Tomatoes

(Lycopersicon esculentum)

Recommended Varieties and Their Disease Resistance

See below for cherry tomato varieties, container varieties, and standard-sized varieties, their adaptation to climatic zones in the state, and their resistance to diseases.

Home-grown tomatoes are one of the most popular garden vegetables. The varieties available to the home gardener are so flavorful and juicy and require relatively little space for large production. Each tomato plant, properly cared for, yields 10 to 15 lb or more of fruit. Choose varieties bred for disease resistance for best results. Fusarium (F) and Verticillium (V) wilt are common diseases that can destroy a whole tomato crop. Many varieties are resistant to these two diseases. Look for VF after the cultivar name, indicating resistance to the wilts. VFN means the plants are resistant to verticillium, fusarium and nematodes; VFNT adds tobacco mosaic virus to the resistance list.

Tomato plants are described as determinate or indeterminate. The term 'determinate' refers to the plant growth habit. Determinate tomato plants grow like a bush to a certain size (about 3 to 5 feet), set fruit, and then decline. Most of the early ripening tomato varieties are of the determinate type. The vines of indeterminate plants continue to grow until frost or disease kills them. Many of the standard-sized, all-summer tomatoes typical of the home garden are of the indeterminate type. They require support of some kind for best results, since the fruit would otherwise be in contact with the soil and thus susceptible to rot.

The large number of tomato varieties available may seem overwhelming to a new gardener; ask gardening friends for the names of their favorites. Many varieties, with a wide array of plant size and habit and disease resistance, do well in various parts of California, depending on their climatic requirements. Although tomatoes are a warmseason crop, you can grow them in the cooler areas of the state if you choose the right varieties. Listed below are three climatic zones (A, B, and C) and the tomato varieties that are adapted to those zones, including the varieties' disease resistance. A number of heirloom varieties are also available if you wish to experiment with them.

Cllmatic Zones for Tomato Varieties

A Coastal areas from Santa Barbara south
Coastal foothills and mountain ranges from San Diego through Marin counties
Foothills surrounding the Central Valley
Napa and Sonoma Valleys
San Jose, Los Angeles, Santa Ana and San Diego
Other areas where summer daytime temperatures are warm but usually below 95^{O}F

B Inland valleys, high and low deserts, and other inland area where daytime temperatures regularly exceed 95^{O}F during the summer growing season.
Included are the Central, San Fernando, and San Gabriel Valleys, Pomona, Riverside, and El Cajon, and interior valleys of San Diego County.

C Immediate central and north coastal areas, cool coastal valleys from
Santa Maria north to the Oregon border, the San Francisco Peninsula, and areas with direct exposure to San Francisco Bay
Northern coastal foothills
Most mountains and mountain valley regions
Eureka, Oakland, Monterey
Other areas with cool to moderate summers with evening temperatures frequently in the 45^{O}F to 55^{O}F range.

(a) Cherry tomatoes have small, cherry-sized (or a little larger) fruits often used in salads. Cherry tomatoes grow in all three zones of the state. Plants of cherry tomatoes range from dwarf size to seven-footers (Sweet 100). One standard cherry tomato plant is usually sufficient for a family, since they generally produce abundantly.

Cherry Grande (VF)	F, V; medium, determinate plant, with large cherry fruit
Sweet Cherry	F; large indeterminate plant, with medium to large cherry fruit
Sweet 100	large, indeterminate plant with clusters of small cherry fruit
Red Cherry	large, indeterminate plant with medium cherry fruit

(b) Container varieties. Container varieties are adapted to all three zones of the state. Midget, patio, or dwarf tomato varieties have very compact vines and do best when grown in hanging baskets or other containers. Some do produce large fruit but they are -sized plants. Container van

Patio	F; dwarf, determinate plant with small to medium fruit
Toy Boy	F, V; compact, determinate plant with small cherry fruit
Better Bush	F, N, V; compact, determinate plant with small to medium fruit
Small Fry	F, N, V; compact determinate plant with small cherry fruit

