

TOMATOES

Vegetable Gardens



By
Charles Marr

Tomatoes are the most popular home garden vegetable. They are easy to grow and thrive under a variety of growing conditions. Sales of tomato transplants have skyrocketed in recent years with tomato plants being an important part of the spring bedding-plant industry.

Tomatoes are a native South American crop but were taken to Europe by early explorers. Although some Europeans accepted the tomato immediately, others thought it to be poisonous. Even after the plant was brought to America, most Americans were afraid of tomatoes until the 1830s.

Nutritive Value

Tomatoes are an excellent source of vitamin C. One and a half small tomatoes contain more vitamin C than half a grapefruit. Tomato juice rivals orange juice in vitamin C content. One small tomato provides nearly 20 percent of the daily minimum requirement for provitamin A, and newer varieties with more vitamin A are being developed. Tomatoes also contain high amounts of magnesium, calcium, phosphorus, copper, iron and cobalt.

Varieties

The table on page two describes tomato varieties popular with Kansas gardeners. Plant characteristics are an important factor to consider in selecting tomatoes. Some vines are relatively compact and less sprawling compared to large-vined types that must be grown using pruning and staking, tying, or "cage" culture.

Transplants

Most gardeners prefer to buy transplants from local greenhouses, nurseries, garden dealers or other suppliers. Tomatoes may be purchased in flats, market packs or individual pots. Individually potted plants are generally more expensive, but because roots do not have to be disturbed, plants suffer less "shock" when transplanted into the garden.

Choose plants that are dark green, short and compact, with sturdy stems about the size of a pencil. There should be a balance between plant and container, so avoid large plants growing in small containers.

Seeding or Growing Transplants

Tomatoes can be seeded directly into the garden. Canning types are best adapted for this. Seed thickly, and thin to about one plant per foot later in the season.

All types of tomatoes can be started indoors if you want to experiment rather than buying transplants. Use clay, plastic or peat pots, milk cartons, paper or plastic coffee cups, or similar containers, making sure they have drain holes in the bottom. It is best to use potting soil from a greenhouse or garden center because it is free of weed seeds and harmful disease organisms. Plant several seeds into soil that has been well-firmed in the pots. Thin later, leaving one seedling per container.

Optimum growing temperature for tomatoes is 70 to 75°F with night temperatures of 60 to 65°F. Because those growing in shade or low-light conditions are spindly, give plants as much light as possible. You can start seedlings in artificial light, but they should be transferred to full sun before they are an inch or two tall. A week or so before they are ready to be set in the garden, decrease watering to toughen or "harden" the plants. This makes transplanting shock less severe.

Planting

To grow tomatoes successfully, plant them where they will get full sun for a half day or more. Those growing in shade will be spindly and unproductive.

Tomatoes are sensitive to frost and do not thrive in cold garden soils. In extreme southeastern Kansas, tomatoes can be transplanted in early to mid-April, but for most of eastern and central Kansas, late April to early May is suggested. In extreme northwest Kansas, plant in

Table 1. Popular tomato varieties.

Variety	Disease Resistance	Vine Size	Fruit Size	Crack Resistance	Comments
Garden Tomatoes					
Sun Start	VF12, TMV	Medium	Medium-large	Fair	Very early
Sunny	VF1, TMV, N	Medium	Medium-large	Good	Early
Daybreak	VFNT	Medium	Medium	Fair	Early
Mt Spring	VF12	Small-medium	Medium	Good	
Mt Fresh	VF12, EB	Small-medium	Large	Good	
Celebrity	VF12, N	Medium	Medium	Fair	
Floralina	VF123	Medium	Large	Good	
Jet Star	VF1	Large	Medium-large	Excellent	
Merced	VF12, TMV	Medium	Large	Good	
Sunmaster	VF12	Medium	Large	Fair	
Sun Leaper	VF12	Small-medium	Large	Good	
Carolina Gold	VF12	Small-medium	large	Good	Yellow
Cherry					
Cherry Grande	VF1	Medium	1 oz	Good	
Mt Belle	VF12	Medium	1 oz	Good	
Sweet Chelsea	VF12, TMV	Large	1 oz	Good	
Paste/Roma					
Roma	VF12	Medium			
Plum Dandy	VF1, EB	Small-medium			
Super Marzano	VF12, TMV, N	Large			

Disease resistance: V = verticillium wilt; F = fusarium wilt, races 1,2 or 3; TMV = tobacco mosaic virus; N = nematodes; EB = early blight

Most newer tomato varieties have a more compact vine with a uniform ripening genetic trait (fruit ripens uniformly from top to bottom), multiple disease resistance and a fairly meaty, firm fruit. The most serious disease - Fusarium wilt - has two races or strains found in Kansas. A third race may move to Kansas in a few years, but it is not currently a threat. Fusarium persists in the soil for eight to 12 years and there is no known control other than resistant varieties. Nematodes are a problem in parts of Kansas that are south of Interstate 70.

mid-May. **If there is a danger of frost after plants are set, be sure to cover them with a temporary protective cover.**

Tomatoes will grow in many different soil types but prefer a deep, loamy soil with a pH of 6.2 or 6.8. If topsoil is shallow, you can improve the growing area by digging a hole 12 to 18 inches deep, mixing in peat moss or compost, and then refilling the hole. If this is not done, till the soil thoroughly with a spade or Rototiller.

