The Backyard Garden
Tomato Pests

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INSECTS

Armyworms

SEVERITY: high
OTHER HOSTS: most vegetable crops, ornamentals, and weeds

GENERAL INFO: There are several species of armyworms present in Utah. Adult moths are mottled gray and brown with light-colored markings (Fig. 1). Larvae vary in color from tan, green, and almost black. They are typically a concern from mid-July through September and have one to three generations per growing season. Eggs are laid on leaves, larvae disperse and feed on foliage and fruit, and when mature, pupate in the soil.

SYMPTOMS:
- Irregular holes in foliage or fruit.
- Skeletonized or shredded foliage.
- Complete defoliation.

MANAGEMENT: Keep garden areas weed-free. Consider tilling soil in the fall to disrupt the overwintering pupal stage. Organic insecticides with active ingredients Bacillus thuringiensis or spinosad are effective on young larvae.

Beet Leafhopper

SEVERITY: high
OTHER HOSTS: several vegetables and weed species

GENERAL INFO: Adults are 3 mm long, and nymphs and adults have wedge-shaped bodies varying in color from pale green, grey, or tan (Fig. 2). Both life stages jump when disturbed. They are typically a problem in early summer when weeds begin to dry up during the first 6 to 8 weeks of planting. Beet leafhoppers can have multiple generations per growing season. They overwinter as adults on weeds in the mustard family in southern Utah and migrate north on spring wind currents. Direct feeding damage is not economically important on tomato; however, they can spread beet curly top virus and big bud, which can have serious economic impacts.

SYMPTOMS: See symptoms of beet curly top virus and big bud.

MANAGEMENT: Manage leafhoppers by excluding them with floating row covers. Shade tomato and pepper plans. Destroy and remove plant debris. Confuse leafhoppers by “hiding” susceptible plants among resistant plants.
Tomato Russet Mite

SEVERITY: moderate to high

OTHER HOSTS: pepper, eggplant, morning glory, Solanaceae weeds

GENERAL INFO: Tomato russet mite (Aculops lycopersici) adults and nymphs are microscopic and have cigar-shaped, yellow-tan bodies (Fig. 7). They are a concern when weather conditions are hot and dry. Their presence often goes unnoticed until injury is evident. If not controlled, tomato plants can be killed. Adults and nymphs feed with piercing-sucking mouthparts that cause bronzing or “russetting” on the plant surface. Tomato russet mites overwinter as adults on crop debris.

SYMPTOMS:
- Yellow, curled, withered leaves (Fig. 6).
- Fruits with longitudinal cracks and bronze discoloration.

MANAGEMENT: Monitor plants closely using a hand lens (15x-20x). Symptoms may look similar to a nutrient deficiency or other disease. Avoid planting during hot, dry periods. Remove infested plant debris. Clean tools when moving from infested plants to healthy plants. If populations are high, consider using an insecticide containing sulfur or abamectin.

Cutworms

SEVERITY: moderate to high

OTHER HOSTS: vegetables, clover, sorghum, strawberry, curly dock, lambsquarters, pigweed

GENERAL INFO: There are several species of cutworms that can affect tomatoes in Utah. Adult moths range from tan to brown and wing spans range from 30–55 mm. Cutworm larvae are dull gray to brown caterpillars with various markings or patterns. They curl into a “c” when disturbed. Larvae can clip off seedlings at the soil line, killing the plant (Fig. 3). They may also feed on fruit and foliage later in the season. Depending on the species, there can be multiple generations per season. Cutworms overwinter as larva in the soil underneath plant debris and become active during the spring and early summer months. Infestations are sporadic.

SYMPTOMS:
- Clipped off seedlings.
- Chewed foliage or fruit.

MANAGEMENT: Monitor plants early in the season; look for wilting or holes in foliage. Protect vulnerable transplants with cardboard collars. Remove cool-season weeds near garden sites that can serve as an alternate host. In the fall, till or turn the soil to disrupt the overwintering larva stage. Organic insecticides with the active ingredients Bacillus thuringiensis or spinosad are effective on young larvae.

Thrips

SEVERITY: moderate to high

OTHER HOSTS: wide range of vegetables and weeds

GENERAL INFO: Both onion thrips (Thrips tabaci) and western flower thrips (Frankliniella occidentalis) are predominant in Utah. Adults are minute with elongated yellow-brown bodies and two pairs of fringed (hairy) wings (Fig. 4). Wingless larvae (nymphs) resemble adults and are a creamy yellow color. Thrips are common in hot, arid conditions and feed with a punch-and-suck behavior on foliage and tomato fruit. Thrips can transmit tomato spotted wilt virus.

SYMPTOMS:
- Gold flecking on tomato fruit (Fig. 5).
- Silvery scars on tomato foliage.
- See symptoms of tomato spotted wilt virus.

