

THE TOMATO: THE HEART OF THE GARDEN

As the most popular crop grown by home gardeners in the United States, tomatoes (*Solanum lycopersicum*) are certainly king of the garden. Bragging rights are on the line as we tackle this easy to grow but frustrating crop. The number and variety of tomatoes currently on the market and maintained through personal seed saving is a testament to the importance of this botanical fruit that is most often referred to as a vegetable. Let's look at some tips to be a great grower and how to overcome some of the common problems.

SELECTING TOMATO TYPES AND PLANTS: Gardeners must make two important decisions related to the types of tomatoes. The first decision is related to harvesting. Determinate tomatoes set fruit over a relatively short period of time and thus ripen over a concentrated harvest interval (often four to five weeks) making them ideal for gardeners who want to do canning to preserve their harvest. Indeterminate varieties will grow taller and continue to set and mature fruit through the summer until the first frost of fall. They will require taller stakes to provide good support and reward the gardener by producing over a longer abundance for fresh eating. The second decision, the specific tomato cultivar, is more difficult due to the hundreds of tomato cultivars available to home gardeners. The most important considerations are disease resistance and the gardener's preference in terms of fruit taste, color, size, shape and days to harvest. While heirloom plants have varying degrees of natural resistance to disease, hybrid plants are bred to be tolerant or resistant to specific disease.

SELECTING AND PREPARING THE GARDEN SITE: Tomato production is best carried out in a garden site with medium textured, well-drained soil with a good level of organic matter and supply of nutrients. A soil test is recommended and tomato gardens should have at least a 6.1 soil pH with an optimum target range of 6.5 to 6.8.

FERTILIZATION: Tomatoes are heavy feeders. Your soil test report will suggest fertilization materials and rates according to the balance of nutrients in the soil prior to planting. In addition, fertilizer is often added after the first cluster of fruit has set and young tomatoes are the size of a golf ball or slightly smaller. Timing is important because young tomatoes that are supplied with too much nitrogen will produce too much stem and leaf growth which can slow or reduce fruit set and yield. Fertilization can be repeated once a month while the plant is bearing.

WATER MANAGEMENT: For best growth, keep the soil in the root zone moist enough to prevent wilting of tomatoes. This is especially important soon after transplanting when the plant is transitioning to garden conditions. Garden tomatoes will generally require 1 to 1.5 inches of water per week, but this number can change according to environmental conditions and plant size.

PLANT SUPPORT: Tomatoes are normally supported with stakes or cages. Staking can be carried out for individual tomato plants or installed and tied as a row.

CULTURAL PRACTICES FOR DISEASE SUPPPRESION AND SUCCESSFUL TOMATO PRODUCTION

- Purchase disease resistant seed or plant varieties.
- Disinfect tools, tomato cages and stakes with a solution of one part bleach to nine parts water before use.
- Rotate the planting location every three to five years but do not rotate or plant near peppers, potato or eggplant.
- Tomatoes are warm-season plants. Planting in cold soils weakens plants making them more susceptible to diseases and may stunt them permanently. Plant once the nights are consistently 50 - 55 degrees and soil temperature is at least 60 degrees. Raised vegetable beds warm up faster and can be planted 2 - 3 weeks ahead of open soil.
- Plant deep. Removing the foliage up the stem to the top two or three leaf sets will allow more roots to form on the stem and provide more opportunity for plants to take up water and nutrients.
- Do not crowd tomatoes. Good air circulation around plants is vital in keeping the foliage dry and preventing diseases. Remove lower branches, leaving the stem bare up to the first set of flowers.

- Add soaker hoses or drip irrigation. By keeping water at the base of the plant, and directing it towards the roots and off the foliage, you will significantly reduce the chances of soil-borne diseases splashing onto the foliage and infecting the plants. Avoid overhead watering whenever possible.
- Add mulch around tomato plants. It acts as a protective layer of insurance to prevent water reaching foliage from the soil. Mulch helps retain moisture in the soil and reduces evaporation while suppressing weeds.
- Remove any diseased looking leaves as soon as possible. At the end of every growing season, remove as much of the plant as possible from the garden and do not add them to your compost pile as the disease can carryover and infect plants when the compost is later used.
- If the above measures do not control disease, you may want to consider fungicidal sprays. Fungicides will not cure infected leaves, but they will protect new leaves from becoming infected. Apply at 7 to 10 day intervals throughout the season. Carefully read and follow label instructions before applying chlorothalonil, maneb, macozeb, or a copper-based fungicide, such as Bordeaux mixture, copper hydroxide, copper sulfate, or copper oxychloride sulfate. Follow harvest restrictions listed on the pesticide label. Note: fungicides do not cure fungal diseases; they can only prevent them from spreading.

