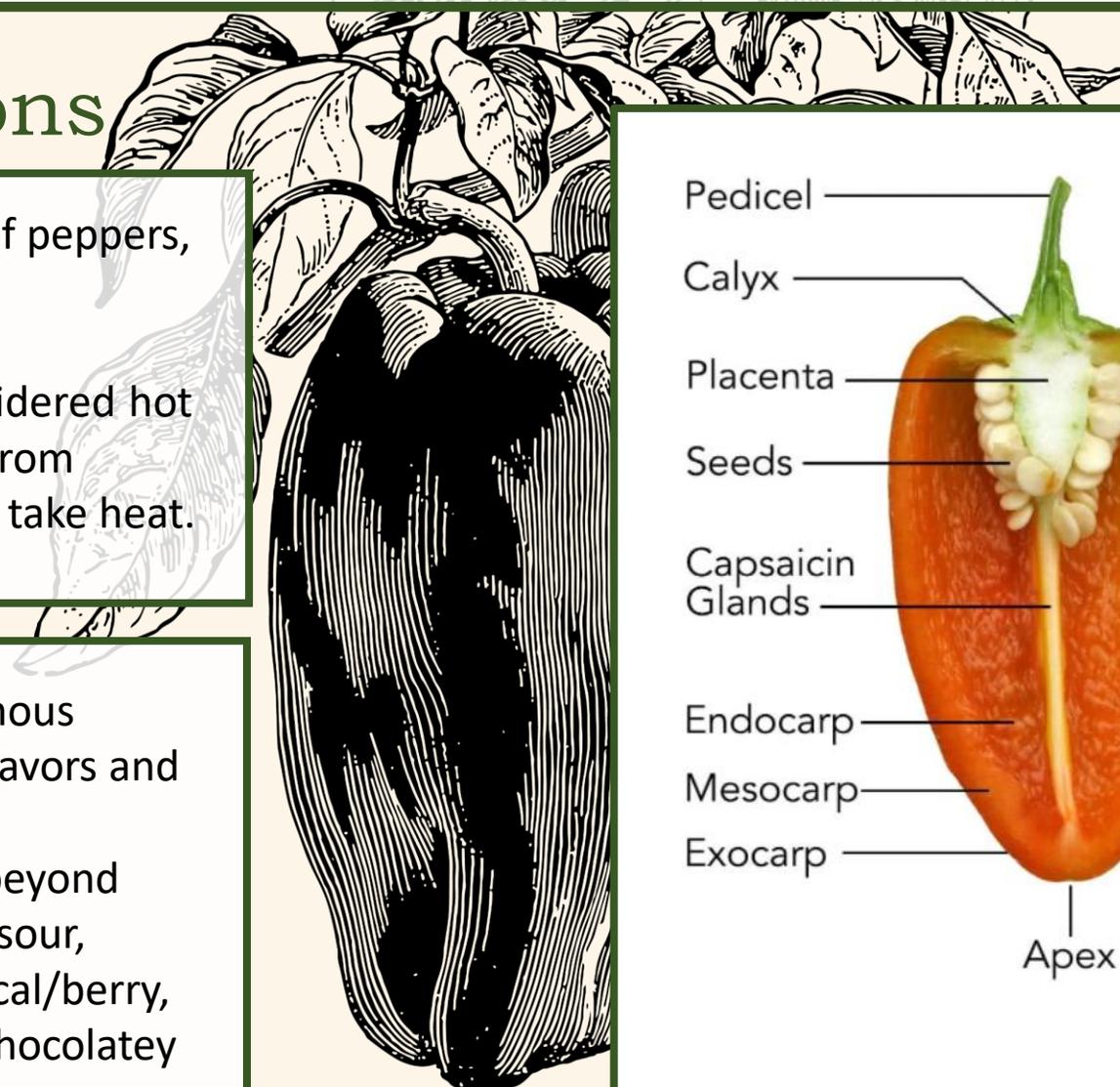
Anatomy of the Pepper

so many options

With **over 50,000 varieties** of peppers, we have a lot of options.

Only 4,000 of them are considered hot peppers, so don't shy away from growing peppers if you can't take heat.

- Peppers come in an enormous amount of shapes, sizes, flavors and heat levels.
- Some flavors to look for beyond 'spicy' are vegetal, grassy, sour, herbal, fruity-melon/tropical/berry, sweet, smokey, bitter, or chocolatey



Pedicel: The stalk or stem of a single flower or fruit. The stem or branch from the main stem that holds a group of pedicels is called a peduncle.

