



Colorado MASTER GARDENER

Plant Health Care: Growing Tomatoes no. 7.846

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Variety Selection

There are over 2,000 varieties of tomatoes grown worldwide. Ask neighbors, local authorities and garden center staff about local favorites.

Hybrid tomatoes are popular in the USA to reduce problems with *Verticillium* and *Fusarium* wilt, common soil-borne pathogens. Early hybrids were developed for their yields and disease resistance. Flavor became a driving factor in the breeding of newer hybrids. Some gardeners prefer to trade off the disease protection of hybrids for the rich tomatoey flavors of heirloom varieties.

Cherry and the new grape-type tomatoes are popular for salads and snacking. Many, but not all, have small size vines suitable for container gardening.

For early production, *Early Girl* is a popular variety with mid-size fruits. *Celebrity*, *Big Boy*, and *Better Boy* are examples of popular main season varieties. Many gardeners prefer the rich tomato flavor of heirloom *Brandywine* or the large beefsteak types. Pear tomatoes and yellow types are gaining popularity.

Paste types such as

Roma and its descendents are preferred for making salsa, chili sauce, and other tomato products, requiring less time to cook down. Be aware the paste types and standard varieties are not directly interchangeable in recipes.

Where the growing season is short, *Early Girl* and other varieties that mature in 50 days or less. In many mountain communities, tomatoes may only be successfully grown in a structure or adjacent to the south side of a building to provide frost protection and warmer growing temperatures.

Whatever type you prefer, VFN resistant hybrid varieties are recommended. The abbreviation VFN indicates resistance to *Verticillium* wilt, *Fusarium* wilt, and nematodes. *Verticillium* and *Fusarium* wilts are common soilborne fungal diseases. Nematodes are not an issue in Colorado due to cold soil temperatures. Researchers have found multiple strains of *Verticillium* and *Fusarium*; so if you're having problems with these diseases, try other VFN varieties.

Vine types – There are two types of vines, **indeterminate** and **determinant**. Most popular home garden varieties are indeterminate. The vine



Figure 1. Sweet 100 is the most popular home garden cherry-type tomato. On a large vine, it produces hundreds of sweet, cherry size fruits with very tender skins.

keeps growing through the growing season, extending fruit production until frost kills the vine. Plant size is typically large. Determinant types are common in commercial production as vine growth stops when flowering begins; plants will typically be moderate in size. Determinant types put on a large single crop. They may be suitable for container planting where trellises are not possible.

Planting

Planting Time

Tomato plants need night temperature above 32 degrees F and daytime temperatures above 60 degrees F. They are readily killed by a light frost. A week of cool daytime temperatures (below 55 degrees F) will stunt plants, reducing yields.

With these warm temperature requirements, planting time along the Colorado Front Range is typically late May. Don't plant tomatoes out into a cold spell and make sure soil temperatures are warm.

To get a head start on the season, gardeners use a variety of frost protection techniques. The wall-of-water provides protection into the mid-teens, or lower. Cool soil temperatures also inhibit early growth. When using a wall-of-water, also use black plastic mulch to help warm the soil. Be cautious in filling the wall-of-water not to splash water around, as a wet soil will be slow to dry and warm in the spring. For additional information on using a plastic mulch, refer to the fact sheet 7.844, *Mulches for the Vegetable Garden*.

In higher elevations with cooler summer temperatures and shorter growing seasons, it may be only feasible to grow tomatoes along the south side of a building or in a structure to provide frost protection and warmer growing temperatures.

Selecting the Ideal Plants

The ideal tomato transplant is dark grass green and 6 to 8 inches tall. The stem is about pencil size in diameter and has not been pruned or cut back. It has been "hardened-off" to tolerate the move from the ideal greenhouse environment to the windy outdoors. (Transplants are hardened-off by withholding water and/or nutrients or by exposure to cooler temperature to slow the rapid growth of a transplant.)

Plant leggy transplants horizontally – In the warm greenhouse conditions of May when gardeners are shopping for transplants, tomato plants quickly grow from ideal size to tall and leggy. The white bumps along the leggy tomato stem are roots beginning to form.

Plant these taller leggy transplants horizontally. Dig a trench a 2 to 3 inches deep. Place the plant horizontal with only the top two to three sets of leaves showing above the soil. Pinch off other lower leaves below the soil line before planting.

Space and Trellis Plants

To minimize Early Blight disease, space and trellis plants to allow for good air circulation and promote rapid drying. Trellised tomatoes are easier to pick and less preferred by tomato psyllid insects. Trellising eliminates problems with fruit rotting where they touch the ground.

The minimal spacing for trellised tomatoes is 2 feet apart in a hedgerow. Research demonstrates that crowding plants will not increase yields, but will increase disease problems.



