

Home Gardening Series

Tomatoes

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Vegetables

Environment

Light – sunny
Soil – well-drained loam
Fertility – medium-rich
pH – 5.8 to 7.2
Temperature – warm
Moisture – moist

Culture

Planting – transplant after danger of
frost or midsummer
Spacing – 18-24 x 48-72 inches
Hardiness – tender, frost sensitive
Fertilizer – heavy feeder

Tomatoes – *Lycopersicon esculentum* - Perennial

Tomatoes belong to a group of plants in the nightshade family. Its edible relatives include Irish potatoes, eggplant, peppers and tomatillos. Tomatoes originated in the Peru-Ecuador area and spread northward in pre-Columbian times to Mexico, where they were first domesticated. Spanish explorers carried the plants to southern Europe, where they were first eaten, before being utilized by the people of northern Europe and the United States. For many years, they were considered poisonous and were grown only for ornamental purposes under the names “tomatl,” “love apple” or “pomme d’amour.” The name *tomate*, or *tomata*, was adapted from the Aztec word *tomatl*. Early tomatoes were remarkably similar to those grown today.

Tomatoes are easy to grow. A few plants provide an adequate harvest for most families. The tomato plant is



a tender, warm-season perennial that is handled like an annual in summer and fall gardens.

Today, 95 percent of all American gardeners grow tomatoes; they are the most popular garden vegetable in Arkansas. According to the U.S. Department of Agriculture, four out of five people prefer tomatoes to any other homegrown food. Tomatoes rank number one in terms of their contribution of nutrients to the American diet, simply because we eat a lot of them.

Cultural Practices

Cultivars

Hundreds of cultivars of tomatoes are now available for the home gardener. They range widely in size, shape, color, plant type, disease resistance and seasons of maturity. Catalogs, garden centers, Web sites and greenhouses offer a large selection of tomato cultivars, and selecting the best one or two cultivars can be extremely difficult. Choose the cultivars best suited for your intended use and method of culture. Small-fruited

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Cultivars

Crop	Cultivar	Days to Maturity	Plants Per 100 Feet of Row	Disease Resistance or Tolerance	Remarks
Red Tomatoes	Better Boy	72	50	F, V, RKN	Globe-shaped fruit, vigorous plant growth with good production, indeterminate vine.
	Celebrity	70	50	V, F, TMV, N	AAS winner, crack resistant, determinate vine, large firm fruit.
	Mountain Pride	77	50	F, V	Hybrid, determinate vine, deep red fruit, crack resistant.
	Big Beef	80	50	F, V	AAS winner, indeterminate fruit up to 2 pounds. Outstanding taste.
Pink Tomatoes	Bradley _{AR}	75	50	F	Smooth pink fruit, crack resistant, indeterminate vine.
	Pink Brandywine	78	50		Deep pink skin, red flesh, indeterminate. One of the best-tasting tomatoes.
	Arkansas Traveler 76 _{AR}	76	50		Crack-free, 6 to 8 ounces. Pink fruit are mild and juicy.
Paste Tomatoes	Viva Italia	80	50		Determinate plants produce lots of red, 3-ounce, paste-type fruit. Great fresh or cooked.
	Plum Dandy	82	50	EB, F1, V	Roma tomatoes, compact, determinate plants, red fruit, good fresh or cooked.
Yellow	Lemon Boy	72	50		Seven-ounce lemon-yellow fruit with mild flavor, very productive hybrid.
Patio/ Container Types	Husky Red, Gold and Pink Cherry	65	50		Hybrid, dwarf, indeterminate, good container/patio type.
	Lizzano	50		LB	AAS winner. Semi-determinate with a low growing habit for containers and uniform growth habit.
Small Fruited	Large Red Cherry	72	50		Good quality, small, round fruit, indeterminate vine.
	Super Sweet 100	50			Dependable production.
	Juliet	65	50		AAS winner, grape tomato clusters of sweet fruit.

Abbreviations: **EB**: Early Blight; **LB**: Late Blight; **F**: Fusarium Wilt; **N**: Nematodes; **RKN**: Root-Knot Nematode; **TMV**: Tobacco Mosaic Virus; **V**: Verticillium Wilt. **(R)**: Resistant; **(T)**: Tolerant; **AAS**: All-America Selections®

cultivars, such as cherry tomatoes, set fruit during periods of high temperature that limit fruit production of the large-fruited types. Container and patio cultivars are popular where space is limited. Their ornamental value is considered as important as fruit quality. They have red or golden fruit and are not suitable for pruning. Many heirloom tomato cultivars such as Brandywine, Oxheart and Marmande are readily available as seeds or plants. It is always fun to try one or two of these and rediscover tomatoes from our past.