Calyx: The part of the stem composed of modified leaves called sepals. Usually green, sepals function as protection for the flower in bud, and often as support for the petals when in bloom.

Seeds: The reproductive part of the plant.

Placenta & Capsaicin Glands: This is where the largest concentration of 'heat' in a pepper is located. Found along the placenta (which holds the seeds). Often referred to as the pith, removing this portion of the pepper will reduce the heat.

Endocarp: The inner wall of a mature fruit.

Mesocarp: The fleshy tissue of a fruit between the Endocarp and the Exocarp.

Exocarp: The outer wall of a mature fruit.

Apex: The blossom end of a mature fruit.

Anatomy of the Pepper

continued

heat

- The perceived heat of a chile is highly personal.
- Perceived heat is dependent on genetics, tolerance and the type of heat.
- *Chile heat is not just one type of heat.*

How fast does the heat come on when you bite into a chile? Rapidly, delayed, or intermediate?

How long does the heat linger? Does it dissipate quickly or does it last minutes or even hours?

Where do you sense the heat? The tip of the tongue? The lips? Mid-palate? The back of the throat?

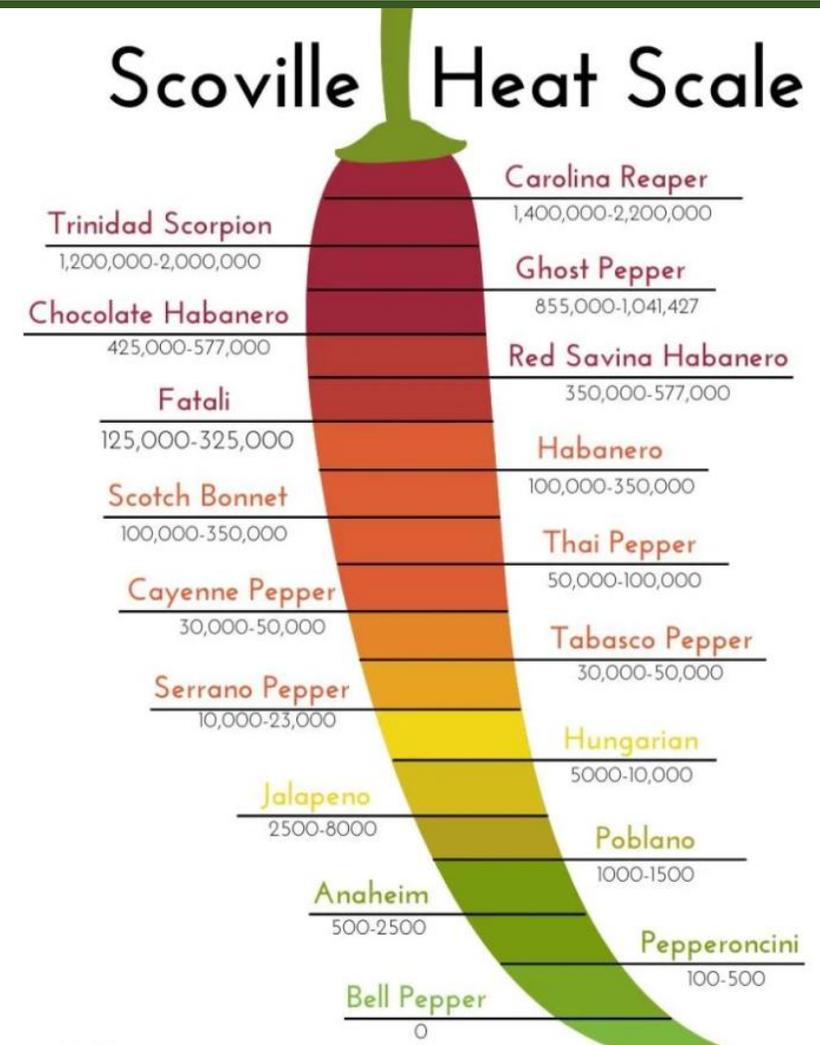
What is the sharp or flat effect? Prickly heat like pins? Or heat that feels like it's been brushed on?

What's the heat level? Mild, medium or hot, in terms of Scoville heat units?

- Best relief of chile heat? Vanilla ice cream

According to Dr. Paul Boland, [Joe the Gardener Podcast](#)

Scoville Heat Scale



Anatomy of the Pepper

continued

growth habit

Pepper plants grow in bush habit.

Early pruning, clipping back longer stems, will encourage a stockier bush habit.

Given our wind storms, early pruning for shape is recommended.

Additionally pepper plants, once laden with fruit, are **HEAVY**.

