



Vegetable Gardening Tips

Growing Information for the Home Gardener Series



Tomatoes

The tomato is one of the most popular vegetables grown in home gardens. It requires little space when staked and can produce 5 or more pounds of fruit per plant. Tomatoes are a good source of vitamins A, C and potassium. Lycopene is a particular carotenoid that gives tomatoes their red color. Lycopene acts as an antioxidant. The medical community believes lycopene combined with a healthy diet and exercise may prevent several types of cancer. Tomatoes are very popular in cuisines around the world. They can be consumed raw, grilled, cooked into sauces and baked in many dishes.

The flavor of a tomato is influenced by several factors, including time of harvest, air temperature and rainfall and soil type. However, the most influential factor is the ratio of sugar to acid. All tomatoes are acidic but some are termed "low acid." Low acid tomatoes are still acidic but have higher amounts of sugar in them as compared to "acidic" tomatoes.

Choosing a Location

Tomatoes need full sunlight. Choose a location that receives 6-8 hours of direct sunlight per day. Tomatoes also need water. Your location should be close to a water outlet. Finally, tomatoes do not like to grow in saturated soils. If the yard is wet most of the spring and summer season, build a raised bed and form a high row in the ground or plant the tomatoes in containers.

Seeds or Transplants

Tomatoes can be started from seeds or purchased as transplants. To start tomatoes from seed, fill a container with loose potting soil. Moisten the soil and plant the seed no deeper than a 1/4 inch below the soil. Water the soil again. Ideal germination occurs when soil temperatures are between 70 and 80° F. Seeds should also be started 8-10 weeks prior to planting in the ground in the spring and about 6 weeks prior to planting the fall crop. The spring crop of tomatoes is planted depending on where you live.

Here is a general guide for early tomato transplanting: In New Orleans, Morgan City and Lake Charles, plant mid-February. In early to mid-March, plant in Covington, Baton Rouge, Opelousas and De Ridder. In late March, plant in Vidalia, Alexandria, Many, Winnfield, Monroe and Lake Providence. Shreveport to Farmerville residents should wait until early April.

These early dates are average last freezes. To be sure, wait a week or two beyond your date. The earliest planted

spring tomato crop seeds should be started in mid-January. Soil temperatures are very cold at this time, even in greenhouses or coldframes. Many gardeners start seeds on heating mats set between 70 and 80° F for 48 hours, then remove seeds from the mats. Keep seeds moist until planted in the ground. Do not fertilize the seedlings until the first true leaf has formed. With fall-planted tomatoes, the strategy is to harvest a good crop before a killing frost takes your plants. Since soils are so warm, seeds can be directly seeded in the garden row or in containers and later transplanted. In north Louisiana, sow seeds the end of June or transplant in July. In south Louisiana, sow seeds by mid-July and transplant in August.

The ideal transplant is as wide as it is tall (Figure 1). The plants should be free of insects and diseases and not yet in bloom. Tomato plants should be "hardened off" before they are set in the garden. To do this, gradually expose them to lower temperatures and less water.

Planting Tomatoes

Prior to planting tomatoes, fertilize the garden. Fertilizer can come in many forms. Organic matter including compost or aged manures are acceptable forms as are synthetic fertilizers such as 13-13-13 and 8-24-24. Tomatoes can be grown on most garden soils in the state, but a fertile, well-drained soil with high organic matter is best. Tomatoes are heavy users of plant nutrients, so you'll need to fertilize them. Apply about a pound or pint of a complete fertilizer (8-24-24 or 13-13-13) per 20 feet of row. If your soil is highly fertile, reduce this rate by about half. Apply the fertilizer in a furrow 6 to 8 inches below



the top of the row, or broadcast over the top of the row and work into the soil several days before planting.

The soil pH (a measure of the acidity or alkalinity of the soil) at which tomatoes produce best is between 5.8 and 6.7. A soil pH that is too low can reduce production. Lime raises the soil pH to the desired level and also supplies calcium. Apply lime only when a soil test indicates it is needed, since it can change the soil chemistry. Some soils in Louisiana have a high soil pH, but a low calcium level. Adding lime may raise the soil pH to an undesirable level. In a case like this, the neutral calcium sulfate (gypsum) is recommended. To apply lime, sprinkle it over the entire area and work it into the soil. Lime acts slowly, so the results will not be immediate as with the other fertilizers.

