



Growing Tomatoes in West Virginia

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Many home gardeners choose to grow tomatoes because they are relatively easy to grow, only require a small space and bear a lot of fruit on each plant – 10 to 15 pounds or more. Vine-ripened tomatoes can be picked at their peak ripeness and are delicious whether you eat them fresh, cook them or can them.

The tomato (*Solanum lycopersicum*) belongs in the nightshade family (*Solanaceae*). It is a perennial plant in tropical climates but is grown and cultivated as an annual plant in West Virginia. Native to Central and South America, the tomato started to show up in European cuisine in the 16th century, but as a member of the nightshade family, it was thought to be poisonous and did not become popular until the 18th century.

Cooking

Prepare by removing green stems and rinsing under running water. Eat tomatoes raw or cooked – baked, broiled, grilled, sautéed or even microwaved. Tomatoes have many culinary uses. They are rich in vitamins A and C, low in calories and an excellent source of lycopene – the pigment that makes tomatoes red, which has been linked to the prevention of many forms of cancer.



Varieties

There are several kinds of tomatoes available, ranging from new hybrids to tasty heirlooms. Varieties exist to suit every climate, garden site and taste. Timing for fruit set goes from 55 to 90 days. The height of tomato plants also can range from as small as 8 inches to as big as 25 feet. Fruit sizes and shapes also vary widely from cherry-size to larger than softballs and from brilliant reds and yellows to dark reddish purple to black.

Another thing to consider is the grow habit of the variety. Determinate tomato plants grow to a certain height and then stop flowering. They flower and set their fruit within a relatively short period of time. Some determinate varieties will set a second crop of tomatoes later in the season. Indeterminate tomato varieties grow, flower and set fruit over the entire growing season. The vines continue growing throughout the season, too, so these varieties should be staked, caged and pruned.

When selecting varieties, home gardeners should consider yield, timing of fruit set, disease resistance and potential for fruit splitting or cracking. Some varieties grow and produce better than others in our short growing season and weather conditions. The varieties selected to be grown are often based on how they will be used. Slicing or chopping tomatoes will be different varieties than canning paste or juice tomatoes, and cherry or pear-shaped tomatoes are different from old-fashioned heirloom varieties grown for their exceptional flavor or unusual appearance.

Resistance to diseases, weather and other disorders can be another important consideration, especially if problems have occurred in the past.



Many hybrid varieties of tomatoes will be followed by one or more letters indicating resistance to verticillium wilt (V) or fusarium wilt (F) diseases, nematodes (N) and tobacco mosaic (T), for example. Some varieties are less likely to experience cracking and yellow shoulders. There are heirloom tomato varieties from West Virginia that have excellent flavor. The seed from heirloom varieties can be saved for future gardening seasons.

Most gardeners do not raise their own tomatoes from seed and may be limited to those varieties offered by local garden centers. Popular and common varieties that seem to grow well in West Virginia include:

| Variety | Days to Maturity | Description |
|------------|------------------|---|
| Brandywine | 85 | Heirloom; indeterminate red/pink/yellow/black; superb flavor and luscious shade of red pink; large, beefsteak-shaped fruits grow on unusually upright, potato-leaved plants; fruits set one or two per cluster. |
| Brandy Boy | 78 | Hybrid indeterminate heirloom-type of the classic Brandywine; has the benefits of an heirloom (incredible taste and smooth, thin skin); loads of large, 5-inch pink fruits. |
| Celebrity | 72 | Hybrid determinate, which indicates that vines are short and bushy not lending themselves to staking; fruits are firm and red, weighing 7 to 8 ounces; plants are highly productive. |
| Big Beef | 75 | Hybrid indeterminate; greater range of disease resistance than many others; fruits are smooth and red, weighing 10 to 12 ounces and are produced abundantly. |
| Early Girl | 57 | Compact plant for container; one of the earliest varieties available; bears medium-sized fruit of 4 to 6 ounces in abundance on indeterminate plants; best-suited as a companion variety to provide early tomatoes. |
| Patio | 70 | Compact plant for container; hybrid that produces delicious, approximately 4-ounce fruits with attractive dark green rugose foliage; easy to grow in pots, containers and small gardens. |
| Rocky Top | 70 | Early-season slicer; produces high yields of 7- to 8-ounce, bright red, round, smooth fruits in clusters; rich, acidic, more than satisfying flavors; great vigor and disease resistance. |