Stakes or similar supports are highly recommended.

sun & temp

Peppers are **very sensitive** to temperatures.

Even temperatures under 50 degrees can stall, stunt or damage a pepper plant.

Generally speaking they should be one of the **LAST** plants transplanted outside. We are not fighting against the clock to get producing peppers fast, so better late than *early*.

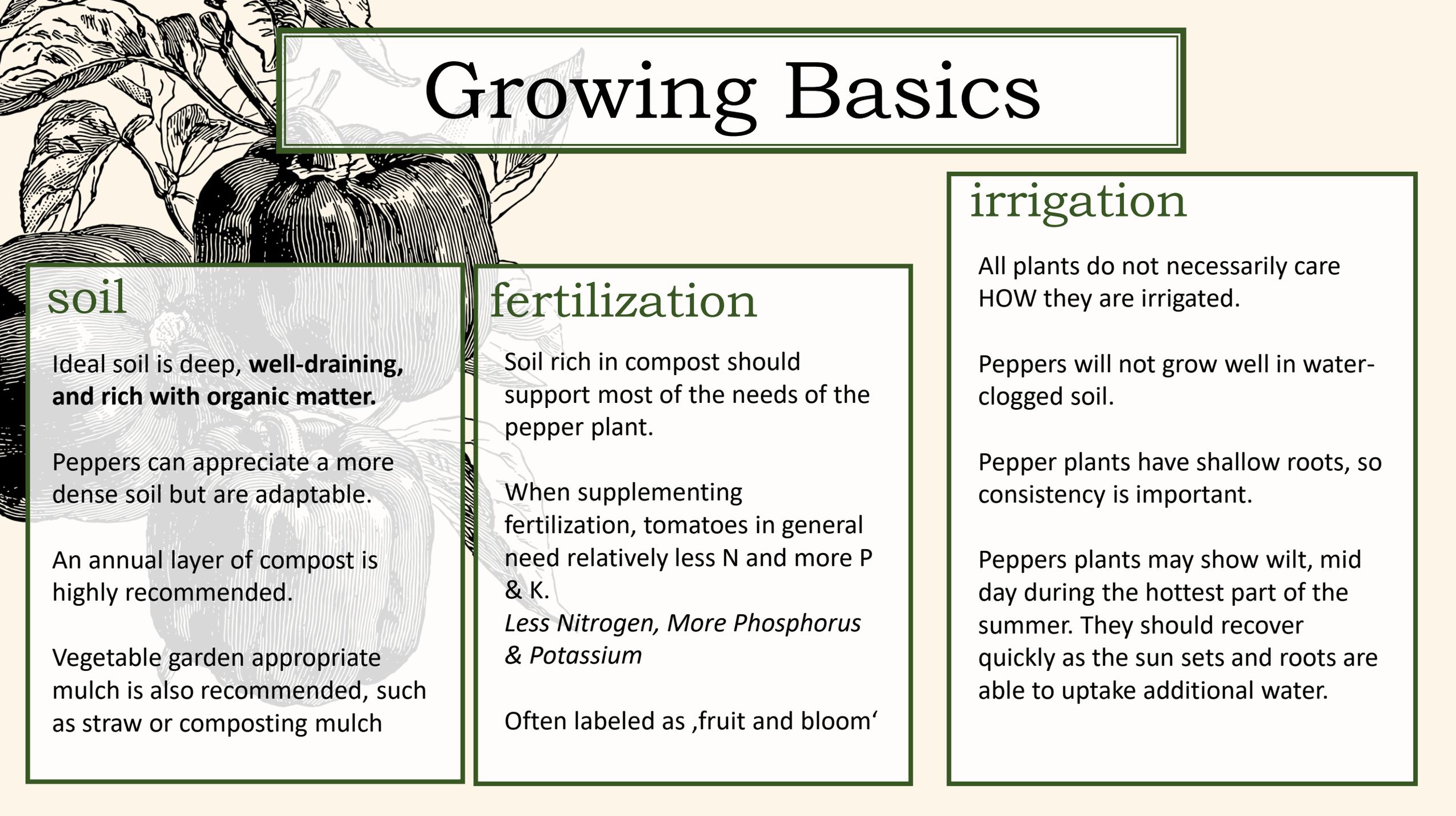
With that said, the base line of direct sunlight starts at only 6 hours a day.

seed types

Hybrid: seeds collected from fruit that has been *crossed*. Hybridization is a very common occurrence in nature. With regards to seed saving hybridizations makes the earliest generations genetically unstable. Hybrid tomato plants tend to be more vigorous and wiser of a choice, with that said flavor can be compromised.