Figure 2. Wall-of-water protects individual plants down to the mid-teens. Notice that black plastic mulch was also used to warm the soil. Cool soil temperatures are also a growth limiting factor with early plantings.



Figure 3. Leggy tomato plants readily root out along the stem in the warm soil near the surface, supporting rapid growth.



Figure 4. Tomatoes planted in a raised bed with black plastic mulch and cages made from concrete reinforcing mesh. Cages are 6 feet around, 2 feet across and 5 feet tall. On improved soils, tomato vines will loosely fill the cage, allow for good air circulation and easy picking.



Figure 6. Single pole trellis.

winds. Wrapping the cages with a plastic sheet or newspapers to provide wind protection for the first week helps plants acclimatize.

Single pole trellis – Some gardeners prefer to trellis tomatoes on a single pole or stake. To do this, prune plants to a single trunk by removing all side shoots. This requires constant removal of side shoots.

Fan trellis – Another method that produces larger fruit, is to trellis a three-trunk, fan shape, removing all other side shoots. This requires a sturdy frame to support the weight of the vine and fruit.

Mulching

As with any crop, apply a surface mulch to conserve soil moisture and manage weeds. Mulching helps reduce the splashing of Early Blight fungal spores from the soil onto the leaves. It also helps stabilize soil moisture levels and reduces the incidence of blossom end rot.

Black plastic mulch is popular for tomatoes, warming the soil and pushing production two to three weeks earlier. When using black plastic mulch, crops must be planted early so plant growth covers and shades the plastic before summer heat sets in. For details, refer to the fact sheet 7.844, *Mulches for the Vegetable Garden*.

Irrigation

Avoid overhead sprinkling on tomatoes. Fungal spores are easily water-splashed from one leaf to another, and water on the leaves creates a favorable environment for disease development. Watering in the morning, allowing plants to dry before nighttime, may also be helpful.

Cages – The American Society for Horticultural Science recommends a trellis 2 feet in diameter by 4 to 5 feet tall. It is easy to make from a 6½-foot length of concrete reinforcing mesh. Cut off the bottom ring of wire so the cages can be pushed into the ground. When a branch sticks out of the cage, simply tuck it back in.

For the smaller-vined, determinant types, two cages may be made from a 6½ foot length, cutting the height in half. Cages will be 2 feet diameter but only 2 to 2½ feet tall.

Commercially available cages are too small for most popular tomato varieties grown on good soils.

Tender transplants are sensitive to cool



Figure 5. Help acclimate transplants by wrapping the cages with a plastic sheet or net.

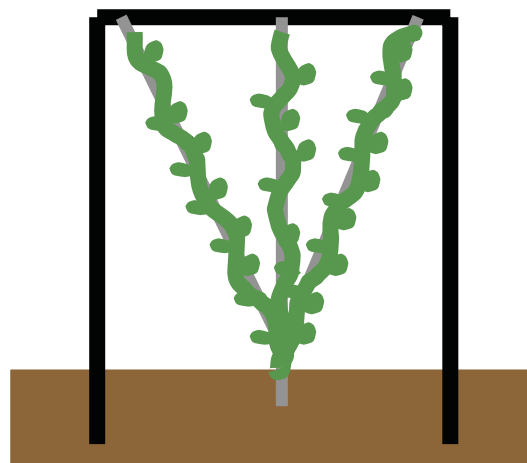


Figure 7. Fan trellis.

For details on garden irrigation, including drip irrigation, refer to the fact sheet 7.843, *Irrigating the Vegetable Garden*.

Fertilization

Tomatoes have a low nitrogen requirement. Under high nitrogen conditions, vines grow excessively large at the expense of fruit production. More correctly stated, tomatoes are a fussy nitrogen feeder. On soils low in organic matter, tomatoes typically run out of nitrogen in mid-summer, reducing yields and predisposing the plants to Early Blight.

At transplanting, apply one to three applications (depending on soil organic content) of a water-soluble, “plant starter” fertilizer. This includes any of the water-soluble products like MiracleGro, Peters, RapidGro, Schults, etc. Transplants should be “hardened off” (growth slowed) in the greenhouse, giving them tolerance to the move from the greenhouse environment to the windy outdoors. A water soluble fertilizer stimulates renewed growth.

If the weather turns cold late spring after tomatoes are out (that is a week with daytime temperatures below 55 degrees F), use water-soluble fertilizers to stimulate growth when warm temperature return. A week with daytime temperature below 55 degrees F stunts tomato growth and reduces yields.

Midsummer – On low organic matter soils, tomatoes typically run out of nitrogen in mid to late summer. Yellowing of the foliage, starting with lower leaves, is the typical symptom of nitrogen stress. Low nitrogen in the plant allows Early Blight disease to spread like wildfire. Keeping nitrogen levels up in mid to late summer is a primary means of Early Blight control and significantly improves yields.