| Variety | Days to Maturity | Description |
|---------------------|------------------|---|
| Mt. Fresh Plus | 79 | Hybrid determinate; produces good yields of 8 to 12 ounces; sweet, very firm, smooth and flavorful; good foliage protecting fruit from sun scald. |
| Red Morning | 70 | Hybrid determinate; early maturing, large, red, round fruit on improved determinate plants that offer good cover; deep red fruit with smooth shoulders; exceptional quality and disease resistance. |
| Mortgage Lifter | 80 | Red/pink heirloom beefsteak; a West Virginia heirloom with excellent flavor; indeterminate growth habit; susceptible to cracking if not properly mulched. |
| Kellogg's Breakfast | 85 | Yellow heirloom beefsteak; very sweet paste tomato with excellent yield and disease tolerance; indeterminate growth habit. |
| San Marzano | 80 | Excellent for sauce-making; bright red with elongated shape, similar in appearance to a Roma but thinner with a more pointed tip. |
| Amish Paste | 85 | Roma type; bright red, heart-shaped fruits with meaty, juicy texture; classic for paste; flavorful and juicy enough for slicing with great meatiness for cooking down; very few seeds, which make sauces and pastes bitter. |
| Sweet Treats | 65 | Cherry (pink) type; vigorous, indeterminate variety that yields hundreds of small cherry tomatoes with incredible flavor; bite-sized fruit are borne in grape-like clusters and are widely known for their sweetness. |

How Much to Grow

A family interested in having only fresh fruit should plant three to five plants per person. If growing for processing, then plant five to 10 plants per person.

To get best results with only a few plants and minimal trouble, purchase plants from a local greenhouse or nursery at the proper planting time.

If a relatively large number of plants are needed, the plants may be started from seeds in a good, porous seeding mix.

Seedlings and Transplants

Because of their long growing season and temperature requirements, tomatoes must be started indoors six to eight weeks before being permanently moved into the garden. When purchasing tomato seedlings, select stocky plants with thick, straight stems and bright green leaves. The ideal transplant is less than 6 inches tall and as broad as it is high. Do not choose tall, lanky plants or large, well-established plants with flowers or fruits already visible.

Plants may be started from seeds in a seed-starting mix. When seedlings are large enough to handle, transplant them into individual containers or bedding plant packs for stocky development. Give them plenty of light.

If kept in the house, expose the plants to a south or west window, and rotate them regularly to give uniform growth. Daily temperatures should be kept below 80 F but not lower than 50 F.

Plants growing in cell packs or individual containers, such as Jiffy pots, are better choices than those growing in flats, as their roots will suffer less transplant shock. Seedlings should be free of insects and visible signs of disease.



Hardening off

Whether your plants are purchased or homegrown, harden off tomato seedlings before transplanting into the garden. About 10 days before transplanting, set plants outdoors for a few hours each day to gradually acclimate them to outdoor conditions. Start by setting plants in filtered light in a setting protected from strong breezes. Each day prolong the period the tomato seedlings spend outdoors, gradually exposing them to direct sunlight and wind. Remember that seedlings lose water much more rapidly outdoors than inside and will need more frequent watering during the hardening off process.

Bring plants indoors at night and on days when temperatures fall below 55 F. Below this temperature, tomatoes experience chilling injury, which can delay their growth and may cause a condition called catfacing on early fruit.

Transplanting

Wait until danger of frost has passed and soil temperatures have warmed to about 60 F before setting tomatoes into the garden. Mother's Day weekend is usually a safe time for transplanting tomatoes, though some northern West Virginia gardeners or those located in higher elevations may need to wait a week or two later. Of course, all West Virginia home gardeners need to beware of occasional late frosts and freezes through the end of May.

The ideal spacing for tomato plants depends on the growth habit of the variety and whether plants will be pruned.

- Staked or caged plants: 18 to 24 inches between plants in rows at least 5 feet apart
- Unstaked determinate plants: 12 to 24 inches between plants in rows 4 to 6 feet apart
- Unstaked indeterminate plants: 2 to 3 feet between plants in rows 5 to 7 feet apart

Use a trowel to dig a hole about twice the size of the tomato seedling and its root ball. Set the seedling into the ground at the same level as it grew in its container. Tomatoes also can be planted relatively deep by planting the stem up to the first leaves on the transplant, which encourages more root development. If only leggy plants are available, plant them at about a 30-degree angle in a trench long enough to leave only the top 5 or 6 inches of the plant exposed. Roots will develop along the buried portion of the stem. If seedlings are growing in peat pots, peel back the rim of the pot so the entire pot is buried below the soil surface, because an exposed peat pot will wick moisture from the soil and dry out transplant roots.