Open Pollinated (OP): Genetically stable seeds. Seeds can be collected if cross-pollination is prevented.

Heirloom: An OP seed that has a history or story. It is a loosely defined term that changes. Generally anything developed before the 1950's.



Growing Basics

soil

Ideal soil is deep, **well-draining,** and **rich with organic matter.**

Peppers can appreciate a more dense soil but are adaptable.

An annual layer of compost is highly recommended.

Vegetable garden appropriate mulch is also recommended, such as straw or composting mulch

fertilization

Soil rich in compost should support most of the needs of the pepper plant.

When supplementing fertilization, tomatoes in general need relatively less N and more P & K.

Less Nitrogen, More Phosphorus & Potassium

Often labeled as ,fruit and bloom‘

irrigation

All plants do not necessarily care HOW they are irrigated.

Peppers will not grow well in water-clogged soil.

Pepper plants have shallow roots, so consistency is important.

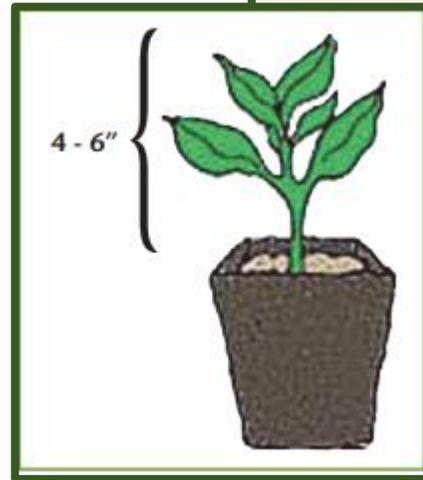
Peppers plants may show wilt, mid day during the hottest part of the summer. They should recover quickly as the sun sets and roots are able to uptake additional water.

Growing Basics

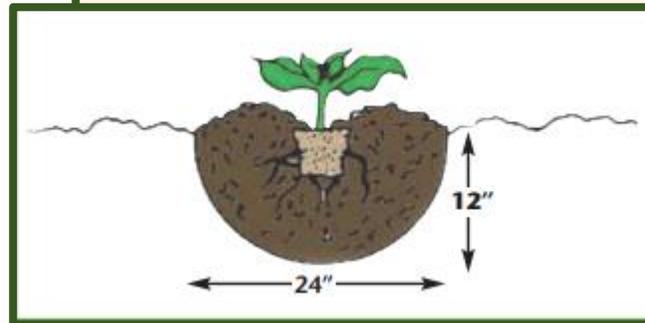
continued

planting

- Plant outside only after day & night temperatures are consistently warm.
- Even slightly cooler weather will stunt growth.
- Plant on a day with mild weather, towards the end of the day.
- Unlike tomatoes, do not cover the plant with soil above its original root ball.
- Plant spacing will depend on variety but generally 18"
- I find Poblanos tend to get very large and require 18-24" spacing



- Choose transplants that are a bright rich green, short & stocky, with no obvious signs of disease or pests.
- The plant should seem appropriately sized for its container. **Bigger is not always better.**



more planting

- An application of fertilizer placed in planting hole is recommended, 2TBL.
- Not strictly necessary but an application of mycorrhizal will aid in root development.
- This will encourage their shallow roots to grow more towards the nutrition below.
- Deep water upon planting. We do this with every transplant:
 - Trauma/Stress
 - Osmosis and water distribution
 - Eliminate any large air pockets

Growing Basics continued

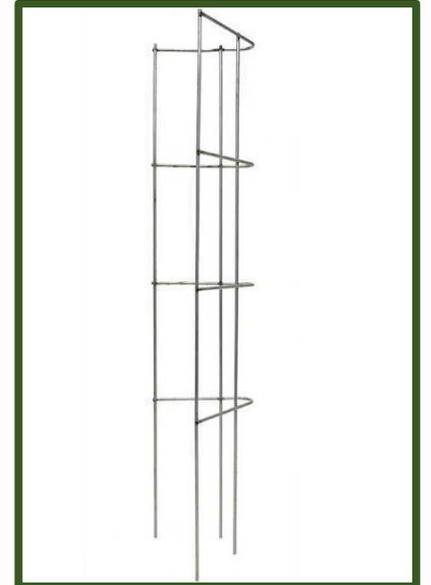
pruning

- Peppers grow in a bush habit, so it is not strictly necessary to prune.
- To encourage a stocky, more outward growth, early pruning is recommended.
- A simple snip or two of the leading stalks is all that is required.
- Prune early in the season when the plant is around 12", do not remove more than 2-3".



