

NB YEAR OF THE TOMATO

Tomato Facts:

The tomato's wild relatives originated in South America, most likely in the Andes Mountains, but the fruit was not cultivated by the Andean people. Instead, it traveled over 2,000 miles north of its center of origin to Central America where the pre-Mayan people grew and domesticated the plants, naming them xitomatl. The cherry-sized fruits of *Solanum lycopersicum* var. *cerasiforme* can still be found growing wild in the coastal mountains of Peru, Ecuador, and northern Chile. Hernán Cortés and his explorers are credited with finding the tomato in an Aztec market around 1520 and transporting the seed to Spain. From there, the tomato traveled throughout Europe and across the channel to England.



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The earliest written records of the tomato are in herbal books. Botanists placed it in the nightshade family, which includes many poisonous plants. "This plant is more pleasant to the sight than either to the taste or smell because the fruit being eaten provoketh loathing and vomiting," wrote an English country doctor in 1600. Needless to say, tomatoes were not a popular food in England at that time. Gardeners grew them for curiosity, and, according to the botanist for King Charles I, "for the amorous aspect or beauty of the fruit."

Colonialists brought many plants from Europe to the New World, and the tomato was one of them. Thomas Jefferson raised them as ornamental plants at Monticello in 1781, but it wasn't until the 1800s that people in North America began to relish tomatoes as food. Legend has it that Colonel Robert Gibbon Johnson staged an event in 1820 that changed public opinion. In Salem, New Jersey, so the story goes, the Colonel set out to eat a basketful of tomatoes at the local courthouse in front of an audience that had gathered to watch the writhing spectacle of his death. He survived, of course, and the tomato was embraced. Over the years this account has been embellished and enshrined, but never verified. It is, however, a proven fact that cookbooks of the time contained recipes for tomato ketchup, relishes, and soups.

In 1880, James Vick's Flower and Vegetable Catalog of Rochester, New York listed six types of tomato seeds. In that same decade Alexander Livingston of Livingston Seed Co. introduced 'Golden Queen', described in W. Atlee Burpee's 1888 Farm Annual catalog as "handsome yellow slices making a beautiful contrast in dish with the red tomatoes." Burpee listed twenty-one other tomato varieties for sale that year as well. A select few tomatoes from that era, including 'Acme', 'Paragon', and the revered 'Brandywine', can still be grown today. These and thousands of other tomatoes are known as heirloom tomatoes, loosely defined as varieties that have been in circulation for more than 50 years. Open pollinated tomatoes, which include heirlooms and all other varieties that grow true from seed, remain popular with home gardeners. Saving and sharing seed of the many unique tomato varieties is a labor of love for many gardeners who, along with organizations such as Seed Savers Exchange, help to maintain the genetic diversity of the species.

The modern age of the tomato was ushered in by Dr. Oved Shifriss, who bred 'Big Boy', one of the first F1 hybrids. Offered by W. Atlee Burpee in 1949, this meaty 1 lb. tomato is still sold today. The early ripening red tomato was an instant success for Burpee. Thousands of hybrids succeeded it, offering gardeners desirable traits such as earliness, crack-resistance, and compact habits. Continued breeding efforts have produced more healthful tomatoes with increased lycopene, and plants with multiple disease resistances. Modern tomatoes tolerate diseases caused by *Fusarium* and *Verticillium* fungi, nematodes, and viruses, and breeders expect that blight-tolerant hybrids will be available in the near future. These tolerances make it easier for gardeners and farmers to grow tomatoes without using pesticides.

Nomenclature

The botanical name for tomato has changed several times. For many years its name was *Lycopersicon* or literally, wolf peach. When the tomato was placed in the nightshade (*Solanaceae*) family, the botanical name changed to *Solanum lycopersicum*.

Classifications

Tomatoes are classified in a number of different ways, including fruit shape, days to maturation, and color. From smallest to largest, popular fruit shapes are identified as cherry, plum, standard, and beefsteak. Cherry tomatoes, which range from ¼ to one ounce, are produced in clusters. Plum tomatoes are shaped as the name implies and generally weigh between 2 and 6 ounces, although they can be twice that. Also known as paste tomatoes, they have meaty interiors and thick fruit walls. Standard-sized tomatoes weigh anywhere from 4 to 16 ounces and are round, while beefsteaks, which can be 2 pounds or more depending upon variety, are usually oblate. Grape, currant, and saladette are relatively recent tomato types. Currant tomatoes are only about half the size of cherries; grape tomatoes, oval-shaped fruits that pop in your mouth, appeared on the scene in the late 1990s. Two- to three-bite saladettes, such as the 1999 AAS (All America Selections) winner 'Juliet', are larger than cherry but often smaller than plum tomatoes.