Planting Time

Transplanting tomatoes gives them the best start. Start plants five to six weeks before the first frost-free date in your region. Some gardeners transplant tomatoes soon after the soil is prepared for spring gardening when there is a high risk of damage from freezing.

Be prepared to cover early-set plants overnight to protect them from frost. There are many different ways to protect young tomato plants. Some of these methods include hot caps, floating row covers and water-filled plastic cones. For best results, plant when the soil is warm, soon after the frost-free date. Plant development, not the age of the plant, determines when tomatoes bear fruit.

Late plantings may be made in early July for fall harvest and storage. These plants have the advantage of increased vigor and freedom from early diseases. They often produce better-quality tomatoes than a late picking from the spring planting. Time late planting for maximum yield before a killing frost arrives in your region (about 100 days from transplanting for most varieties).

Spacing of Plants

Spacing depends upon the variety and method of culture. Space dwarf plants 12 inches apart in the row, staked plants 18 to 24 inches apart and wire-caged or groundbed plants 24 to 36 inches apart. Place rows 48 to 72 inches apart.

Care

Prior to planting, fertilize with a complete fertilizer at the rate of 1 pound per 100 square feet of row. Apply 8 ounces of a starter fertilizer solution (1 tablespoon of 20-20-20 per gallon) when transplanting. Hoe or cultivate shallowly to keep down weeds without damaging roots. If you wish to maintain your plants for full-season harvest, consider mulching with black plastic or organic materials.

Water the plants thoroughly every two to four days during dry periods. Plants in containers need daily watering. Side-dress with nitrogen fertilizer at the rate of 1 pound per 100 feet of row or 1 tablespoon per plant after the first tomatoes have grown to the size of golf balls. Make two more applications three and six weeks later. If the weather is dry following these applications, water the plants thoroughly. Do not get fertilizer on the leaves.

Staking and Pruning Methods

Many gardeners train their tomato plants to stakes, trellises or cages with great success. Wire cages placed over small tomato plants hold the vines and fruit off the ground. Short cages (3 feet high) usually support themselves when the wire prongs at the bottom are pushed into the ground. Taller cages require a stake, post or wire for support. Large mesh (6 x 6 inch) wire permits easy harvesting. Tomato plants must be tied to supporting stakes or to a trellis because they do not support themselves with tendrils, unlike cucumber plants. Loop ordinary soft twine, cord or cloth loosely around the main stem and tie it tightly to the stake. Tying the stems too tightly injures them. All varieties are not equally suitable for staking and pruning.

Staking involves pruning the plant to either one or two main stems. Tomatoes grown without support develop a bush shape. The small suckers that develop between the axil of the leaf and the stem are removed to develop a vine structure rather than a bush. Drive a wooden stake (1-inch diameter and 6 feet long) into the ground beside the plant and allow it to be loosely attached to the stake as it grows. Do not damage the root system when inserting the stake in the ground. Attach the plant to the stake with twist-ties, soft string, strips of cloth or nylon hosiery. The plant is sufficiently supported if it is attached to the stake at 12- to 14-inch intervals. Continue to remove suckers to prevent the plant from developing more than one or two central stems.

Prune staked or caged tomato plants to stimulate early fruit maturity. Be sure your cultivar is suitable for pruning. To prune the plant properly, remove the shoots (suckers) when they are 1 to 2 inches long. The shoots develop in the axil of each leaf (the angle between the leaf petiole and the stem above it). Pinch the shoots off by hand rather than cut them.

Prune the plants every five to seven days. Be careful not to prune the developing flower clusters that grow from the main stem or to pinch off the growing tip (terminal) of the plant. Remember, the more severely you prune the foliage, the more you limit plant growth (including root development). Double-stem or multiple-stem pruning systems sacrifice some earliness and fruit size for less risk of cracking, blossom-end rot and sunburn. Do not prune cherry tomatoes.

Determinate cultivars stop growing after five to seven clusters of fruit have developed. This type requires less pruning than the indeterminate cultivars. The determinate vine has a repeating pattern of two leaves followed by a fruiting cluster, while the indeterminate vine has a repeating pattern of three or four leaves and a fruiting cluster. The indeterminate cultivars are technically perennial plants because they keep growing until adverse conditions stop their growth. Indeterminate cultivars require more pruning and larger cages or taller stakes.