support

- Support is strongly encouraged.
- Pepper plants have shallow roots and when laden with fruit can become very top heavy.
- Especially with are heavy wind storms, we run the risk of trauma and damage leaving a pepper unsupported.
- Stakes are generally more common but tomato cages also work.
- Just make sure those supports are firmly planted into the ground. Again, **keep in mind weight.**



Growing Basics continued

controlling heat

- Genetics of the plant will be the strongest determination of heat.
- Second to that is environmental factors, any stress will increase the heat of the fruit. Be it heat, cold, moisture or dryness.
- For example a mild chile one year could be a medium chile after an extremely hot summer. A hot jalapeno could drop down to a medium jalapeno after a cool summer.
- Time of harvest, the first fruit on the plant is hotter than the later fruit.
- Fruit heat can vary slightly on the same plant, the biggest variation of heat will be between plants. This has to do with variation in genetics.
- MYTH: Growing a sweet pepper plant next to a hot pepper plant will make the sweet peppers spice. Not true folks.

According to Dr. Paul Boland, [Joe the Gardener Podcast](#)

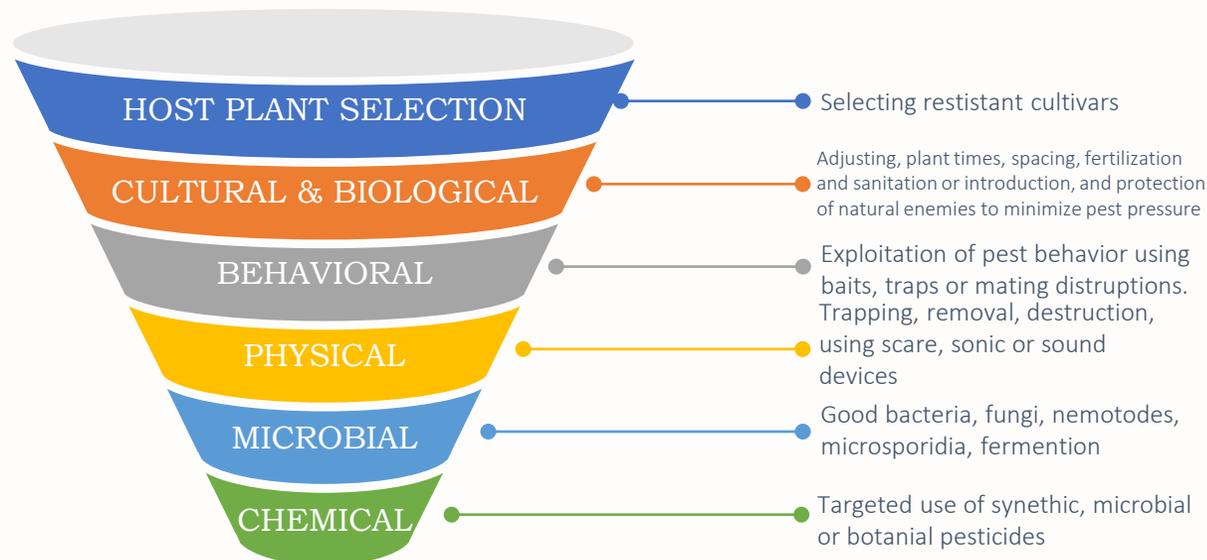


Common Pests & Control

IPM

Science based approach that combines a variety of techniques. By studying the biology, anatomy, life cycles and how pest interact with their environment, pest management can be improved along with lower cost and lower risk to people and the environment.

Integrated Pest Management



steps

- 1. Prevention:** Many pests can be controlled with preventative steps. This is the most important step.
- 2. Identify & Monitor:** Determine the agent and its abundance, ask for help
- 3. Evaluate:** Do we need to act? What is the most effective, necessary action with the most minimal impact on people and the environment?
- 4. Action:** Implement method of choice.
- 5. Monitor:** Continue to monitor, further treatments may or may not be necessary. If pest population increases it may be time to increase the level of action.

Common Pests & Control

continued

prevention

- Choose pest resistant cultivars
- Ensure well-draining soil
- Ensure adequate sun and air circulation
- Ensure proper fertilization
- Water consistently, preferably in the morning
- Prune with a purpose
- Remove and destroy infected plant material
- Apply a preventative garden-spray weekly or bi-weekly



CO Potato Beetle

- Manually remove, hand or pressurized water
- Floating row covers
- Companion plants: strong odor repels, nasturtium traps
- Application of Sevin, Neem Oil, Insecticidal Soap

Cutworms

- Manually remove, hand or pressurized water
- Floating row covers
- Companion plants: strong odor repels, nasturtium traps
- Application of B.T., Sevin, Neem Oil
- Collars of paper or aluminum foil can prevent fatal damage.