Tomatoes are also categorized by maturity date. The number of days to maturity means the average number of days from planting outdoors to the first ripe fruit. Early tomatoes, generally speaking, are those that ripen in fewer than 70 days from transplanting; mid-season tomatoes ripen in 70 to 80 days; and late types require over 80 days.

Fruit colors range from creamy white through lime green, to pink, yellow, golden, orange, and red. Pink, yellow, and orange are milder tasting than most red varieties. Contrary to popular belief, yellow tomatoes are not lower in acids. Rather, it is the balance of acids, sugars, and aromatics that distinguishes the taste of one tomato from another.



TOMATO CULTURE

Growth Habits

Tomato varieties are also distinguished by their growth habits, which may be determinate or indeterminate. Determinate tomatoes are relatively compact, and reach a predetermined height or number of fruit clusters. Each short branch ends in a flower cluster, and plants do most of their growing before setting fruit. Determinate tomatoes tend to ripen all at once, so that the main harvest is concentrated into a few weeks. This may be ideal for gardeners who wish to preserve fresh tomatoes for winter soups and sauces.

Indeterminate tomato plants grow, blossom, and produce tomatoes throughout the growing season. They can reach up to 12 feet tall, and produce many main stems, all of which are capable of flowering and fruiting. As shoot tips continue to grow, flower clusters are borne in the leaf axils of the elongating shoot. An example of an indeterminate variety is 1994 AAS winner 'Big Beef'. To support unwieldy growth and to keep tomatoes off of the ground, the National Garden Bureau recommends supporting plants with cages or stakes. Staked plants should be pruned to remove all but two growing stems, which are tied loosely to the stakes and trained for vertical growth. Because this system allows air to circulate around the plants, it can help prevent disease. Pruning, although not strictly necessary, can produce larger but fewer tomatoes. Suckers (shoots that grow the main stem and the branches) are easily pinched between thumb and forefinger.

There is a third type called semi-determinate which is bushy like a determinate, but will set and ripen fruit over a longer period of time. The 1984 AAS Award Winner 'Celebrity' is a semi-determinate. The best way to grow determinate or semi-determinate plants is to *not* prune and place a cage around the tomato while still small. As the plant grows it fills the cage. Gardeners need only pluck ripe fruit.

Sowing Seed

Many gardeners start their tomato plants from seed, which allows them a much wider choice of tomato varieties than a garden center is likely to offer. Tomato seed should be sown indoors about 6 weeks before the last expected frost date. Use a sterile germination mix as the growing medium, and make sure the planting tray has holes for drainage. Moisten the growing mix and sow the seeds, covering them lightly. Keep the planted tray from drying out by misting or covering gently with newspaper or plastic, and for maximum germination, warm the soil to 70 to 75 degrees F by placing the tray on a heat mat or other warm surface. The seeds will germinate in about a week. Remove the cover when most of the seeds have sprouted and place the seedlings in a sunny location. After they develop at least one set of true leaves, it's time to move the plants to individual pots filled with soilless planting mix. Prick out the seedlings, disturbing their roots as little as possible. Make holes in the medium with a pencil and place each seedling gently in a hole, firming the soil around it. After "resting" in the shade for a day, young plants will need as much direct sunlight as possible—twelve hours a day is desirable—to keep them from becoming leggy. Gardeners often use grow lights to supplement natural sunlight.

Preparing garden soil and hardening off

It is important to harden off tender plants before placing them in the garden by exposing them gradually to the harsh outdoor conditions. Put young plants outside where they will receive morning sun but be protected from wind, and move them inside at night. Continue this for about a week, and then begin to leave them outside on nights when the temperature does not drop below 50 degrees F. After a week or two, the plants should be ready to transplant.

Prepare your garden soil by loosening it deeply with a garden fork. Break large clods of soil into small pieces, and work in compost to improve the texture and add nutrients. If you have doubts about the fertility of your soil, contact your local county cooperative extension office about having a simple soil test done. Soil test kits are inexpensive, and will provide you with a wealth of information.