(c) Many standard sized tomato varieties listed below are indeterminate plants that require some type of support. Heavy duty cages with at least 6 inch openings through which the fruit can be harvested are effective. They should stand 5 - 6 ft tall and be supported with two strong stakes on either side of the cage so the fruit-laden plants do not blow over from wind or weight. Usually a cage about 18 inches in diameter works well. If you make your own cages out of metal fencing or concrete reinforcing wire, it helps to make each cage at least two inches different in diameter so that you can store one cage inside another over the winter. Beefsteak type tomatoes are large-fruited types, producing a tomato slice that easily covers a sandwich. The whole fruit may weigh as much as 2 lb or more. These are usually late to ripen, so plant some standardsized, early tomatoes for a longer harvest.

Ace Hybrid (Zones A & B)
F, N, V; medium, determinate plant grown with short stake or cage or as a large bush, with medium to large, attractive fruit

Better Boy (Zone A)
F, N, V; large, indeterminate plant grown with stake or cage

Big Pick (Zones A & B)
F, N, TMV, V; large, indeterminate plant grown with stake or cage

Big Set (Zones A & B)
F, N, V; medium, semideterminate plant grown with cage or as a bush

Bingo (Zones A & C)
F, TMV, V; medium, determinate plant with large fruit grown with short stake or cage or as a bush

Carmelo (Zone C)
F, N, TMV, V; medium, semideterminate plant grown with cage or as a bush

Celebrity (Zones A & B)
AAS, F, N, TMV, V; medium, semideterminate plant grown with stake or cage; widely adapted, with consistently large, firm fruit

Champion (Zones A, B. & C)
F, N, TMV, V; large, indeterminate plant grown with stake or cage; large, attractive fruit; excellent for winter crop in inland valleys

Early Bush 76 (Zones A & B)
F, V; medium determinate plant grown with short stake or as large bush with concentrated production of large fruit -- Best determinate plant for Zone A

Early Girl (Zone A)
V; large, indeterminate plant grown with stake or cage; continuous bearing of small to medium fruit

Early Pick (Zones A, B & C)
F, V; large, indeterminate plant grown with stake or cage; abundant medium to large attractive fruit

Floramerica (Zones A & B)
AAS, F, V; medium, determinate plant grown with short stake or cage with consistent yields of large fruit, some green shoulders

Jackpot (Zones A & B)
F, N, V; compact, determinate plant grown with short stake or as bush, with concentrated production of medium to large fruit

Jet Star (Zones A & B)
F, V; large, indeterminate plant grown with stake or cage; good quality medium to large fruit

Quick Pick (Zone A)
F, N, TMV, V; large, indeterminate plant grown with stake or cage; early, good quality small to medium fruit

Royal Flush (Zones A & B)
F, N, V; compact, determinate plant grown with short stake or as a bush; concentrated production of large fruit

7718VF (aka San Diego Hybrid) (Zones A & B)
F, V; large, semideterminate plant grown with stake or cage; widely adapted with large fruit

Supersteak (Zone A)
F, N, V; very large, indeterminate plant grown with stake or cage; large, high-quality fruit

Valerie (Zones A & C)
F, N, V; medium, determinate plant grown with short stake or as bush; early, medium fruit

Whopper *(Zone A)*
F, N, TMV, V; large, indeterminate plant grown with stake or cage; attractive, medium fruit

Tomato plants may be started indoors from seed, or transplants may be purchased. If starting your own plants, use a light soil mix and give the plants plenty of sunlight. Tall, spindly transplants are usually caused by low light levels in the home. Unless you have a sunny, south-facing window, supplemental light will probably be necessary. The seeds are sown 6 to 8 weeks before the last frost date in your area. A few weeks before transplanting time, harden-off indoor-grown plants by exposing them to an increasing number of hours outdoors each day. Bring plants in if there is danger of frost.