Harvesting

The tomato is an unusual plant; cell division in the future fruit is nearly over at the time of flowering. A small but fully formed tomato can be seen at the base of the flower as soon as it opens. Further development is largely a matter of cell growth. The tomato reaches full size in 20 to 30 days, about half the length of the total ripening period.

Tomatoes should be harvested when they are firm and changing color. They are of highest quality when they ripen on healthy vines and daily temperatures are about 80 degrees F. When temperatures are higher (90 degrees F or more), the softening process is accelerated and color development is retarded.

During hot summer weather, pick tomatoes every day or every other day. Harvest the fruit when it has a healthy pink color and ripen it further indoors (at 70 to 75 degrees F). Harvest all green, mature fruit in the fall on the day before a killing frost is expected. Wrap the tomatoes individually in paper and store at 55 to 65 degrees F. They will ripen slowly during the next several weeks. Immature green tomatoes may be harvested and used for frying or processed for relish, pickles, etc.

Common Problems

Insects

Tomato hornworms are large (2 to 3 inches long when fully grown) green worms with white stripes on their bodies and a horn protruding from the top of the rear end. They feed on the leaves and fruit and can quickly defoliate a plant. They are difficult to see when small. Pick the worms off or use a suggested biological insecticide, such as Dipel, *Bt* or Thuricide.

Tomato fruitworms are almost sure to be found in the garden. The moth lays the eggs in the terminal growth (top growth of the plant) then the larvae (small worms) hatch and make their way to the fruit. Once a larva is inside the fruit, it's too late to save that fruit. Use the recommended insecticide every seven days.

Stinkbugs attack the fruit and produce small, irregular, cloudy white spots under the skin of the fruit.

Diseases

Verticillium and fusarium wilt are diseases that cause yellowing of the leaves, wilting and premature dying of the plant. These diseases persist in gardens where susceptible plants grow, and the only practical control is resistant (VF) varieties.

Early blight is characterized by dead brown spots that usually start on the lower leaves, spread up the plant and cause defoliation. Upon close inspection, concentric rings can be seen within the spots. Although early blight is most severe on the leaves, it sometimes occurs on the stems. Use fungicide sprays for high yields and quality fruit. Some varieties are more tolerant of early blight than others. Remove diseased leaves from the garden and dispose of them.

Septoria leafspot is characterized by numerous small brown spots on the leaves. The centers of these spots later turn white, and tiny black dots appear in the white center. The disease starts on the bottom leaves and may become severe in wet weather. Use suggested fungicides for control.

Physiological Disorders

Blossom-end rot, a dry, leathery rot on the blossom end of the fruit, is common in homegrown tomatoes. It is caused by a combination of calcium deficiency and wide fluctuations in soil moisture. Severe pruning stresses the plants and increases the incidence of blossom-end rot. Some tomatoes are much more susceptible to this condition than others. Liming the soil, mulching and uniform watering help prevent blossom-end rot.

Poor fruit set of large-fruited tomatoes occurs when night temperatures remain warm, above 72 degrees F, for six hours or more. Cherry tomatoes will continue to set fruit during these warm periods.

Poor color and sunscald occur when high temperatures retard the development of full color in tomatoes exposed directly to the sun. Sunscald appears on the fruit during hot, dry weather as a large whitish area. It becomes a problem when foliage has been lost through other diseases, such as early blight.

diseases – early blight, Septoria leafspot, verticillium and fusarium wilts, late blight, tobacco mosaic virus, bacterial spot, tomato spotted wilt virus

insects – flea beetle, hornworm, pinworm, stink bugs, Colorado potato beetle, fruitworm, aphids, mites, whiteflies, cutworms

other pests – nematodes

cultural – blossom-end rot caused by irregular soil moisture or calcium deficiency, poor color, yellow spots or large whitish-gray spots, sunscald from lack of foliage cover, leaf roll, fruit cracking, irregular soil moisture, black walnut wilt caused by roots of tomato plants coming in close contact with roots of black walnut trees

Harvesting and Storage

days to maturity – 55 to 105

harvest – Harvest when fully ripened but still firm; most varieties are dark red. Place in shade. Light is not necessary for ripening. Mature green tomatoes may be picked, and when desired, ripen fruits at 70 degrees F.

