DISEASES

Recognizing Tomato Problems no. 2.949

by B. Edmunds and L. Pottorff [1] (5/09)

Quick Facts...

Tomatoes are an easy and popular vegetable to grow.

Tomato problems may be caused by nutrient deficiencies, diseases, fungi or insects.

Assess the symptoms, then make the appropriate treatment.

Good cultural practices can reduce or eliminate many problems.

Despite the short growing season in many areas of Colorado, tomatoes are an easy and popular vegetable to grow. For healthy tomatoes:

- Improve garden soil by adding organic material such as compost.
- Use disease-resistant varieties.
- Eliminate competition from weeds.
- Keep the plant growing vigorously with proper water and nutrients.
- Keep the garden clean of plant debris.
- Rotate crops.
- Space plants for maximum air circulation.
- Monitor for pests.

Failure to follow one or more of these steps can lead to pest problems.

To manage pests, identify the source of the problem by assessing the symptoms. The key in Table 1 will help you narrow down the cause. It is organized by affected plant parts: leaves, stems, roots and fruit.

Common Tomato Problems

Phosphorus deficiencies (Figure 1) occur early in the growing season when soil is still cool. Phosphorus is abundant in our soils but may be unavailable to the plant when the soil is too cold. Don't plant tomatoes too early in the season. Use plastic mulch to warm the soil. Once soil temperatures rise, the problem usually corrects itself.

Figure 1: Phosphorus deficiency.

Curly top virus is transmitted by the beet leafhopper. This problem is common in western Colorado but seldom found in eastern Colorado. Infected plants turn yellow and stop growing. Upper leaflets roll and develop a purplish color, especially along the veins. Leaves and stems become stiff; fruit ripens prematurely. It is difficult to control because leafhoppers migrate from southern areas. Hot, dry springs with predominantly southwest winds usually indicate increased problems with this disease. No chemical controls are effective. Use row covers to protect tomato plants from the leafhopper.

Psyllids (Figure 2) are more commonly found in eastern Colorado and are seldom a problem in western Colorado. They feed on tomato or potato plant sap and inject a toxic saliva that causes the characteristic "psyllid yellows." Leaves turn yellow; veins often turn purple. Stems may become distorted, giving the bush a zig-zag appearance. To confirm psyllids, check the undersides of leaves

Figure 2: Psyllid damage.

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Table 1: Key to the identification of tomato problems.

LEAVES	
Purple leaves:	
Leaves with purple veins and overall purplish tint. Early season, cool temperatures. No insects present	*Phosphorus deficiency*
Leaflets roll upward and develop a purplish color, especially along the veins	*Curly top virus*
Yellowed leaves:	
Slight distortion, purpling of veins. Zigzag stem and branching pattern. Check underside of leaves for insects	*Psyllids*
Infected plants turn yellow and soon stop growing	*Curly top virus*
Small holes, approximately 0.5 mm	*Flea beetle*
Chewing injury on leaves.	*Tomato/tobacco hornworm*
Black or dark brown spots. Lesions have margins or concentric rings. Lower leaves commonly affected	*Early blight (Alternaria)*
Spots on leaves with white or gray centers surrounded by dark black or brown margins	*Septoria leaf spot*
Honeydew produced and	
white insects fly away	*Whiteflies*
black, rosy or green insects present	*Aphids*
Leaf scorching. Check watering, ambient temperature, salts, etc.	
No signs of insect or disease present. Check stems, roots and vascular system.	
Vascular system discolored. See wilting section.	
Distorted leaves:	
Curling, shoestringing, cupping and	
herbicides applied recently	*Herbicide injury*
plants stunted, no herbicides applied	*Cucumber mosaic virus*
Wilted leaves: (Check roots for rot and cut the stem to look inside the stem tissue.)	
Vascular streaking evident along entire length of stem	*Fusarium wilt*
Vascular streaking evident only in the crown (first 12 inches of stem)	*Fusarium crown rot*
Lower leaves turn down, leaf edges brown	*Bacterial canker*
Leaf spotting, concentric rings and necrotic (dead) leaf margins may or may not be present, leaf tissue stiff, not flaccid	*Tomato spotted wilt virus/ impatiens necrotic spot virus*
No vascular streaking. Check roots and soil moisture.	
Roots discolored, mushy. See root section.	
STEMS	
Black or dark cankers on stem. (Submit samples to a diagnostic clinic for confirmation)	*Early blight (Alternaria), tomato spotted wilt virus/ impatiens necrotic spot virus, bacterial canker*
ROOTS	
Roots discolored, mushy. Check soil moisture and watering	*Root rot caused by one of several common fungi*
FRUIT	
Spots, circles or blotches:	
Ring spots on fruit	*Tomato spotted wilt virus/ impatiens necrotic spot virus*
Dark pinpricks surrounded by a light, discolored area on green fruit. These areas turn yellow or remain green on ripe fruit. The tissue under the spots is white and spongy and remains firm as the fruit ripens	*Stink bug feeding*
White, leathery areas	*Sunscald*
Blotches on the shoulder of the fruit	*Green/yellow shoulders*
Small, white to yellow, raised blotches on fruit, often called bird's eye.	*Bacterial canker*
Distorted:	
Yellowing or not, with necrotic areas or not	*Catfacing*
Blossom end flattened and black	*Blossom end rot*
Yellowing	*Psyllids*
Ring spots on fruit	*Tomato spotted wilt virus/ impatiens necrotic spot virus*
Contact your Colorado State University Extension county office for more information or for help identifying problems.	