Common Pests & Control

continued

all-good garden spray

2 Gallons of Water
2.5 tsp Insecticidal Soap or
Castile Soap
3.25 oz Neem Oil

Mix ingredients together.
Spray, preferably, pressurized.
*Pay attention to underside of
leaves.*

Weekly or bi-weekly application



Aphids & White Flies

- Manually remove, hand or pressurized water
- Avoid overwatering
- Floating row covers
- Predator insects: Lady beetle, green lacewings, damsel&pirate bugs
- Companion plants: strong odor repells, nasturtium traps
- Application of Spinosad, Neem Oil, Insecticidal Soap

Leaf miner

- Manually remove, hand or pressurized water
- Floating row covers
- Predator insects: Spiders & Assassin bugs
- Companion plants: strong odor repells, nasturtium traps
- Application of Sevin, Spinosad, Neem Oil, Insecticidal Soap

Common Diseases & Control

prevention

- Choose disease resistant cultivars
- Ensure well-draining soil
- Ensure adequate sun and air circulation
- Ensure proper fertilization
- Water consistently, preferably in the morning
- Prune with a purpose
- Remove and destroy infected plant material
- Apply a preventative garden-spray weekly or bi-weekly



Blossom-End Rot

Causes bottom end of tomato to stop development and rot. Associated with calcium deficiencies and inconsistent watering & weather

- Maintain consistent watering
- Mulch to maintain consistent moisture
- Avoid high levels of nitrogen
- Well-draining soil
- Remove damaged fruit

Mosaic Virus

Viral disease that causes young growth to be yellow & mottled, fruits become bumpy.

- Highly infectious
- Garden hygiene is important
- Tobacco is common host plant, therefore smokers can cause transmission.
- No treatment, infected plants should be destroyed

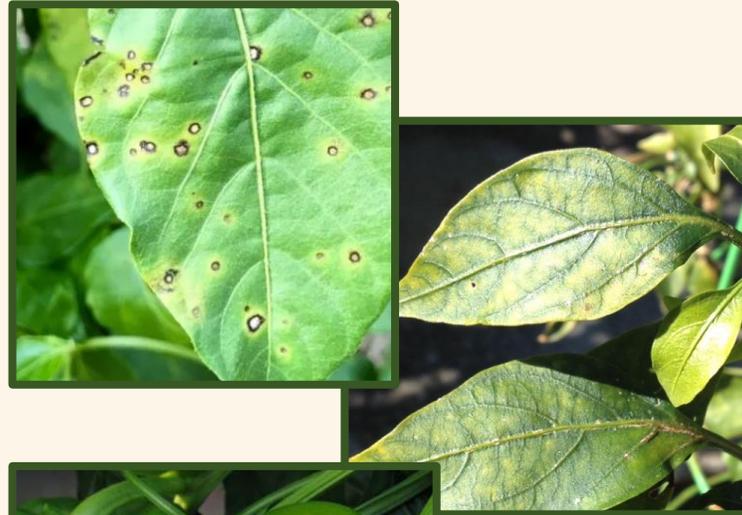
Common Diseases & Control

continued

Pepper Leaf Spot

Common bacterial disease that starts with small yellow & green spots that develop into brown. Associated with consistently damp weather.

- Maintain consistent watering & air circulation
- Regular application of preventative fungicide
- Remove damaged plant material
- Crop selection



Sunscald

Results of too much sun exposure to direct sunlight. Fruit or foliage may become light in color or papery.

- Avoid over-pruning
- Consider shade

Powdery Mildew

Fungal disease that causes white spots or white dusting. Can be managed with relative ease.

- Maintain consistent watering & air circulation
- Regular application of preventative fungicide
- Remove damaged plant material
- Crop selection

Blight(s)

Fungal disease that starts with dark concentric spots that causes leaf drop. Associated with uncontrolled humidity and warm temperatures.

- Maintain consistent watering
- Maintain consistent air circulation
- Regular application of preventative fungicide
- Remove damaged plant material
- Crop selection

Harvest

ripeness

The ripeness of a pepper depends heavily on what you expect from the variety and what you want from it.

Aspects of ripeness:

- **Color**
- Size
- Firmness
- Aroma

Peppers are mature when it is green, full-sized and firm. It will have a more vegetal flavor.