When you are ready to put home-grown or purchased plants into the ground, select stocky transplants about 6 to 8 inches tall. Set tomato transplants in the ground covering the stems so that only 2 or 3 sets of true leaves are exposed. Horizontal planting of tomato plants is an effective way to make plants stronger, especially leggy ones. Roots will form along the buried portion of the stem, giving better growth and less chance of plant injury from a stem that is too weak. Do not remove the containers if they are peat or paper pots. If non-biodegradable containers are used, knock the plants out of the pots before transplanting, and loosen the roots somewhat. Press the soil firmly around the transplant so that a slight depression is formed for holding water. Pour approximately 1 pint of starter solution or dilute fish emulsion around each plant.

Though it requires more initial work, staking makes caring for tomatoes easier than letting them sprawl on the ground. Since they are off the ground, fruit rots are reduced; spraying is easier and may be required less often; and harvesting is much less work. Use wooden stakes 6 ft long and 1-1/2 or 2 inches wide. Drive them 1 ft into the soil about 4 to 6 inches from the plant soon after transplanting. Attach heavy twine or strips of cloth to the stakes every 10 inches. As the plants grow, pull the stems toward the stakes and tie loosely.

Prune staked tomatoes to either 1 or 2 main stems. At the junction of each leaf and the first main stem, a new shoot will develop. If plants are trained to 2 stems, choose one of these shoots, normally at the first or second leaf-stem junction, for the second main stem. Weekly, remove all other shoots, called 'suckers,' to keep the plant to these two main stems. Pinch shoots off with your fingers. Tomato plants may also be set along a fence or trellis and tied and pruned in a manner similar to that used with stakes.

Growing tomatoes in wire cages is a method gaining in popularity among gardeners because of its simplicity. Shortly after plants are established, place cylindrical cages that are about 18 to 30 inches in diameter and 36 to 60 inches tall over them. This type of culture is especially suited to indeterminate varieties. Cage-growing

allows the tomato plant to grow in its natural manner, but keeps the fruit and leaves off the ground, offering the advantages of staking as well. Using wire cages requires a large initial expenditure and a large storage area, but many gardeners feel that the freedom from pruning and staking is worth it. The cages, if heavy duty, will last many years. Be sure to get concrete reinforcing wire or fencing with at least 6-inch spacing between wires so that you can get your hand inside to harvest the tomatoes. If tomato plants in wire cages are pruned at all, once is enough; prune to 3 or 4 main stems. Wire-cage tomatoes develop a heavy foliage cover, reducing sunscald on fruits. Caged plants are less prone to the spread of disease from plant handling, since they do not have open wounds and must be handled less frequently than staked plants. However, it helps to space the plants somewhat farther apart (at least 3 ft) to allow good air circulation between plants; humidity is higher because of the foliage density, and diseases, such as late blight, spread rapidly in humid situations. If well-nourished and cared for, caged tomatoes can make up for the extra space required with exceptional harvests.

In addition to the usual round red tomato, home gardeners can choose to grow orange, yellow, pink or striped tomato varieties which have little commercial appeal and are only available to the home market. Some of the yellow varieties, which are shaped like pears or plums, have mild, sweet flavor with low acid content.

Tomatoes are medium in rooting depth and need several irrigations. Most plants do not set fruit from all blossoms due to an already heavy load of fruit on the plant or to extremes of temperatures. Harvest when fruits are red ripe. Toward the end of the season, there are usually some whitish-green, full size tomatoes still on the vines. You can pick these tomatoes and store them at 70^{O}F to ripen. Picked tomatoes should be placed in the shade; light is not necessary for ripening immature tomatoes.