for nymphs. Nymphs are about the size of an aphid. At first, they are yellow, then they turn green. They are sedentary while feeding and secrete small, white granules that resemble sugar. For best control, dust the foliage, especially the undersides, with sulfur. See fact sheet 5.540, *Potato and Tomato Psyllids*.

Flea beetles (Figure 3) are small, black or brown beetles that jump when disturbed. The adults chew small holes or pits in leaves. Wounded tissue may be

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Figure 3: Evidence of flea beetles.

Figure 4: Tomato hornworm.

Figure 5: Symptoms of early blight.

Figure 6: Aphids.

Figure 7: Fusarium wilt.

more susceptible to diseases such as early blight. Most plants outgrow flea beetle damage. Insecticides such as cabaryl or permethrin are effective controls, if needed. See 5.592, *Flea Beetles*.

Tomato or tobacco hornworms (Figure 4) are large, green or gray-green caterpillars with white to tan v-shaped or dashed markings on their sides. A green to reddish horn protrudes from the hind end. They are voracious feeders, stripping leaves from stems and even eating unripe fruit. Pick them off by hand. The caterpillars are susceptible to *Bacillus thuringiensis* (Bt), as well as to many common vegetable insecticides.

Early blight (*Alternaria* leaf spot) (Figure 5) is caused by the fungus *Alternaria solani*. Symptoms become prevalent during the hotter months. This disease produces brown to black, target-like spots on older leaves. If severe, the fungus also attacks stems and fruit. Affected leaves may turn yellow, then drop, leaving the fruit exposed to sunburn. Sanitation is the best control. Remove all diseased plant tissue on the ground, as the fungus overwinters on leaf debris. Do not plant tomatoes in the same place next year. Space plants farther apart to improve air circulation. Avoid overhead irrigation. If the infestation is heavy, sulfur dust may help protect new leaves from infection.

Septoria leaf spot is less common in Colorado than early blight. It, too, is a fungal disease. Characteristic symptoms are white or gray spots on leaves, surrounded by a black or brown margin. Control is similar to early blight.

Whiteflies and aphids (Figure 6) both cause leaf yellowing and leave a characteristic sticky excrement called honeydew. Leaves appear shiny and are somewhat sticky when honeydew is present. Damage usually is minimal on tomatoes and often can be ignored. If aphids become a problem, some applications of insecticidal soap are quite effective.

Cucumber mosaic virus and herbicide injury are almost impossible to tell apart without previous knowledge of chemicals applied or laboratory confirmation. Cucumber mosaic virus causes tomato plants to yellow and become bushy and stunted. Leaves may be mottled. The virus most often is carried in tomato seeds. Mechanical transmission by workers touching plants and movement by aphid carriers can occur, but this is much less common in tomatoes than in cucurbits. Remove and destroy plants. There are no chemical controls.

***Fusarium* wilt and *Fusarium* crown rot** symptoms (Figure 7) begin as yellowing of older leaves. With *Fusarium* crown rot, the leaves often turn brown or black and eventually wilt. With *Fusarium* wilt, the yellow leaves turn downward and droop. *Fusarium oxysporum*, the cause of both diseases, is a common tomato fungus that lives in the plant's vascular system, which carries water from the roots to the leaves. To see if either of these diseases is present:

- Check watering practices. Both over- and underwatering can mimic disease symptoms.
- Check the roots. Discolored roots indicate root rot.
- Cut the lower or main stem and look inside at the vascular tissue. *Fusarium* wilt causes a dark brown discoloration within the vascular tissue. *Fusarium* crown rot causes a rot or canker at the base of the stem and possibly a root rot.

Most tomato seeds or transplants are labeled with a code such as "VFN," "VFNA," "VFNT," etc. This indicates that the plants are resistant to Verticillium wilt (V), Fusarium wilt (F), southern root-knot nematode (N), early blight (A), or tobacco (tomato) mosaic virus (T). Verticillim wilt and root knot nematodes rarely cause a problem in Colorado, but if you have had a Fusarium wilt problem in the past, it would be a good idea to choose a variety labeled 'F'. Do not plant tomatoes, potatoes or eggplant in the affected area for two or three years. No fungicides are labeled for control.