As it continues to ripen, it will become, *based on varietal*, red/yellow/orange/brown, sweet, smoky and thinner walled.



can i pick it?

Dependent on several factors:

- Variety
- Weather
- Pest pressure
- Kitchen's empty
- Intended use/Storage

picking tips

- Regular harvesting with increase season yield.
- Harvest throughout season to encourage new growth, allow end of season peppers to fully mature.
- Bring a basket and use shears.
- Clip at the pedicel, or stem of the single fruit.
- Remove any diseased or rotting fruits.
- Peppers will continue to ripen for a day or two further after picking, before they begin to degrade.

Varieties-Chile/Hot

Anaheim



Chinese 5 Color



Habanda



Hungarian Wax



Jalepeno



Jalepeno-TAM Mild



Long Thin Cayenne



Pimiento de Padron



Poblano/Ancho



Tabasco



Varieties-Sweet / Bell

California Wonder



Corbaci



Cornito-Carmen



Cornito-Escamillo



Cubanelle



Doux D'Espagne



Italian
Pepperoncini



Jimmy Nardello



Lipstick / Lunchbox



Shishito





Easy Gardening

PERS • PEPPERS • PEPPERS • PEPPERS • PEPPERS

Joseph Masabni, Assistant Professor and Extension Horticulturist, The Texas A&M University System

Peppers are a warm-season crop that will grow in most Texas areas. Red and green peppers are good sources of vitamin C, some vitamin A, and small amounts of several minerals. Red peppers have more vitamin A than do green peppers.

Peppers are good raw or cooked. Eat them as a snack, use them to decorate food, or add them to salads and casseroles. You can also stuff peppers with seasoned bread crumbs or meat and bake them.

Varieties

The best varieties of *sweet peppers* for growing in Texas include:

- Bell Tower
- California Wonder
- Keystone Resistant Giant
- Shamrock
- Yolo Wonder

Suitable *hot pepper* varieties include:

- Hidalgo Serrano
- Hungarian Wax
- Jalapeño

- Long Red Cayenne
- TAM Mild Jalapeño

Site selection

Peppers grow in all types of soils but do best in heavier, well-drained soils. Plant them in areas that receive at least 6 hours of sunlight each day.

Soil preparation

Several weeks before planting, work the soil 8 to 10 inches deep and rake it several times to break up the large clods. Work the soil only when it is dry enough not to stick to garden tools.

Incorporate large amounts of organic matter into the soil, especially if you are working with heavy clay. You can use compost, peat moss, rotted hay, or other organic matter.

Planting

Because a few plants will feed most families, it is best to buy pepper plants

rather than grow them from seed. Buy healthy plants that are 4 to 6 inches tall (Fig. 1).

About three to four hot pepper plants and eight to ten sweet pepper plants usually are enough for a family of four.

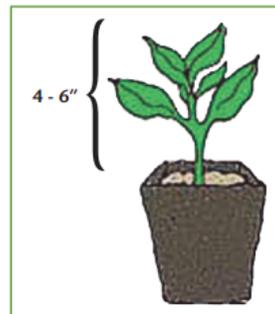


Figure 1. When buying pepper plants, choose those that are dark green and 4 to 6 inches tall.

Peppers grow best in warm weather. Plant them only

when all danger of cold weather has passed. Plant fall peppers 12 to 16 weeks before the first expected frost.

Make the transplant holes 3 to 4 inches deep and about 1½ feet apart in the row. Space the rows at least 3 feet apart. Before planting, fill the holes with water and let it soak in.

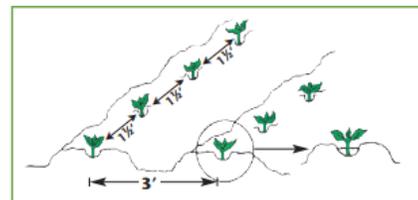


Figure 2. Peppers should be planted at least 1½ feet apart in a slightly sunken area to retain water.

Move the plants carefully from the box or flat, and set them in the transplant holes. Leave as much soil as possible around the roots. Fill the hole with soil and pack it loosely around the plant. Do not cover the roots deeper than the original soil ball. Leave a slightly sunken area

around each plant to hold water (Fig. 2). Water the plants after planting.

It is best to transplant peppers in the evening or on a cloudy day. This will keep the plants from drying too much and wilting.

Fertilizing

Add 2 to 3 pounds of fertilizer such as 10-10-10 per 100 square feet of garden area. Spread the fertilizer evenly over the garden. Work it into the soil.