Planting

Tomatoes are one of the easiest garden plants to grow. They need as much direct sunlight as possible to produce the highest yield. Native to the tropics, tomatoes require warm temperatures for good growth, so wait until the nighttime air has warmed to about 55 degrees F before transplanting them. Planting tomatoes too soon will only slow them down.

The best way to plant a tomato is the trench method. After loosening the soil, dig a trench and lay the tomato plant into it horizontally. Pinch lower leaves off of the stem, and allow the top cluster of leaves to lead out of the trench. Cover the root system and bare stem with soil, gently firming it where the plant emerges, and push a pillow of soil under the top stem to keep it erect. The plant will grow up towards the sun and, because the bulk of the stem is buried at a shallow level, the newly developing roots will warm up quickly. This is a boon to gardeners living where the growing season is short. Be sure to water deeply to encourage deep root growth.

If temperatures drop at night, keep young plants warm with a cloche or other protective cover. Tomatoes are not frost hardy, and will die if exposed to 32 degrees F without protection.



Continue watering regularly for about two weeks until the plants are established. Throughout the growing season remember to water the plants deeply during dry periods for as long as they are setting fruit. Established tomato plants need at least one inch of precipitation per week.

Plant Nutrition

Tomatoes need phosphorus, nitrogen, potash and minor elements. Starting your plants off with an ample shovelful or two of compost will go a long way toward making sure the soil will provide for their needs. It will also aid the soil in holding onto moisture, which will prevent problems such as blossom-end rot. Many gardeners also add a synthetic or organic fertilizer. Some types, such as water-soluble granules or fish emulsion, can be applied when watering. There are also granular forms that can be mixed with the soil before planting or used as a side dressing, and time-release fertilizers, which can be added to the soil at planting time. No matter what kind of fertilizer you use always follow the directions on the label. Do not over fertilize because this will cause lush plants with little fruit set. It's best to select a fertilizer that contains more phosphorus (P) than nitrogen (N) or potassium (K). Phosphorus promotes flowering and fruit set.

Container Culture

Gardeners living in urban environments can grow tomatoes in tubs or large patio containers. For best results select a tomato variety with a compact or determinate habit—compact cherry tomatoes are particularly good for container culture. The container needs to be deep, at least a foot, with drainage holes on the bottom. Use a sterile growing mix, keep the plants evenly watered, and place them so that they receive as much direct sunlight as possible. Feed plants regularly with a water-soluble fertilizer, keeping in mind that nutrients will leach out of the pots faster than garden soil. During periods of hot weather, full-grown plants may need to be watered daily.

Harvest

For the best tomato flavor, allow the fruit to fully ripen on the plant. Wait until it is deep red, yellow, or whatever final color the tomato is to be, because once it is removed from the vine, the supply of sugars is cut off. To harvest, gently twist the fruit so that the stem separates from the vine. Tomatoes are best kept at room temperature, and will store on a kitchen counter for several days. It is absolutely unnecessary to place a ripe tomato in the refrigerator. At the end of the season when frost is predicted, green tomatoes can be harvested and placed on a windowsill or counter. Most will gradually turn red and have some degree of tomato flavor. Placing unripe tomatoes in a paper bag will hasten the ripening process.

There are several long keeping tomatoes that can extend the fresh tomato season. These varieties were bred to retain the tomato flavor for a longer period after harvest.

Growing Problems

Most gardeners successfully grow tomatoes in their gardens without significant problems. Examine plants regularly and notice any difference in leaf color, size, or shape. If you notice holes, it probably means that there are insects eating the foliage. If an unidentified problem develops, take a sample of the leaf or fruit and contact the local cooperative extension office for assistance. The National Garden Bureau recommends rotating tomatoes and other crops in your garden on a three to five year cycle, that is, do not grow the same crop in the same place more often than every third year.

When browsing through tomato seed packets in a store you may notice the letters V, F, N, or T on the description. These letters mean the plant is genetically tolerant of certain diseases or viruses.

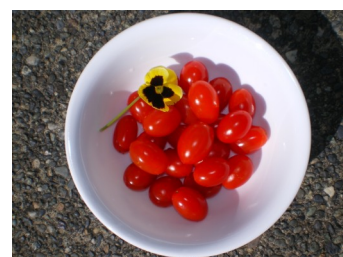
Verticillium Wilt (V) is caused by a soilborne fungus. The symptoms of infection are wilting of older leaf tips, yellowing and browning of leaves in a V-shaped pattern and leaf drop beginning with the older foliage. As the fungus moves throughout the plant, all leaves curl upward and the stunted plant will not respond to water or fertilizer. Cool weather conditions encourage this disease.