To reduce transplant shock and speed up establishment of the tomatoes, water well in the garden with a complete soluble fertilizer, such as 20-20-20, at the rate of 1 to 2 level tablespoons per gallon of water. Apply approximately 1 cup of a fertilizer solution around the roots after placing the plant in the hole. If cutworms have been an issue in the past, guard the plant base with a wax paper collar about 3 inches high – 2 inches above the ground and 1 inch below.

Planting and Maintenance

Selecting growing area

Tomatoes grow best when they receive full sun. Plant them away from trees and buildings to get highest yield. A tomato plant needs a lot of water so arrange for easy watering. Select a well-drained area, because poor soil aeration leads to root loss and physiological problems, such as blossom end rot. Tomatoes should be rotated with botanically unrelated plants for at least two years to prevent pest buildup. Do not rotate tomatoes with vegetables botanically related to them, such as peppers, eggplants, potatoes or tomatillos.



Preparing soil

Tomato plants grow well in many types of soil. Work the soil only when it is dry enough so it will not stick to tools. Improve garden soil by adding organic matter, such as peat moss, leaf mold, well-rotted manure or compost. Tomatoes grow best in nearly neutral soil with a pH of 6.5 to 7.0. If soil test results indicate the need for lime, add it in late fall or early spring.

Fertilizing

Add a complete garden fertilizer at the time the soil is prepared. For tomatoes, use a fertilizer low in nitrogen (N), high in phosphorous (P) and medium to high in potassium (K). Among the best analyses for tomatoes are 8-32-16 and 6-24-24.

Use a maintenance rate of 1 pound per 100 square feet after the proper fertility level has been developed from previous soil tests and fertilizations. If only 5-10-5, 5-10-10 or similar analyses are available, apply 2 pounds per 100 square feet. All fertilizer should be worked well into the top 6 inches of soil.

Staking

Staking improves marketable yield, fruit set and fruit quality, and it also makes harvesting easier. Staked plants are less likely than unstaked plants to get diseases. Stakes can be made

from a 6-by-1-by-2 piece of wood, pointed at one end. Place it firmly into the ground about 4 inches from the plant at time of transplanting. Metal T-posts or cattle panels make an excellent trellis for tomatoes. Use soft cord or twine for tying plants to the stake, allowing at least ½ inch slack for stem enlargement.

Many gardeners prefer to support tomato plants in cylindrical wire cages. Mesh should be wide enough for a person's hand to fit through to pick fruits. This method saves time required for staking, pruning and tying.

Pruning

Pruning, or selectively removing some of the tomato plant growth, can improve harvestable yields and prolong the harvest season. It also can help reduce some disease problems.

Some early-season determinate varieties may not require pruning. However, large vine indeterminate varieties benefit from the removal of some of their axillary or side shoots (i.e., suckers), or from being topped to prevent plants from becoming too bushy and tall.

Less pruning is required when plants are grown in cages. Break out only enough shoots to allow good light and air movement through the cage. If you plan to use stakes or cages, install them at planting time rather than later when the plants' roots are established.

Watering

An even moisture supply throughout the time the fruit is developing helps prevent a condition called blossom end rot, as well as for supplying the water needed to develop the fruit. Too much (or too little) water at any one time may cause ripening fruit to split or crack.

A tomato fruit is 95% water, so tomatoes need a lot of water to grow and develop fruit. They should receive 1 to 2 inches of water a week. If this amount is not received as rainfall, then supplemental irrigation is necessary.

Soak the soil thoroughly when watering. Frequent light watering will encourage a weak root system. Mulching with straw, clean hay, compost, paper or plastic will reduce soil water evaporation and reduce fruit splitting or cracking. Plants growing in small containers may need daily watering.

Side-dressing

Fertilizer applied at the time of planting will not supply enough nutrients for the entire season. Too much nitrogen in the beginning results in lush vegetative growth and poor fruit set.

Apply the first side-dressing when the first fruits are about one-third grown. Apply ½ pound of actual nitrogen per 100 feet of row. This is equivalent to 5 pounds of 10-10-10 fertilizer. Calcium nitrate is an excellent fertilizer to apply as a side-dress. About 3½ pounds of calcium nitrate can be side-dressed per 100 feet of row. Mix the fertilizer carefully into the top inch of soil. Don't get fertilizer on the foliage.

Apply the second side-dressing two weeks after picking the first ripe fruit. Make a third application a month later. Water-in the nitrogen if rain is unlikely.