COMMON FUNGAL, BACTERIAL AND VIRUS DISEASES

	<p>Early Blight (<i>Alternaria Solani</i>) Early season disease - “bullseye” pattern with yellow halo. Overwinters in soil or plant debris. Spores splash by rainfall or wind onto lower leaves. Can affect leaves, stems and even fruit.</p>		<p>Bacterial Spot (<i>Xanthomonas campestris</i> pv. <i>Vesicatoria</i>) dark, circular or irregular lesions more visible on underside of leaf. Favors warm and rainy weather.</p>
	<p>Septoria LS (<i>Septoria Lycopersici</i>) Occurs later in the summer (after fruiting) - Silver/tan leaf spot with purple margin. Overwinters in the soil and spreads by splashing rain.</p>		<p>Late Blight (<i>Slerotium rolfsiii</i>) Appears first as greasy, grayish patches on older tissue followed by a rapid wilt— favored by high humidity, moisture and heat (85-95 degrees).</p>
	<p>Tomato Spotted Wilt Virus - Caused by thrips. Symptoms vary with stage of disease. Stunted or one-sided growth, young leaves may spot and eventually die. Dark brown streaks appear on stems. Immature fruit on infected plants display mottled green rings with raised centers and orange /red discolorations on mature fruit.</p>		<p>Cucumber Mosaic Virus—Early plants are yellow, bushy and stunted leaves may mottle. Shoestring-like leaf blade. Transmitted by aphids. No CMV resistant or tolerable varieties available.</p>

To minimize fungal bacterial and virus problems keep the garden free of plant debris, avoid overhead watering, water before 3 PM to allow foliage to dry before night. Mulch to reduce soil splash from rain onto the foliage, as plants mature remove lower leaves up to first fruit set, space to allow adequate air circulation, monitor plants and remove aphids with a sharp water spray as needed.

PEST ISSUES AND COMMON WEATHER-RELATED CONDITIONS

	<p>Blooms Drop Off —Day temps above 85 degrees, Night temps above 70 or below 55 degrees and Humidity below 40% and above 70% inhibit fruit set.</p>		<p>BLOSSOM END ROT— Water soaked spot on blossom end. Primary causes are fluctuations in soil moisture and insufficient calcium in soil.</p>		<p>Squirrel and Rodent Damage —May eat only a few bites before discarding the tomato and proceeding to find another.</p>
	<p>Tomato Leaf Roll—Seen in periods of cool, rainy weather</p>		<p>Green Shoulders —High temps and prolonged exposure of direct sunlight.</p>		<p>Horizontal Growth Cracks—Caused by too much water intake when fruit is full sized.</p>
	<p>Catfacing - Can be caused by cold temperatures during flowering, high nitrogen fertilization, or improper pruning.</p>		<p>Tomato Fruitworm— feeds on leaves and green fruit. They bore into the fruit and devour the insides.</p>		<p>Vivipary—Seeds ripen inside the fruit. Over-ripe tomatoes allow the seeds to break dormancy and sprout.</p>
	<p>Tomato Horn Worm—Can defoliate the entire plant and cause damage to blossoms and fruits. Hand-picking is the most expeditious method of removal.</p>		<p>Bird Damage - Wounds that appear to have been made by small daggers with sizeable holes often evident.</p>		<p>Sunscald—yellow or white spotted area on fruit. May blister before turning thin, wrinkly and paper-like. Caused by sudden exposure to direct sunlight.</p>

Weather related conditions cannot be changed but some issues can be minimized by good cultural practices and extra precautions. Mulch to help moderate soil temperatures and even soil moisture. Avoid overwatering, check soil moisture knuckle deep or use an inexpensive moisture meter to be sure water is needed. Never assume you need additional water as indicators of over watering and under watering are often the same. Netting can help keep birds and squirrels away from your crop. Monitor your tomatoes regularly look for damage and take action early. Hunt for hornworms by looking for their excrement then look up. They are masters at camouflage and often are on the underside of a leaf. You can also hunt them at night using a black light to make them more visible.

Consider picking your tomatoes at the “breaker stage” when a tomato is showing some color over about 50% of the fruit (for example, half green and half pink) it is at the breaker stage. At that point, the tomato fruit is already packed with everything it needs to develop full flavor. By harvesting the fruit before it’s fully ripe, you’ll beat many pests to the punch. Picking before fully colored also helps prevents splitting or cracking, which can be caused by water falling on the ripe flesh. Allow the fruit to fully ripen at room temperature away from sunlight. You won’t lose any flavor, quality or nutritional value. Never place tomatoes – at any stage – in the refrigerator, though. Any temperature below 50 degrees Fahrenheit will affect the cellular walls of the fruit and deteriorate the flavor and texture.