If you will plant single plants, place about 2 level tablespoons of fertilizer on the soil in the planting area. Mix it well with the soil (Fig. 3).

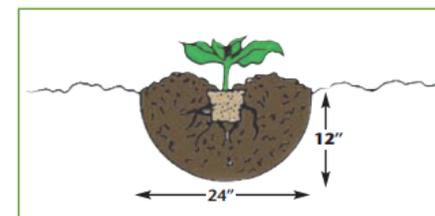


Figure 3. If you are planting single plants, work organic matter and 2 tablespoons of fertilizer into the planting area.

Watering

Water the plants enough to keep them from wilting. Slow, deep watering helps the root system grow strong. Do not let pepper plants wilt because this will reduce yield and quality of the fruit.

Care during the season

Hoe or till the soil lightly. Deep tilling will cut the pepper roots and slow growth. Pull by hand any weeds that are close to the plants.

After the first fruit begins to enlarge, place about 2 tablespoons of fertilizer around each plant about 6 inches from the stem. Water the plant after adding the fertilizer. This will increase the yield and the quality of the peppers.

Name and description	Control
 <p data-bbox="206 454 318 475">Flea beetle</p> <p data-bbox="364 347 555 454">1/8 inch long; metallic bronze, black-bronze, black, blue or green; jumps fast quickly; eats holes in leaves</p>	<p data-bbox="575 354 621 375">Sevin</p>
 <p data-bbox="206 606 318 628">Leaf miners</p> <p data-bbox="364 499 555 606">Small, yellowish larvae inside the leaves; cause tunnels or trails on the leaves. Remove infested leaves</p>	<p data-bbox="575 499 657 621">Biological controls (Dacsure, Disureig-sure)</p>
 <p data-bbox="206 759 293 781">Aphid</p> <p data-bbox="364 652 555 753">1/8 inch long; green, pink, red, brown; underside of leaves; sucks plant juices</p>	<p data-bbox="575 652 647 674">Diazinon</p>

Insects

Many insecticides are available at garden centers for homeowner use. Sevin is a synthetic insecticide; organic options include sulfur and Bt-based insecticides. Sulfur also has fungicidal properties and helps control many diseases.

Before using a pesticide, read the label and always follow cautions, warnings, and directions.

Diseases

Because diseases can be a problem on peppers, watch the plants closely. In mild weather, diseases start easily. Leaf spots are caused by fungi and bacteria and can be treated with neem oil, sulfur, or other fungicides. Again, always follow label directions.

Harvesting

If you pick the peppers as they mature, the yields will be greater. The first peppers should be ready 8 to 10 weeks after transplanting.

Pick bell peppers when they become shiny, firm, and dark green. If left on the plant, most peppers will turn red and are still good to eat.

Harvest most hot peppers when they turn red or yellow, depending on the variety. Jalapeños are mature when they reach good size and develop a deep, dark green sheen.

Storing

Store peppers in the vegetable crisper of the refrigerator or use other covered containers. Use them within 3 to 5 days after harvesting.

Acknowledgments

This publication was revised from earlier versions written by Sam Cotner, Professor Emeritus and former Extension Horticulturist and Jerry Parsons; former Professor and Extension Horticulturist.

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Revision

RESOURCES

I don't need to know everything, I just need to know where to find it, when I need it. --Never memorize something that you can look up. --Education is not the learning of facts, but the training of the mind to think. --Albert Einstein

books

[Epic Tomatoes](#)

Craig LeHoullier

[The \\$64 Tomato](#)

Willian Alexander

[Peppers of the America's](#)

Maricel E. Presilla

[Chilis: How to Grow, Harvest, and Cook](#)

Eva Robild

[Texas Fruit & Vegetable Gardening](#)

Greg Grant

[Texas Organic Vegetable Gardening](#)

Garrett & Beck

[The Vegetable Book: A Texan's Guide](#)

Dr. Sam Cotner

The Old Farmer's Almanac Handbook

The Old Farmer's Almanac Yearly Trade Edition

online

Online Institutions

[Texas A&M Agrilife Extension](#)

[Farmer's Almanac](#)

[Texas Gardener Magazine](#)

Social Media

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[Seeds of Change](#)

general product

[Bootstrapfarmer.com](#)

[Gardeners.com](#)

[Saferbrand.com](#)

[Amazon.com](#)

Home Depot & Lowe's

Sam's & Costco

Follow this link to access all four sessions of this Veggie Series

[Grayson County Master Gardeners](#)

will only be available until May

THANK YOU
&
GOOD LUCK!