Nutritional Value of Tomato

Serving size:	I (about 4 oz.), raw	Primary Nutrients		%RDA(m)	%RDA(f)
Calories	26	Vitamin C	24 mg	40	40
Fat	0.4g	Folic acid	18 mcg	9	10
Calories from fat	14%	Vitamin A	77 RE	7.7	9.6
Cholesterol	0	Iron	0.55mg	5.5	3.7
Sodium	11 mg				
Protein	1.0 g				
Carbohydrate	5.7 g			% Min Requirement	
Dietary fiber	1.6 g	Potassium	273 mg	13.7	

Tomato Fruit Set Failure and "Flower" Drop[1]

Most people who raise backyard tomatoes have experienced the problem of poor fruit set. Under good environmental conditions, fruit set occurs normally, but tomato plants may fail to set fruit for any one of several reasons. The most frequent problems are

- Cold nights in the spring
- High temperatures in the summer
- Low light intensity
- Smog (ozone)

The tomato flower contains both male and female parts. In order for fruit set to occur, viable pollen from the anthers (male parts) must be transferred to the stigma (part of the female organs), germinate

there, and send its tube down through the style to fertilize the ovules. When fertilized successfully, the developing ovules (young seeds) produce a stimulus which results in fruit enlargement. Under adverse environmental conditions, one or more of these processes may fail to occur, and the flowers will fall from the plant. Occasionally fruits will enlarge without pollination or fertilization, but these fruits are usually poorly formed and fail to develop to desirable size.

Prevention and Control of Fruit Drop

Cool nights. After several days in which night temperatures fall below 55^{O}F, fruit set often falls in most varieties. Under these conditions, fruit set can be improved with the use of fruit-setting hormones which are available in most retail nurseries or agricultural supply houses. Research has shown that 4-CPA (parachlorophenoxyacetc adic) is more effective than BNOA (beta naphthoxyacetc acid). Follow label directions carefully.

Hot days. When daytime temperatures consistently exceed 90^{O}F, fruit set failure may also be expected in many tomato varieties. Some varieties are more tolerant of high temperatures and will continue to set fruit when others fall. Under these conditions, it will be helpful to keep the plants in a healthy growing condition so that flowers which develop will have a better chance to survive. This includes the maintenance of a constant moisture supply, the elimination of damaging insects, and the control of diseases. Fruitsetting hormones are not effective in hot weather.

Low light intensity. Tomato flowers may also fail to develop into fruit under conditions of inadequate sunlight. This may occur when plants are growing under dense shade trees or along the north wall of a building. Planting locations which do not allow at least several hours of direct sunlight should be avoided. Best growth will result where the plants receive full sunlight throughout the day.

Smog. Research has shown that high concentrations of ozone, a principal air pollutant during summer months, will significantly reduce fruit set in tomatoes. This is an unfortunate problem for which there is no solution at the present time.

Solar Yellowing in Tomatoes[1]

[Editors note. *Hunter Johnson, Jr., retired University of California Cooperative Extension Vegetable Specialist, was asked frequently to identify the cause of yellow shoulders or yellow-orange color on ripe tomato fruit in varieties which are normally all red at maturity. He offered the following explanation.]*

Yellow discoloration invariably occurs beginning in the late spring months under greenhouse conditions, or from that period on through the summer in the open field in inland areas where daytime temperatures regularly exceed 85^{O}F. An accurate term for this condition is “solar yellowing" because the source of the problem is the sun. It isn't only the heat of the sun or the temperature increase in the fruit that creates the problem, but also high light intensity. This was shown by Dr. Werner Upton, who coined the term "solar yellowing" in research he conducted on the subject in 1970. His treatments involved shading or painting the fruit either black or white. Black-painted fruit were higher

in temperature than exposed fruit, but discoloration was highest in the exposed fruit. His conclusion was that short-wave radiation was largely responsible for defective coloration.

The reason for the yellow or yellow-orange color, rather than the normal red, is that the red pigment (lycopene) fails to form above 30^{O}C (86^{O}F). This phenomenon was first described by researchers in 1952 and was later confirmed by others. When lycopene fails to form, only carotenes remain for fruit color. In the field, some red color forms when day temperatures rise above 85^{O}F because of fluctuation in noninhibiting temperatures during other parts of the day or night. An orangey-red color results. In production areas where temperatures do not exceed 85^{O}F, much higher red color develops.