Fusarium Wilt (F) is also a soilborne fungal disease. Multiple F's on a seed packet means the variety is resistant to multiple strains of the Fusarium pathogen. This infection commonly occurs when the soil is above 75 degrees F. Plants in light sandy soils, or soils with low pH, are most susceptible to Fusarium wilt. Symptoms of this disease are yellowing, curving and dying leaves; infected plants are stunted and fruits are small or deformed.

Fungal wilts will kill your plants over time. Pull diseased plants out of the garden bed and dispose of them in the trash; composting diseased plant material will perpetuate the problem. Do not plant members of the tomato family, which include peppers, eggplants, and potatoes, in that bed the following year.

Nematodes (N) are tiny worm-shaped animals that live in the soil. Most nematodes are beneficial, but a few, including root knot nematodes, are plant parasites that cause stunted growth, wilting, and dieback. To verify this problem, pull the tomato from the soil. If the roots have growths or galls on them, root knot nematodes are the problem. Be sure to plant resistant varieties in the future.

Tobacco Mosaic Virus (T) is a widespread tomato virus. Weeds harbor the virus and insects that feed on the weeds can transmit the disease to tomato plants. Symptoms are light and dark mosaic patterns on leaves, or yellow mottling. Tobacco, a close relative of the tomato, is the source of the virus, which can



Early Blight and Late Blight also affect tomato plants, sometimes with devastating consequences. Early blight, caused by the fungus *Alternaria solani*, can be recognized by dark concentric rings on older leaves. Although spotted leaves usually die prematurely, the disease will not kill the entire plant. Because the fungus overwinters in residue, be sure to dispose of diseased plants in the trash. Late Blight occurs during cool, moist periods in mid- to late summer. Spores of the fungal pathogen, *Phytophthora infestans*, can blow in and infect plants when conditions are favorable, causing greasy, grayish areas to develop on leaves. Often a white downy mold will also be seen on leaves and fruit. When Late Blight strikes, it can ruin a tomato garden almost overnight. The only thing to do is to remove and destroy affected plants. To prevent blights, avoid crowding your plants, and keep foliage dry by watering the soil, not the leaves.

There are a few minor fruit disorders that gardeners often encounter. One of the most common is blossom-end rot. It begins with tan lesions on the blossom end of the tomato, which eventually enlarge into dark sunken areas. This rot appears during periods of high growth or when soil moisture is alternately high and low. The direct cause is the fruits' inability to take up sufficient calcium. Maintaining uniform soil moisture by watering regularly and keeping a layer of mulch on the soil will prevent this disorder.

Cracking and catfacing occur more in some varieties than others. Changes in conditions, such as high temperatures and moisture levels followed by dry weather, can cause tomatoes to crack near the stem end. Catfacing, caused by incomplete pollination in cold weather, is a malformation of the fruit on the blossom end, and is more common in larger tomatoes such as beefsteaks. To prevent either disorder, choose from among the many varieties that are resistant.

Sunscald, the white, shiny blisters that sometimes develop on a tomato's skin, is caused by exposure to the sun. Keeping foliage robust by attending to the soil and providing the plant with adequate irrigation will reduce the chances of sunscald.

Inspect your plants regularly for insects. The tomato hornworm, a large green caterpillar, can eat through a considerable amount of foliage in a very short time. Fortunately, hornworms are easy to handpick. If you notice one carrying white cottony cocoons on its back, spare it—the cocoons are braconid wasp larvae, the hornworm's chief natural predator. Brown stink bugs can also be a problem. These sucking insects cause cloudy spots on ripe tomatoes. To prevent damage, control weeds in border areas, which can harbor the bugs.

Nutritional Value

Tomatoes provide abundant vitamins and minerals. One cup of cherry tomatoes will provide 25% of daily recommended Vitamin A, 32% of Vitamin C, and a substantial amount of Vitamin K and potassium. Tomatoes are also an excellent source of lycopene, a powerful antioxidant that has been linked to a reduced risk of cancers. For the best tasting, most nutritious tomatoes, grow your own and eat them fresh from your garden.