Apply an additional sidedressing of nitrogen fertilizer at the first and second fruit set. Apply it at the rate of 1/3 pound of calcium nitrate for 20 feet of row. You may also substitute ammonium sulfate 8-8-8 (a good idea in sandy soils) as a sidedressing. Apply it along one side and about 6 inches away from the base of the plants. Work the fertilizer in lightly, but do not damage roots. In containers use potting soils that are pre-charged with fertilizer. If needed, sidedress with liquid fertilizers or additional slow release fertilizer (use rates on label).

Plant tomatoes only as deep as their rootball. Leggy tomatoes benefit from being planted deep, but healthy stocky transplants do not.

Maintaining Tomatoes

Tomatoes need mulch. Black plastic mulches are used in large gardens and benefit early spring tomato production. The plastic warms up the soil early in the season, helps to control weeds, conserves moisture and fertilizer and reduces fruit rotting by preventing the fruit from touching the soil or soil splashing up on the fruit. Lay the plastic mulch before transplanting, and cut holes at the desired intervals (at least 18 inches apart). Set the plants in these holes. Apply fertilizer before laying the plastic. The soil should be moist. Smaller gardens can be mulched with leaves, pine straw, hay or newspaper.

Space tomato plants 18 to 24 inches apart on rows at least 3 feet apart. Raised beds provide good drainage and encourage extensive root development. If you started seeds in peat pots, completely cover peat pots with soil. If peat pots are exposed to the air, they will act much like a wick and draw the moisture out of the pot, damaging the plant roots.

Before tomatoes become too tall, place cages around them or stake tomatoes with wood or rebar poles and tie plants using twine loosely so that the plant has room to grow. Any supporting method is acceptable. Remember indeterminate or tall tomatoes need at least 6 feet of support whereas determinate tomatoes (bush types) usually stop growing around 3-4 feet in height.

Harvest

Tomatoes, depending on the variety selected, are generally ready to harvest from transplanting in 65 to 75 days. Fruit continues to mature beyond this first picking date. The average number of days from bloom to ripe fruit is 50 days. Factors that cause problems with

pollination and fruit set in tomatoes include: high and low temperatures, both day and night (day temperatures above 90° F and night temperatures above 75° F or nights below 55° F); high humidity; too much shade; and overfeeding (especially with nitrogen).

For the best flavor, harvest tomatoes after they have reached the “breaker” stage. Breaker stage is a blushing of yellow to orange color. If pulled off the vine this early, allow the fruit to ripen at room temperature. Never refrigerate tomatoes until they are fully ripe and always serve at room temperature.

Variety Selection

There are literally thousands of tomato varieties to choose from. Select varieties based on characteristics you are seeking. Tomatoes come in many sizes, shapes and colors (red, pink, maroon-to-purple, yellow and red-yellow variegated). Some tomato hybrids have also been bred for disease resistance, which is nice in Louisiana. Hybrids have been bred for more than just disease resistance; they are also known to produce heavy yields of quality tomatoes (free or with very little scars and blemishes).

Heirloom tomatoes are open-pollinated types that have been saved from generation to generation always producing the same growth and fruiting characteristics. Many gardeners favor heirlooms for their flavor and accept the fact that blemishing, fruit softness and cracks will occur.

Plant height is another selected trait. Tomato varieties come in two growth types: determinate and indeterminate. Determinate are short, bush type tomatoes, while indeterminate are taller types that will continue to grow tall as long as you continue to support their growth. Some gardeners prefer bush types for a shorter harvest season but also less maintenance on staking pruning and tying. Other gardeners do not mind reaching higher for longer producing fruit sets. The vast selection to choose from can sometimes be overwhelming. We suggest starting with varieties that have performed well in LSU AgCenter variety trials and branch out from there.



Table 1. Varieties with good to superior performance in our climate.