Fertilize tomatoes lightly as the first fruits reach 2 inches in diameter. Water-soluble fertilizers (such as MiracleGro, RapidGro, and Peters) used according to label directions make a good summer fertilizer supplement. Make applications every two to four weeks, depending on soil organic content.

If using a dry granular fertilizer, apply 21-0-0 (ammonium sulfate) at the rate of 1 level tablespoon per plant. Sprinkle the granular fertilizer in a wide circle 12 to 20 inches out from the plant, and water in. Dry granular fertilizers can easily kill tomatoes if over-applied.

For additional details on soil management and fertilization, refer to fact sheets available on-line at www.cmg.colostate.edu.

Pollination and Summer Temperatures

Pollination is temperature dependant. If nighttime temperatures drop below 55 degrees F, pollen fails to develop and flowers that open the following morning will not set fruit. Cool nights often interfere with fruit set for early tomatoes and in higher elevations. Blossom set sprays effectively produce fruit even with cool nights.

If the daytime temperature reaches 90 degrees F by 10 a.m., blossoms that opened that morning abort. Blossom set sprays are not effective under high temperatures.

In July and August along the Colorado Front Range, night temperatures have a 50/50 probability of staying above 55 degrees F any given night. In unusually warm seasons, tomato fruit set may be unusually high. When poor soil conditions and/or watering problems limit plant growth potential, fruit may ripen while small in size. With good soil tilth and water conditions, fruit size may be unusually large.

Garden Sanitation

Control weeds. Common weeds harbor many garden insect and disease problems. Volunteer potatoes and tomatoes could be a source of Early Blight infection.

For Early Blight management, some references suggest removing lower leaves that show symptoms. Symptoms start as tiny black spots on lower leaves. Spots enlarge to light and dark target-like rings. Leaves yellow and the disease progresses from lower leaves up the plant.

If removing lower leaves, focus on leaves with the tiny black spots. Removing just the lower yellow leaves will not be adequate. Wash hands with soap and water immediately after touching diseased leaves to prevent spreading spores to other plants. Avoid working with the plants when they are wet.

Another disease, tobacco mosaic virus (TMV), can readily spread from tobacco smoke residues on the clothing and hands to tomatoes. Prevent TMV infections by washing hands after smoking or handling tobacco products.



Figure 8. Early blight leaf spots.

Rotation

Since the common tomato diseases (Early Blight, Verticillium and Fusarium wilt) are soil borne, crop rotation is an effective management tool. However, this may not be practical in most home garden situations, particularly since rotation allows no tomatoes, peppers, potatoes, eggplants, vine crops (cucumbers, squash, pumpkins, melons), strawberries or raspberries in the same growing area for at least four years.

Fall Clean-Up

Remove all tomatoes and potato debris in the fall. Dispose of debris in municipal trash or by burial. Do not compost unless the compost heats to at least 145 degrees F and the pile is turned occasionally. Most home compost piles do not heat adequately to kill pathogens.

Ripening Fruit at the End of the Season

To speed fruit ripening in the fall, hold back slightly on watering.

Ripening Fruit Indoors

With the forecast of a light frost, tomatoes may be protected by covering. If heavy frost is forecast or where covering is not practical, harvest fruit before the frost event and carry indoors.

Pick ripening fruit and green tomatoes with a glossy green appearance that have reached about three-fourths of their full size. Remove stems. Wash fruit under a stream of water and allow to air dry on a clean towel. Save only blemish free fruits for ripening indoors.

As for humidity, fruit shrivel if it is too low. If the humidity is too high, fruit mold. A gardener will have to learn by trial and error what works for their home.

Some gardeners hang the whole plant upside down in a dark cool barn or basement to let the fruits ripen gradually. In Colorado's dry climate, fruit tend to shrivel from the low humidity.

Common Disorders

Refer to the following fact sheets:

2.949 Recognizing Tomato Problems

7.847 Tomato Early Blight

Other options include placing tomatoes one or two layers deep in a covered box for ripening. Some people find better success by individually wrapping fruit in newspaper or wax paper and placing them in a covered box. Placing a few fruit together in a vegetable storage bag has been effective for others.

For higher humidity, place tomatoes up to two layers deep in a blanching pan or strainer inside of a covered pan with some water in the bottom. Make sure the fruit does not touch the water.

Ethylene gas produced by ripening tomatoes is a ripening hormone. To speed the ripening process, place a ripe tomato in the container with the fruit. To slow the ripening of green tomatoes, routinely remove ripening fruit from the container.

Green fruit will ripen in about two weeks at 65 to 70 degrees F, and in about three to four weeks at 55 degrees F. Storage below 50 degrees F will give fruit a bland, off-flavor.

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