Harvesting

For optimal flavor, tomato fruits should be allowed to ripen fully on the vine but harvested before they begin to soften. Tomato color and flavor are optimal when average daily temperatures are about 75 F. High temperatures (greater than 92 F) during ripening reduce fruit flavor, texture and color. Fruit exposed to high temperatures develops internal white tissue and yellow color on the fruit surface. Thus, it is important to have good vine growth, which partially shades the fruit from intense sunlight. If picked before it is fully ripe, tomatoes will finish ripening on your kitchen counter. Light is not necessary for ripening mature tomatoes.

Storage and preservation

Do not refrigerate tomatoes after harvest. Flavor and quality are preserved by holding the fruit at room temperature.

Mature green fruits can be harvested in the fall and held for later use. Select fruits free of disease, wrap them in paper and store them at about 60 to 65 F. They will ripen slowly and provide good tomatoes for several weeks.



Container Growing

Where space is limited or conditions are not suitable for tomato culture, tomatoes may be grown in containers. Although any large container will work as long as it provides adequate drainage, a general recommendation is to plant one tomato plant per 4- or 5-gallon container. Grow containerized tomatoes in artificial potting mix; do not use regular garden topsoil or homemade compost. Pay special attention to water and fertilizer needs, as container-grown tomato plants have no access to the deep soil reservoir of water and nutrients. Most containerized tomato varieties require a stake, trellis or other support.



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Low and High Tunnel Growing

Commercial farmers often grow tomatoes in unheated, solar greenhouses called high tunnels. Keeping the plants under cover keeps the leaves drier, which reduces leaf diseases that are common problems, such as early blight and Septoria leaf spot.

Growing tomatoes within tunnels facilitates early and late harvest of tomatoes in West Virginia, with harvest starting as early as May and continuing until early December. Growing tomatoes under cover also can increase crop yields and quality, while allowing you to work on the crop in inclement weather.

Inexpensive temporary tunnels, sometimes called caterpillar tunnels, are one way to create such a cover for tomatoes. This strategy may be worth considering if you have a history of crop losses from diseases.

Common Problems

Weeds

Many weeds carry diseases that can seriously affect tomato plants when transmitted by insects or man. Weeds also may harbor harmful insects and compete with tomato plants for light, soil moisture and nutrients.

Use mulches to avoid a lot of hoeing and hand-weeding. Hay, straw, grass clippings, paper, compost or plastic can be used as mulches for tomatoes. Mulches retain soil moisture, raise soil temperature during the early part of the season and help stabilize soil temperatures throughout the summer. Black plastic warms the soil and is very beneficial for early plantings. Organic mulches offer the same moisture-retaining, weed-suppressing and fruit-protecting advantages as plastic and eventually decompose, adding to the soil's supply of organic matter. Tomatoes can be mulched with a thick organic mulch of straw, pine needles or leaves, spread 2 to 4 inches thick around plants to prevent weeds from emerging. Because organic materials delay soil warming, wait until the soil is thoroughly warm before applying these mulches.

Insect pests

Insect pests are common problems for tomato plants. Insects that are most problematic include flea beetles, cutworms, hornworms and stink bugs. Control measures include floating row cover times at pest emergence to organic sprays to insecticides, depending on the pest.

Diseases

Fungal diseases such as Septoria leaf spot, early blight and late blight also are common on tomatoes. The fungi that cause Septoria leaf spot (*Septoria lycopersici*) and early blight (*Alternaria solani*) overwinter on plant debris in the soil. Both are common

causes of spots on tomato leaves, with symptoms usually beginning on the lower leaves. Septoria is usually more severe because it can eventually cause the plants to be defoliated and also causes spotting on the stems and petioles. Late blight (*Phytophthora infestans*) does not overwinter in the soil; it arrives via storms each year, usually late in the season. If you suspect fungal diseases are affecting your tomato crops, it is important to identify the disease in order to manage the disease effectively.

Tomato diseases like bacterial speck and spot, early blight, fusarium wilt, anthracnose, Septoria leaf spot, tobacco mosaic virus, curly top virus and verticillium wilt can be avoided or limited by selecting resistant varieties.

Many of the following disorders are quite common and should be readily recognized: blossom end rot, catfacing, cracking, cloudy spots, flower drop, leaf roll, sunscald, chemical injury and walnut toxicity. These disorders are not caused by insects or disease. Little can be done for most of them, but the fruit may be eaten if affected portions are removed.



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