Determinate Varieties	Resistance Listed
Amelia	N, FI, 2 and 3, TSWV, S
Bella Rosa	Heat tolerant, A, FI and 2, S, TSWV
BHN 640	FI and 2, TSWV
Tribeca	Heat tolerant, TSWV
Tribute	Heat tolerant, TSWV
Carolina Gold	FI and 2
Celebrity AAS	N, FI and 2, T, A, S
Cherry Grande (cherry)	A, F, S
Floramerica AAS	N, FI and 2, A, S
Floralina	Heat tolerant, FI, 2 and 3, S
Heatwave II	Heat tolerant, FI and 2, A, S
Florida 91	Heat tolerant, A, FI and 2, S
Mountain Delight	FI and 2, A, S
Mountain Belle (cherry)	FI and 2
Mountain Fresh Plus	N, FI and 2
Mountain Spring	FI and 2, S
Phoenix	Heat tolerant, A, FI and 2, S
Solar Fire	Heat tolerant, FI, 2 and 3, S
Solar Set (Fall only)	Heat tolerant, FI and 2, A, S
Spitfire (Fall only)	FI and 2, A, S
Sun Start	A, FI and 2, S
Sunbeam	Heat tolerant, FI and 2, A, S
Sunchaser	Heat tolerant, A, FI and 2
Sunleaper	Heat tolerant, FI and 2
Sunmaster	Heat tolerant, FI and 2, A, S
Indeterminate Varieties	Resistance Listed
Better Boy	N, F, A, S
Big Beef (large) AAS	N, FI & 2, T, A, S
Cupid (grape)	A, FI, S
Jet Star (low acid)	F
Jolly, AAS (cherry)	-
Juliet AAS (grape)	A
Mortgage Lifter	-
Persimmon	-
Red Brandywine	-
Smarty (grape)	FI
Sugary AAS (grape)	-
Sun Gold (cherry)	-
Sweet Million (cherry)	N, F, T
Terrific	N, F, A, S

N = nematode; AAS = All America Selection; F = Fusarium Wilt race 1, 2 or 3; B = bacterial speck; A = Alternaria; S = Gray Leaf Spot; T = TM Virus; TSWV Spotted Wilt Virus

Pests and Problems

Garden pests may interfere in the process of a tomato maturing on the vine. Generally, pest problems from weeds, insects and diseases can be managed using less organic and synthetic chemical spraying if proper cultural practices are followed (as discussed above). Pest-free gardens are sought but seldom found because of Louisiana's hot, humid climate. Therefore, it is important to be able to identify and know control methods for several of the more aggressive pests in tomato patches.

Weeds

Tomatoes are extremely sensitive to most herbicides such as Roundup. However, trifluralin (Treflan, Miracle Gro Weed Preventer) is an herbicide that controls many weeds before they emerge from the soil. This herbicide should be applied prior to transplanting tomatoes. Grasses such as crabgrass and bermudagrass can be controlled after they emerge with sethoxydim (Poast, Hi-Yield Grass Killer) without injuring the tomatoes. Other weed control options include mulching, shallow cultivation and hand-pulling.

Insects

Tomato fruitworm: Tomato fruitworm is also known as corn earworm and cotton bollworm. It is the most damaging pest of tomatoes. Fruitworm larvae prefer green fruits and enter the fruit usually from stem end. Larval feeding inside the fruit leads to decay and rotting of tomato fruits. Handpicking and destroying the larvae is an effective control measure. Once the season is over, destroying infested fruits and crop debris helps to reduce number of overwintering insects. Insecticides like Bt, are effective if applied just after eggs hatch and before larvae enter into fruit. Spinosad, bifenthrin, carbaryl, cyfluthrin, etc. are also recommended for managing fruitworms.



Tomato hornworm: Hornworms are easily identified by the presence of a distinctive horn-like projection on their rear body. Hornworm larvae feed on leaves and occasionally on fruits. Heavy infestation can lead to extensive defoliation in plants. Management practices for hornworm are similar to fruitworm.

Armyworms: Three species of armyworms – beet armyworm, southern armyworm and yellow striped army worm – are potential tomato pests. Armyworms feed extensively on foliage as well as fruit, which differentiate them from fruitworms. Handpicking the eggs is an effective way of controlling armyworms. However, if damaging populations are found, spinosad, insecticidal soaps, and Bt can be used for managing armyworms.

Stink bugs: Green and brown stink bugs can be important pests of tomato. Nymphs and adult stink bugs suck sap from green fruits and the damage appears as pinholes surrounded by discolored area. Tomato fruit develop irregular white or yellow blotches underneath the skin. Stink bug feeding can also cause fruit decay if pathogens are introduced while feeding on fruits. Depending upon the abundance of stink bugs, one to three applications of insecticides like bifenthrin, permethrin, carbaryl etc. may be necessary to prevent damage. Handpicking eggs, nymphs and adults helps in managing population buildup of stink bugs. Planting tomatoes early also helps in avoiding heavy infestations in late summer and fall.