For good uniform red color to develop, high temperatures should be avoided and fruit should be protected from short-wave radiation in high light intensity areas. Dr. Upton showed that sprays of non-phytotoxic whitewash will help. In greenhouses, growers who intend to mature fruit in May and June should begin to alter their pruning practices in March by allowing two leaves to develop on axillary branches instead of the standard practice of removing these branches.

[1]The author is Hunter Johnson, Jr., retired University of California Cooperative Extension Vegetable Specialist, Riverside Campus.

Leaf Roll of Tomato [2]

Leaf roll of tomato is a very common disorder in many tomato varieties grown in California. Leaf roll does not develop markedly on plants until about the time of fruit setting of the first and second flower clusters. At this time, the older leaves begin to roll upward and inward rather suddenly. Affected leaves are stiff to the touch, brittle, and at times, almost leathery. They are much thicker than normal leaves and shiny on both the upper and lower surfaces. In mild cases, leaves become trough-shaped. In severe cases, the leaves may form a very tight cylinder with the leaf margins touching or overlapping. The severity of leaf roll varies with climatic conditions, cultural practices, and the particular variety grown. No pathogens have been identified as causal agents. When leaf roll is severe, three-fourths of the leaves on a plant may be involved and fruits become exposed to full sunlight, resulting in the development of disorders such as yellow leaf discoloration and sun scald.

No control methods for leaf roll are recommended since it is not known to severely damage plants or fruit production and its actual cause is not fully understood. Susceptible varieties have been observed to express leaf roll most frequently when they are grown in staked culture and heavily pruned. Maintaining a high soil moisture content for prolonged periods of time is also believed to accentuate the disorder.

Observations of an experiment in Florida led to a hypothesis that leaf roll might be caused by an accumulation of excess amounts of carbohydrates, namely sugars and starch. This theory was tested in the Floradel variety by removing vegetative shoots, flowers, and developing fruits which serve as sinks for photosynthates. These treatments resulted in rapid expression of leaf roll completely to the tops of certain plants. A second test involved growing plants under 0 to 75 percent shade to inhibit photosynthate production. In the treatment under high shade conditions, the

incidence of leaf roll was greatly reduced to less than 50 percent. It was observed that leaves which originally were shaded and did not roll later developed leaf roll when exposed to full sunlight.

Although no definite conclusions can be drawn as to the cause-effect relationships of plant carbohydrate concentration to leaf roll, it does appear that leaf roll will be most severe when tomatoes are grown in staked culture under high light intensifies and high soil moisture conditions.

[2]The author is Dennis R. Pittenger, Area Environmental Horticulturist, Southern Region, University of California Cooperative Extension.

Problem Diagnosis for Tomatoes

What the Problem Looks Like	Probable Cause	Comments
Worms up to 1-3/4 inches long in immature or ripe tomatoes	Tomato fruitworm	
Worms up to 3/8 inch long Tunneling in fruit	Potato tuberworm	Do not plant tomatoes where potatoes were planted the year year before. Destroy volunteer Potato plants.
Worms never longer than 1/4 inch tunnel in core and fleshy parts radiating from core. Leaves may be mined and folded together.	Tomato pinworm	Pinworm is most common in Southern California and the central to Southern end of the San Joaquin Valley. It occurs earlier in season than fruitworm.
Leaves eaten, stems remain. Fruit with small to large gouged out areas. Very large cater pillars may be present.	Hornworms Insects have distinctive horn on rear end.	
Fruit surface eaten away or fruit hollowed out	Snails feed on surface of fruit. Slugs hollow out fruit.	Stake tomatoes to get fruit off ground and away from slugs and snails.
Creamy to yellowish cloudy spots lacking definite margin on ripe tomatoes. Tissue	Stink bugs. Green to gray shield-shaped bugs 1/4 inch long beneath the spots is spongy.	Stink bugs overwinter beneath boards in weedy areas, refuse piles. Remove debris from garden area. Hand pick egg masses and bugs. Weed control.