Consult your county agent for specific recommendations on fertilizing tomatoes. If a soil test is not available, add 1 to 2 pounds of complete garden fertilizer per 100 square feet. Avoid using fertilizers with too much nitrogen because excessive nitrogen fertilization can cause spindly plants and few fruits. Fertilizers with ratios of 5-10-10, 6-12-12, 5-10-5, or with about half as much nitrogen as phosphate are most desirable.

Spacing depends on plant size and whether or not plants will be staked. Small-vined types can be spaced 15 to 18 inches apart and staked vines 18 to 24 inches. Unstaked

plants should have 30 inches of space between them. If planting several rows, place them about 4 feet apart.

Set tomato plants in the ground slightly deeper than they were growing in the flat or pot. To prevent plants from breaking off in spring winds, cover tall, spindly plants to the first leaf so most of the stem is below the soil surface. When using peat containers that do not have to be removed, tear off the top edge of the pot or make sure the pot is well below the soil surface. The edge of a peat pot when exposed to air acts like a wick and draws water from the soil around the plant.

After planting, water well with a starter fertilizer solution. You can purchase water-soluble starter fertilizers at your local garden center or mix 3 to 4 tablespoons of ordinary garden fertilizer in a gallon of water. Use about 1 cup of water starter around each plant.

Protect plants for a few days by shielding them with boards, shingles or covers that let light penetrate, such as plastic containers, glass or hotcaps.

Staking

In small garden areas, tomatoes can be staked to conserve space. This usually produces earlier tomatoes because vines are pruned to promote fruit growth. In extremely hot weather, however, staked plants lack adequate foliage to prevent sunburning fruit.

Choose stakes 6 to 7 feet tall and drive them about 2 feet into the ground, 3 to 4 inches from the plant. Tie the plant to the stake with twine, cloth or soft plastic strips about every 12 inches up the stake, tying first tightly around the stake, and then loosely. Tie again loosely around the plant so the stem will have room to expand.

As plants develop, it is a common practice to prune "suckers" or shoots that develop in the angle between the stem and branches. Remove suckers every few days as they form and before they are more than 1 to 2 inches long. When they are small, suckers can be easily pinched from the plant allowing one stem to grow up the stake. Some gardeners allow the lowest sucker on the plant to develop, forming two main stems.

One cultural method that is preferred by many Kansas gardeners is to use a "cage" or trellis for each plant. This keeps tomatoes and foliage off the ground and conserves garden space while allowing plenty of foliage protection during the hot summer months.

To construct a tomato cage, use concrete reinforcing wire or similar material with spaces large enough so fruits can be removed. A cylinder about 18 to 20 inches in diameter is ideal and can be formed out of a 5-foot length of wire. Cut off the lowest horizontal wire and stick the vertical wires into the ground (Figure 1). A stake will keep the cylinder from blowing over.

Place the cylinder or "cage" over a single transplant and allow the plant to grow normally, without removing suckers. You don't have to tie the plant to the "cage," but you may have to push stems back in if they grow out of the holes. Using this method, you should have ripe tomatoes until frost. Do not prune compact-type plants.

Mulching

A mulch benefits growing tomatoes by holding in soil moisture, reducing soil compaction and helping to control weeds. Plastic mulches used early in the season, before planting, warm the soil and encourage early growth. Apply straw, compost, leaves and grass clippings in mid-June at the base of each plant.

As the Plants Grow

Tomatoes require about 1 inch of water per week. This can be supplied with sprinklers, soaker hoses or furrow irrigation if not by natural rainfall.

Control weeds while they are small by hoeing. Use shallow scraping and avoid deep cultivation. A garden mulch will smother small weeds, reduce soil moisture losses, and decrease fruit rotting and foliage diseases. Mulch with 2 to 3 inches of compost, peat moss, leaves or grass clippings, or 4 inches of coarser mulch such as wheat straw or old prairie hay.

Tomatoes planted in sandy areas may benefit from monthly side-dressings of fertilizer containing about twice