approximate yield (per 10 feet of row) – 15 to 45 pounds

amount to raise per person – 20 to 25 pounds for fresh use; 25 to 40 pounds for canning or drying

storage – green tomatoes – medium cool (50 to 70 degrees F), moist (90 percent relative humidity) conditions, 1 to 3 weeks; ripe tomatoes – cool (40 to 45 degrees F), moist (90 percent relative humidity) conditions, 7 to 10 days

preservation – can, dry or freeze as sauces or in chunks (whole or quartered), peeled

Frequently Asked Questions

Q. What causes the lower leaves of my tomato plants to roll up?

A. Leaf roll (curling of the leaflets) is a physiological condition that occurs most commonly when plants are trained and pruned. Any type of stress can cause leaf roll. It does not affect fruiting or quality, and it is not a disease.

Q. What causes the flowers to drop off my tomato plants?

- A. During unfavorable weather (night temperatures lower than 55 degrees F or above 72 degrees F and day temperatures above 95 degrees F with dry, hot winds), tomatoes do not set fruit and the flowers drop. The problem usually disappears as the weather improves.

Q. What causes the young leaves of my plants to become pointed and irregular in shape? I noticed the twisting of the leaves and stems after spraying the plants for the first time.

- A. Your tomato plants have been injured by 2,4-D or a similar weed killer. Never use the same sprayer for weed control in your vegetable garden you used on your lawn. Drift from herbicides originating one-half mile or more away can also injure tomato plants. A virus disease called cucumber mosaic virus (CMV) can mimic these symptoms.

Q. How often should my tomato plants be fertilized?

- A. Fertilize the garden before planting tomatoes. Apply fertilizer again when fruit first sets. After the first fruit sets, side-dress the plants with additional fertilizer every two weeks. Fertilize plants grown on sandy soils more frequently than those grown on heavy clay soils. A general side-dress fertilizer recommendation is 1 1/2 level tablespoons of a complete fertilizer (10-20-10 or 13-13-13) scattered around the plant and worked into the soil.

Q. What causes large, black spots on the bottom or blossom end of my tomatoes?

- A. Blossom-end rot is caused by improper moisture conditions. This results in a calcium deficiency in the developing fruit. Make sure the soil pH is above 6.0. Maintain uniform soil moisture as the fruit grows. Remove affected fruit. When possible, use calcium nitrate to fertilize the plants.

Q. If tomatoes are picked green or before they are fully mature, how should they be handled to ensure proper ripening and full flavor?

- A. Never refrigerate tomatoes if immature when picked. Place them in a single layer at room temperature, and allow them to develop full color. When fully ripe, place them in the refrigerator where they can be stored for several weeks.

Q. My tomatoes were healthy during the spring and early summer; yet after a rain, they wilted and died very rapidly. I found a white fungal growth at the base of the plant.

- A. This is southern blight, a soilborne fungus that lives on organic material in the soil. Deep burial of undecomposed organic material in the soil reduces this problem. Control foliage diseases of

tomato plants, because the fallen leaves around the base of the plant feed the fungus and allow it to build up near the plant and cause damage. Crop rotation also reduces the incidence of southern blight.

Q. My tomato plants wilted rapidly. When I cut the stem open, I found a brown ring around the inside.

- A. This is fusarium wilt caused by a soilborne fungus that attacks tomatoes and other crops. Use resistant varieties to control this disease. Most commercial tomato varieties are resistant. Before you plant a cultivar, make sure it is resistant to fusarium wilt. This resistance is denoted by the letter F after the name; for example, Celebrity VFN.

Q. The lower foliage on my tomatoes is beginning to turn yellow and drop. The leaves have circular dark brown to black spots.

- A. This is Alternaria leaf spot or early blight, a common problem on tomatoes that causes defoliation usually during periods of high rainfall. Plant tomatoes on a raised bed to improve water drainage, and space them so air can move to dry the foliage and prevent diseases. Start a fungicide spray program when the fruit is set and continue at one-week intervals during the growing season until harvest. Use a fungicide such as Daconil approved for home garden use.

Q. The foliage on my tomatoes is covered by small circular-shaped spots that cause it to turn yellow and drop off. This occurs in all seasons and is on the top and bottom leaves.