Problem Diagnosis for Tomatoes (continued)

What the Problem Looks Like	Probable Cause	Comments
Leaves almost totally eaten off of young plants. Small dark weevils on plants.	**Vegetable weevil**	Weevil attacks many vegetables but does not fly so it spreads Slowly through garden. Hand-picking adults off plants at night is effective if population is low. Rotenone is effective
Lower leaves, stems have bronze, oily brown color. Discoloration moves higher on plant. Dry lower leaves drop from plant or plant may lose leaves.	**Tomato russet mite** Very tiny mites not visible to naked eye. Use 20 power hand lens. Mites appear as whitish-yellow pear-shaped bodies moving slowly.	Do not grow tomatoes near petunias or any solanaceous plant such as potato because they are alternate hosts of the russet mite. Sulfur is effective, but excessive rates may injure plant.
Leaves yellowish, slightly curled. Some leaves and fruit with small shiny spots. Others may appear blackened. Clouds of small white insects fly up when plant is disturbed. Insects visible on undersides of leaves.	**Aphids** Tiny, oval, yellowish to greenish scale-like bodies	Not a problem unless honeydew or sooty mold becomes obvious Can use insecticidal soap.
Seedlings or small transplants with small holes in leaves. In severe cases, entire plants may be completely destroyed.	**Flea beetles**	Rarely damaging except on seedlings. Tomatoes tolerate a lot of beetle damage if they are healthy.
Plants with poor vigor, reduced yields. Foliage yellows, turns brown from bottom up. May look wilted. Many beads or swellings on roots.	**Root knot nematode** Nearly microscopic eelworms which attack feeder roots.	Plant varieties resistant to root knot nematodes. Such varieties are labeled VFN, referring to resistance to *Verticillium wilt, Fusarium* wilt, and nematodes. Rotate. Remove old plant debris.

Problem Diagnosis for Tomatoes (continued)

What the Problem Looks Like	Probable Cause	Comments
Blossoms fall off	Night temperatures too low (<55°F)	Fertilize properly. Do not plant too early. Hormone sprays can improve fruit set during low temperatures but will not help in high temperatures.
	Day temperatures too high (>90°F)	Keep soil moderately moist.
	Smog during blossoming period	Tapping on blossom stems 3 times per week in midday when flowers are open may help set fruit.
	Excess nitrogen fertilizer	
	Too much shade from trees, house	Plant tomatoes in full sun.
	Susceptible variety	Some varieties are not adapted to California's hot summers and these often fail to set fruit.
	Early blossoms	Early blossoms do not consistently set fruit.
Leaf veins turn purple and bronze. Leaves curl upward, feel thick, leathery, or brittle. Plant growth stops. Fruit ripen prematurely.	Curly top virus Disease is spread by leafhoppers.	After plants are infected, no practical control in the home garden.
	Purple leaves can also indicate phosphorus deficiency	
Leaves have irregular light and dark green color pattern. May be wrinkled or frilly. Terminal growth may be spindly with narrow, wrinkled leaves.	Mosaic virus	Plant tobacco mosaic virus (TMV) resistant varieties. Do not handle plants more than necessary. Plant tomato seeds rather than transplants. Do not smoke and handle plants since TMV can be spread in tobacco. No cure for virus in infected plants. Infected plants produce edible fruit but yield, size, and quality and reduced.