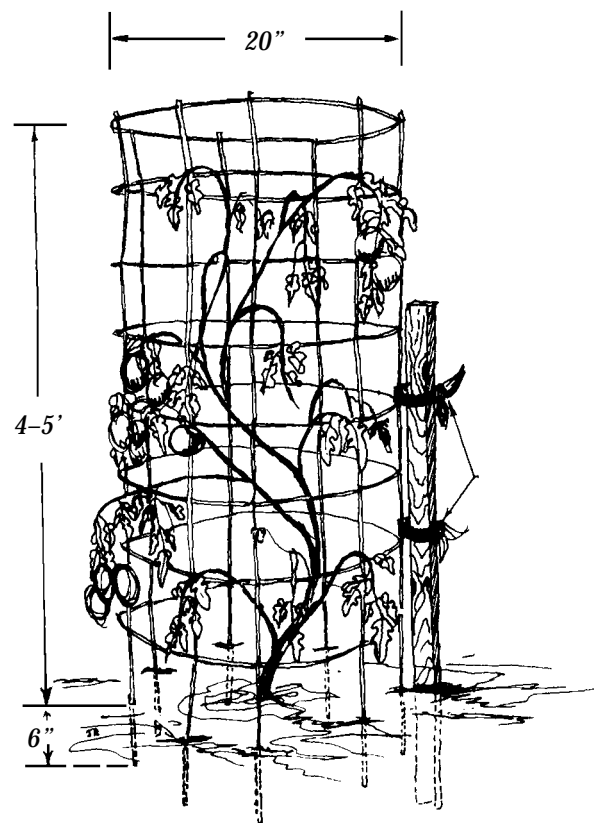


Figure 1. Cut off bottom horizontal wire and stick resulting prongs into the ground approximately 6 inches.

as much phosphate as nitrogen. Use 2 to 3 pounds per 100 square feet of garden area and water well.

In extreme summer heat, blossom drop may be common. At temperatures above 90°F and with low humidity, poor pollination causes blossom drop and poor fruit set. Blossom-set type hormone sprays have not been effective in reducing blossom drop under these conditions.

Harvest

Tomato fruits do not turn red when temperatures are above 95°F. In extreme summer heat, fruits allowed to ripen on the vine may be yellowish-orange. For optimum color development, it is advisable to pick tomatoes in the pink stage and allow them to ripen indoors. About 70°F is ideal, and light is not necessary. After tomatoes have ripened, they may be stored in the refrigerator for several weeks until needed.

Just before frost, remove green tomatoes from the vines, detach stems, and wipe with a soft cloth. Wrap each tomato in newspaper or waxed paper. Store in a cool, dark place at 55 to 60°F, checking frequently to remove decaying or damaged fruit. As the fruits begin to turn, remove them and continue ripening at 70°F. Using this technique you should have ripe tomatoes until Thanksgiving or Christmas.

Common Tomato Problems

Leaf curl. This curling or rolling of the leaves occurs in hot weather or after cultivation or severe pruning and does not affect yield or quality. Keep plants well watered,

and do not hoe deeply around plants.

Blossom End Rot. Appearing as a dry leathery patch at the bottom of tomato fruit, this disorder is caused by fluctuations in the soil's moisture supply. Provide uniform watering, use a mulch and do not overfertilize with nitrogen.

Blossom Drop. At temperatures below 60°F or above 90°F, blooms may fall off plants. Spring bloom drop from low temperatures can be reduced by using hormone-type "blossom set" sprays. Avoid excessive nitrogen fertilization.

Cracking. Sudden summer rains or watering after drought may cause fruit cracking. Varieties differ in their tendency to crack, so choose one recommended for Kansas. Pick fruits in the pink stage and allow them to ripen indoors.

Weed Spray Damage. Phenoxy herbicides such as 2,4-D in small quantities may cause twisting and distortion of tomato stems and leaves. Avoid using these sprays close to your garden, and do not allow wind to direct vapors or spray onto your plants. Plants usually return to normal in a few weeks.

Wilts. A sudden wilting and death of the plant may result from this serious tomato disease. Most varieties are resistant, so choose one of these.

Blight and Other Foliage Diseases. Several fungus diseases cause spots or lesions on tomato leaves and fruit. Lower leaves may yellow, die and fall off the plant. These diseases are usually worse in warm, humid weather. A fungicide spray containing maneb, chlorothalonil, difolatan or fixed copper applied at weekly intervals should control this problem. Your local dealer can suggest brand name materials containing these fungicides. A mulch will also help.

Aphids. These small green, yellow, or dark-colored insects are often present on tomato plants. Spray plants thoroughly with malathion, Thiodan, diazinon or rotenone. Sevin will not control this pest. Large numbers of lady bugs, lacewings and other predator insects may control aphids.

Cutworms. Worms cut young tomato plants off at ground level. A paper or aluminum foil collar around each plant may prevent damage. Mix diazinon into the soil just before planting.

Spider Mites. The first indication of these tiny, difficult-to-see insects is a pale stipple or small white spots on leaves. Later, leaves shrivel and turn brown, and a fine webbing is often seen on undersides of leaves. Early treatment is crucial. Use kelthane, malathion or insecticidal soaps, covering plants completely, especially the undersides of leaves.

Fruitworms. These green or brown worms with light-colored heads bore into tomato fruits. Use Thiodan or Sevin.

Tomato Hornworms. This large green worm with a horn or tail eats large amounts of tomato foliage. Remove by hand picking. Use *Bacillus thuringiensis* (BT), Sevin or Thiodan for control.

Stink Bugs. These green or brown shield-shaped insects suck juices from fruits causing white "cloudy spots" beneath the skin. Use Sevin or Thiodan on the fruit.

Additional References

Contact your local Extension office for related publications.
Vegetable Garden Planting Guide, MF-315
Pest Control in Vegetable Gardens, C-595
Recommended Vegetable Varieties, L-41
Kansas Garden Guide, S-51

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Marr, Tomatoes, Kansas State University, April 2003.