Thrips: Thrips cause direct feeding damage to tomato fruit by feeding on new leaves and developing flowers thereby causing distorted and cupped leaves. Egg laying by thrips appear as oviposition scars or small dimples in fruits. The major damage caused by thrips is transmission of tomato spotted wilt virus (TSWV). Thrips are not easily visible on plants but can be seen by shaking flowers and new foliage over a white index card. An average of one thrip per flower works well as the treatment threshold level. Spraying thoroughly with insecticidal soaps, neem oil and imidacloprid soil drenches will help in managing thrips but may not be very effective in preventing tomato spotted wilt virus. However, early insecticide applications may reduce the incidence of TSWV. Use of reflective mulches will make the plants less attractive to thrips and hence reduce virus transmission.

Mites: Mites have become an increasingly important pest in tomatoes in southeast. Mites usually feed on the underside of leaves. Infestation by mites results in speckled appearance on the upper surface of leaves and webbing on the lower surface of leaves. Damaged leaves appear bronze colored, curled and may eventually drop from the plant. Mites can be seen by tapping a leaf or branch on white paper, and mites appear as small, moving dust spots. It is essential to control mites early in the season to prevent population buildup. Hot and dry weather favor mite infestation; therefore, watering and keeping the plants moist will help in controlling mites. Soap solution and neem oil will reduce mite problem but thorough coverage is very important.

Aphids: Aphids often infest transplants as they come from the greenhouse. Heavy aphid infestation results in curling and mottling of leaves and poor and stunted growth of plants. Large numbers of aphids are found congregated on the lower side of leaves. Black, sooty mold

fungus grows frequently on honeydew (sticky sap-like residue) excreted by aphids. Aphids also transmit certain plant viruses, and cultivar selection with viral resistance is important. Using aluminum-painted plastic mulch and removing damaged plants may help in reducing virus transmission by aphids. Use water from the garden hose to dislodge and reduce concentrated aphid populations. Soap solutions, neem oil and Malathion are helpful in managing aphid populations. While spraying, thoroughly cover the whole plant especially the lower leaf surface.

Diseases and Disorders

Blossom-end rot is the most troublesome and common disorder of tomatoes. It is caused by a calcium deficiency and aggravated by drought stress, extreme fluctuations in soil moisture and over fertilization, especially with nitrogen. Tomato plants absorb calcium through the roots. The calcium content of the soil should be determined by having a soil test performed. If soil calcium and soil pH are low, consider adding lime. If soil calcium is low but pH is not, consider applying calcium nitrate as a sidedress fertilizer application when the plants begin to bloom. Generally, a 1/2 to 1 tsp of calcium nitrate per plant at each bloom set is sufficient. Another practice that can help to reduce blossom-end rot is to maintain uniform soil moisture. Do not let the soil dry out completely, and provide good drainage to remove excess water following heavy rains.

In Louisiana, tomatoes are susceptible to several plant diseases caused by fungi or fungi-like microorganisms, bacteria and viruses. Major diseases that are caused by fungi are early blight and southern blight.

Early blight appears early in the season, often before fruit set and can affect the stems and leaves. If symptoms are predominately on the stem, the disease is referred to as *Alternaria* stem canker, named after the fungus that causes the disease. Symptoms usually start at the bottom of the plant. Typical symptoms are irregular-shaped brown spots with dark, concentric rings. Spots are frequently surrounded by a yellow halo. Spots (cankers) on the stem are elongated and can girdle the stem causing the stem to collapse. Fruit are rarely affected. To prevent *Alternaria* stem canker, select a variety with resistance. Improving airflow will help reduce spread of the disease. If disease is severe, apply a fungicide containing mancozeb or chlorothalonil on a weekly basis.

Southern blight is caused by a soil-borne fungus. The fungus attacks the crown of the plant at the soil line causing stem girdling resulting in wilting of plants. The disease develops when soil temperatures warm up in mid-spring. White fungal growth may be observed at the base of the plant and the nearby soil. In later stages, the fungus develops mustard seed-like structures on the stem near the soil line. There are no soil-applied fungicides registered for home garden use. Therefore, when symptoms are first observed, remove and discard the affected plants along with the associated topsoil. Do not compost diseased plants. In severe cases, soil sterilization or a new planting site should be considered.