- A. Several types of leaf spots attack tomatoes. Septoria leaf spot quite often starts at the bottom of the plant and rapidly spreads. It can be controlled with a fungicide spray. Begin the spray program early in the life of the plant.

Q. What causes my upper tomato leaves to turn yellowish and fall off?

- A. Many conditions may cause these symptoms, including spider mites, diseases and nutrient deficiencies. Examine the underside of the leaves for small, red to greenish mites. If you find mites, treat with two to three applications of insecticides at five-day intervals.

Q. How do you select good transplants at nurseries or garden centers?

- A. First, select the right cultivar. Look for plants that appear healthy, dark green in color and do not have any spots or holes in the leaves. The ideal tomato transplant should have five leaves and no flowers. Avoid tall, spindly plants with weak stems and leathery purple leaves.

Q. What causes some of my early tomato fruit from the spring garden to be oddly shaped and of poor quality?

- A. This condition is usually caused by stress and low temperatures during flower formation, bloom and pollination. Fruit set when temperatures are 55 degrees F or below often are odd-shaped and of poor quality. The blooms are abnormal because of temperature conditions and grow into abnormal, odd-shaped fruit. Another name for this disorder is catfacing.

Q. My tomato fruits have small yellow specks on the surface. When the fruit is peeled, those yellow specks form a tough spot that must be cut off before eating the tomatoes. What is wrong?

- A. The yellow speckling is caused by injury from sucking insects such as stinkbugs or leaf-footed bugs. Early control of sucking insects that feed on the fruit is necessary to reduce the problem.

Q. Will tomatoes become fully ripe and red if they are harvested early?

- A. Yes. Fruits harvested at the first blush of pink will ripen fully. A tomato picked at the first sign of color and ripened at room temperature will be just as tasty and colorful as one left to fully mature on the vine. Picking tomatoes before they turn red reduces bird and squirrel damage.

Q. My tomato plants look great. They are dark green, vigorous and healthy. However, flowers are not forming any fruit. What is the problem?

- A. Several conditions can cause tomatoes to not set fruit. Too much nitrogen fertilizer, nighttime temperatures over 75 degrees F, low temperatures below 50 degrees F, irregular watering, insects such as thrips or planting the wrong cultivar may result in poor fruit set.

Q. Are there really low-acid tomato varieties?

- A. Some varieties are less acidic than others. Some yellow-fruited types are slightly less acidic than the normal red varieties. Flavor differences between varieties are not because of differences in acid content but the sugar-to-acid balance. Cherry tomatoes are higher in both sugar and acid levels.

Q. When caging tomatoes, how large are the cages?

- A. The diameter of the cage should be at least 18 to 20 inches at the top. Smaller cages often restrict

plant growth and reduce yields. Height of the cage varies, but generally 3 1/2 feet is sufficient for the recommended varieties. However, with vining types such as Better Boy or Cherry Grande, a cage 5 feet in height is preferred. Whatever cultivar, a cage 3 1/2 feet tall is sufficient for most fall garden tomatoes.

Q. What causes a tomato fruit to crack? What can I do?

- A. Cracking is a physiological disorder caused by soil moisture fluctuations. When the tomato reaches the mature green stage, reduce or cut off the water supply to the plant as the tomato begins to ripen. At this time, the skin around the outer surface of the tomato becomes thicker and more rigid to protect the tomato during and after harvest. If the water supply is restored after ripening begins, the plant resumes translocation of nutrients and moisture into the fruit. This causes the fruit to enlarge, and the skin splits around the fruit resulting in cracking. The best control for cracking is a constant and regular water supply. Apply a layer of organic mulch to the base of the plant. This serves as a buffer and prevents soil moisture fluctuation. Some varieties are resistant to cracking, and we try to recommend these varieties.

Q. My tomato plants are stunted and have pale yellow foliage. The root system has knots or swelling on the roots.

- A. These are root-knot nematodes. Some varieties such as Celebrity and Better Boy resist this problem. It is best to use only nematode-resistant varieties. Nematode resistance is shown by the letter N after the name; for example, Celebrity VFN.

Q. We planted tomatoes in our small garden. They are loaded and are the best tomatoes we have ever had; however, there are some small holes near the stem end of the tomato. When we cut the tomato open, there is a small worm inside. What is it and what can we do?

- A. Your fruit has been invaded by the tomato pinworm. They usually do not damage all fruit and can be controlled only by a preventive insecticide spray every 7 to 10 days. When the damage is evident, it is too late to do anything about it.