Bacterial canker (Figure 8) occurs sporadically in Colorado. Symptoms begin with lower leaves turning downward. Dark to light brown streaks may

Figure 8: Bacterial canker.

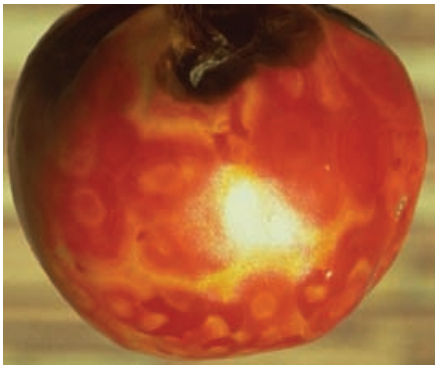

Figure 9: Tomato spotted wilt/impatiens necrotic spot.

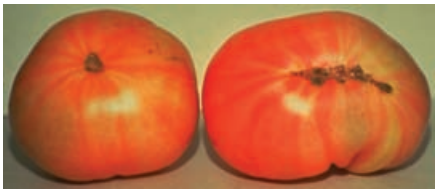

Figure 10: Catfacing.

Figure 11: Blossom end rot.

Figure 12: Sunscald on tomato fruit.

develop on the leaf midribs and eventually extend down the petiole to form a canker on the stem. There may be vascular discoloration. Symptoms on fruit are small, white, scabby, raised lesions, often described as "bird's eye." This disease is difficult to distinguish from other tomato diseases and may need laboratory confirmation. If identified, destroy the plants. Do not compost plant material. Do not plant tomatoes, potatoes or eggplant in the same soil for two to three years.

Tomato spotted wilt/impatiens necrotic spot tospoviruses (TSWV or INSV) (Figure 9) has traditionally been a problem in commercial tomato production. Recently, however, the disease has increasingly been found in home gardens. Symptoms begin as dark brown to purple spots on leaves. The dark areas spread to stems, forming cankers. Stem streaking also may be noticed. Wilting symptoms gradually develop as the disease spreads. However, the leaf tissue is stiff, not limp. The most noticeable symptoms are yellow rings or spots on fruit. Fruit may be distorted. TSWV and INSV are moved from plant to plant by western flower thrips. The only way to manage the disease is to remove and destroy affected plants. Thrips are extremely difficult to control. Trials with soaps, oils and sulfur dust have not yielded good results. For more information, see 2.947, *Greenhouse Plant Viruses (TSWV/INSV)*.

Root rot can be caused by several fungi. However, poor soil drainage and overwatering are always involved. For home gardeners, control of a potential root rotting fungus is almost impossible. Therefore, management of root rot requires soil improvement, proper watering, and rotation of tomatoes. Plant tomatoes and related species in the same garden spot only once every three years.

Catfacing (Figure 10) is a term that describes tomato fruit that is misshapen, with scars and holes in the blossom end. The cause is thought to be cold weather during blossoming and perhaps high levels of nitrogen. To manage it, avoid setting out transplants too early in the season.

Blossom end rot (Figure 11) begins as light tan, water-soaked lesions on the blossom end of the fruit. These lesions enlarge and turn black and leathery. The cause is thought to be a combination of cold temperatures or excessive heat during blossom set, and fluctuations in water supply. When these two factors occur simultaneously, calcium often becomes unavailable to the plant. Hence, a calcium deficiency occurs during fruit formation. To manage the problem, fertilize and water properly. Avoid setting out transplants too early in the season. Use mulch to help reduce fluctuations in moisture levels.

Stink bugs cause spots and internal damage to tomato fruit by their feeding. Adults are shield-shaped and brown or green, with red, pink or yellow markings. They release an offensive odor when handled. Control weeds around the tomato patch, as these insects overwinter in such areas. Stink bug damage on green fruit appears as dark pinpricks surrounded by a light, discolored area. As fruit ripens, these spots may remain green or turn yellow. The tissue underneath is white and spongy. Cavities may form under the damaged skin.

Sunscald (Figure 12) is common on fruit exposed to too much sun. This problem often occurs when infestations of hornworms are high and defoliation or pruning of leaves is heavy. To help control sunscald, shade the plant and reduce the fruit's exposure to the sun.

Green/yellow shoulders develop on ripening fruit, possibly due to high temperatures. Chlorophyll in this area is slow to break down and results in a patch that remains green or turns yellow but not red. This problem may affect the entire shoulder or only a small, irregular patch. Shade the plant and take other precautions to reduce the fruit's exposure to the sun.