Late blight is a very serious tomato disease in Louisiana. Symptoms appear on all aboveground plant parts and tubers. Late blight is caused by a soil-borne, fungal-like microorganism called *Phytophthora infestans*,

the same pathogen that caused Irish potato famine of the late 1840s. Symptoms appear as irregular, water-soaked, dark necrotic lesions that rapidly enlarge and entire leaf appears blighted within three to four days. Remove and destroy any infected plants. Spray plants on a regular basis with fungicides such as chlorothalonil, mancozeb, copper or a combination of mancozeb plus copper. Several bacterial diseases affect tomatoes in Louisiana, but major ones are discussed below.

Bacterial spot is caused by a seed-borne bacterium that attacks the leaves, stems and tomato fruit. The disease also affects peppers. Bacterial spot is prevalent in Louisiana due to favorable warm and humid conditions. On the leaves and stems, symptoms begin as small irregular shaped, water-soaked spots. Over time the spots enlarge and begin to coalesce. Older spots are crusty and have a yellow halo. Spots on the fruit first appear on green, immature fruit. The spots are raised and crusty in appearance.

Bacterial spot is often confused with early blight. It is important to have a specialist assist with the identification of the disease since management tactics differ for early blight and bacterial spot. Management of bacterial spot relies on prevention. Only use certified, disease-free seed and transplants. Avoid overhead watering and plant handling when the leaves and stems are wet. Copper-based fungicides applied weekly will slow the spread of disease but only if sprays are applied before the onset of the disease.

Southern bacterial wilt is caused by a soil-borne bacterium. The disease also affects pepper and eggplant. Mature, fruit-bearing plants begin to wilt at the top of the plant in mid-summer when temperatures rise above 86° F. In many cases, the plant will perk up in the evening and early morning when the plant doesn't not require as much water. However, within two to three days the entire plant wilts and dies. Similar to *Fusarium* wilt, the inner stem tissue will have a brownish color. The bacterium can survive in the soil for long periods of time even in the absence of a host plant. Immediately remove and discard diseased plants, including the root system and any soil surrounding the root system. In severe cases, soil sterilization or a new planting site should be considered. Growing tomatoes in a pot with commercial potting soil is an alternative way to avoid this disease.

Bacterial disease are much more difficult to manage than fungal diseases due to the lack of effective chemicals. Therefore, practices that prevent these diseases are critical.

Tomato spotted wilt virus (TSWV) and **Tomato yellow leaf curl virus (TYLCV)** are two important plant viral diseases common on home grown tomatoes. TSWV is spread by thrips and TYLCV by whiteflies. The insects acquire the viruses by feeding on infected weeds or ornamental hosts. TSWV symptoms include stunting, bronze spots on the leaves and twisted or cupped leaves. TYLCV symptoms include yellowing and distortion of leaves. Affected plants appear stunted with abnormally small leaves. Many tomato varieties with TSWV resistance are available. Other management practices include the use of thrips or whitefly free transplants, managing insects with natural or synthetic insecticides or horticultural oils and use of reflective mulches (aluminum or silver colored). Weed removal is very important because weeds can harbor both the insects and the plant viruses. Remove and discard diseased plants.

Nematodes

Nematodes are microscopic soil worms that feed on roots. They may form knots or galls on the roots or just weaken and stunt the growth. When hot weather and drought come, tomatoes are the first plants to show injury. Choose resistant varieties designated as “N” following the variety name. In severe cases, a new planting site should be considered.

Cultural Control for Nematodes

1. Plant early, before nematodes get active in soil.
2. Rotate crops in the garden and also the garden site each year.
3. Add organic matter such as green manures, compost or mulches to stimulate nematode enemies and improve growing conditions.
4. Use fallow plowings during mid-summer to reduce nematodes.
5. Clean the garden of weed hosts of nematodes.
6. Keep soil fertility levels high, and have the proper soil pH.
7. Provide extra water during dry spells.
8. Remove crops immediately after harvest, especially the roots.
9. Most marigolds (except Signet types) are effective trap crops against root-knot nematode. Plant the marigolds solid for at least 2-3 months, and then plant vegetables.

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