Problem Diagnosis for Tomatoes (continued)

What the Problem Looks Like	Probable Cause	Comments
Plants pale, turning yellowish with brown lesions on leaves. Brown stripes on some stems. Fruit poorly colored with circular light areas or distorted bumps. Plants eventually die.	Spotted wilt virus Disease is spread by thrips from various crops, ornamentals, weeds.	Remove and destroy infected plants. Control nearby weeds that can harbor virus or thrips. vector
Plants turn yellow starting with one side or branch and gradually spreading. Main stem when cut off at base is dark reddish brown instead of normal ivory color. Wilt.	Fusarium wilt Disease is caused by a soil fungus that infects tomatoes only. Favored by warm soil	Grow varieties labeled VF. They have resistance to most (but not all) races of *Fusarium.*
Older leaves begin to yellow and eventually die. Yellowing begins between main veins of leaves. Internal stem is very slightly tan-colored, usually in small patches.	Verticillium wilt Disease is caused by a soil fungus that infects many plants Favored by cool soil and air temps.	Grow varieties labeled VF. Avoid ground previously planted with tomatoes, potatoes, peppers, eggplant or cucurbits. Symptoms most severe when plants are water-stressed in hot weather with fruit load.
Plants grow slowly and wilt. Roots have water-soaked areas that turn brown and dry up.	Phytopthora root rot Caused by a soil fungus	Most common in heavier clay soils. Irrigate affected plants carefully to maintain them. Do not saturate soil for extended periods and water more frequently for short periods.
Plants wilt with white cottony growth on stem near soil line.	Southern blight Caused by *Sclerotium rolfsii*	Rotate to corn or other nonhost crops for 2 to 3 years.
Fruit turns light brown, leathery on side exposed to the sun	Sunscald Caused by Overexposure to sun	Maintain plant vigor to produce adequate leaf cover.
Water-soaked brown areas on leaves and stems. Grayish white fungus grows on undersides of leaves and they die. Fruit discolored but firm.	Late blight Caused by a fungus. Favored by high humidity and temperatures around 68^{o}F.	Avoid sprinkler irrigation. Destroy all tomato and potato debris after harvest.

Problem Diagnosis for Tomatoes (continued)

What the Problem Looks Like	Probable Cause	Comments
Irregular yellow blotches on leaves. Blotches turn brown and die but leaves usually do not drop, unless disease is severe. No symptoms on stem or fruit.	Powdery mildew Caused by a fungus	Disease usually occurs late in summer or fall but does not cause significant loss unless very severe so no control normally needed. Avoid water stress. If young plants attacked, sulfur dust will control the disease.
Dark brown to black blotches surrounded by yellowing along edges of leaves. Superficial dark specks on green fruit.	Bacterial speck A disease caused by a bacteruim	Develops only under wet, cool temperatures, usually in early spring. Daily mean temps. >70^{o}F suppress it. If speck is a problem, consider delaying planting until temps are warm. Rotate. Avoid overhead watering.
Fruits are brown-black on bottom (blossom) end. Affects both green and ripe fruit.	Blossom end rot A physiological disease (not caused by a microorganism)	Disease involves calcium nutrition and water balance in plant. Aggravated by high soil salt content or low soil moisture. More common on sandier soils. Maintain even soil moisture.
Lower leaves yellow with tiny brown specks. Leaves die. Blossoms drop. Poor growth.	Smog	Some varieties more susceptible than others. Very difficult to diagnose accurately.
Fruit with large cracks in concentric circles around stem.	Usually follows rainfall or irrigation esp. after dry spell.	Remove ripe fruit immediately after a rain to prevent cracking.
Fruit with large cracks radiating from stem	High temps. (>90^{o}F) High sunlight	Keep soil evenly moist. Maintain good leaf cover. In very hot regions, choose planting time to avoid fruit maturity when temps will be consistently above 90^{o}F.
Fruit with black mold along growth cracks. Develops on damaged, cracked tissue	Fruit rot	Prevent fruit cracking. See above. Handle fruit carefully.

Problem Diagnosis for Tomatoes (continued)

What the Problem Looks Like	Probable Cause	Comments
Black sunken spots on fruit	Alternaria fruit rot	Use registered fungicide
Tiny, white, winged insects on undersides of leaves	Whiteflies	Encourage beneficials
Trails, tunnels in leaves	Leafminers	Use insecticides, natural enemies to control
Young plants cut off at ground	Cutworms	Use cutworm collars or registered insecticide