MANAGEMENT: Regularly monitor for thrips signs and symptoms and inspect the underside of foliage with a 10x hand lens. Use overhead irrigation to dislodge thrips from plants. Remove nearby weeds that may serve as an alternate host. Chemical control is not recommended for home gardens as thrips can rapidly develop resistance.
Aphids

SEVERITY: low to moderate

OTHER HOSTS: most vegetable crops, fruit, ornamentals, and weeds

GENERAL INFO: Aphids are small, soft-bodied, pear-shaped insects with two tailpipe-like appendages (Fig. 9). Common species that attack tomatoes include green peach aphid, potato aphid, and melon aphid. They overwinter as eggs on woody hosts and after hatching, feed for several weeks on the succulent new growth before migrating to vegetables. Aphids may overwinter as adults in greenhouses or high tunnels. They are a concern throughout the entire growing season.

SYMPTOMS:
- Stunted, yellow, and distorted plant structures.
- Presence of sticky honeydew (secreted by aphids)
- Presence of white “casted” aphid skins

MANAGEMENT: Scout for aphid signs and symptoms frequently. Remove nearby weeds that can serve as an alternate host. Encourage natural aphid predators in your garden by planting attractive flowers and other plants. Use organic pesticides with active ingredients like neem oil, pyrethrins, or insecticidal soap.

Hornworms

SEVERITY: moderate

OTHER HOSTS: pepper, eggplant, nightshade weeds

GENERAL INFO: Both tomato and tobacco hornworms are the larval stage of large sphinx moths (whose flight at flowers resembles hummingbirds). Hornworms are green with white markings and can grow up to 4 inches long (Fig. 8). They have a notable “horn” or spine on the rear end of the abdomen. They have one to two generations per year in Utah. Hornworm larvae primarily feed on foliage.

SYMPTOMS:
- Chewed leaves and defoliation.

MANAGEMENT: Begin monitoring in early July during early morning or evening. Shake the plant over paper or a tray to identify any larvae that may be blended into the foliage. Look for large dark frass (excrement) on and around the plant as a sign of hornworms. Hand-removal is the most effective hornworm control option in garden settings with just a few plants. Pesticides aren’t typically necessary in the garden, but organic products such as those with the active ingredient spinosad or Bacillus thuringiensis work best on young larvae.

Stink Bugs

SEVERITY: low to moderate

OTHER HOSTS: multiple vegetable crops, fruits, and ornamental plants

GENERAL INFO: Stink bugs are shield-shaped true bugs and there are multiple species common to Utah (Fig. 10). Eggs are barrel-shaped and laid in clusters of 10–30 on host leaves. Early-stage nymphs often have a different coloration from adults. A small number of stink bugs have the potential to cause serious damage to tomato fruits. They are usually a concern from July through harvest. Damage is greater during warm and dry periods. Both nymphs and adults have piercing-sucking mouthparts that puncture tomato fruits.

SYMPTOMS:
- White, calloused areas surrounding a central feeding puncture.
- Cat-facing (tomato fruit grows in distorted manner).
- Poor flavor of tomato fruit.

MANAGEMENT: Monitor for stink bugs by looking for eggs on foliage. Shake foliage over a beating sheet/tray to identify any fallen nymphs or adults. Handpick and destroy nymphs and adults as they are found. Due to the structure of stink bug adults, chemical control is often ineffective. Encourage natural enemies such as birds, spiders, wheel bugs, assassin bugs, and parasitic wasps.
DISEASES

Damping-Off

SEVERITY: high

OTHER HOSTS: all vegetable crops (transplant production)

GENERAL INFO: Damping-Off is caused by several soilborne fungi including *Pythium*, *Rhizoctonia*, *Fusarium*, and *Phytophthora* species. The fungi infect and kill the roots of germinating and established seedlings (Fig. 13). The fungi can survive in minute plant debris in the greenhouse, reused seed trays, and benches. Outbreaks of damping-off can occur when seedlings are kept overly wet. Damping-off pathogens present on dirty greenhouse benches produce spores in wet conditions that migrate to seed trays through openings in the tray bottom. Once symptoms are visible on seedlings in a tray, neighboring seedlings are likely infected as well.

SYMPTOMS:

- Seedlings shrivel and collapse at stem.
- Failed germination.

MANAGEMENT: Sterilize pots and trays by soaking in a 10–15% bleach solution or use quaternary ammonium compounds. Disinfect greenhouse benches and other supplies. If infections do occur, seedlings should be disposed of along with the potting mix as it may be harboring the soilborne fungi.

Tomato Fruitworm

SEVERITY: low to moderate

OTHER HOSTS: mainly sweet corn

GENERAL INFO: Tomato fruitworm (*Helicoverpa zea*) is more commonly known as corn earworm (Fig. 11). Adults are tannish-brown moths that are most active at dusk. The brown-headed larvae have bodies ranging in color from green, brown, and black. They are mainly a concern from mid-July through harvest. Dispersing adult moths are seen as early as May. There are three generations per year in northern Utah and four or more in southern Utah. Tomato hornworms overwinter as pupae in the soil in central and southern Utah, and they migrate north each season. Larvae feed on leaves and other parts of tomatoes. They can bore deep into tomato fruit causing premature fruit ripening.

SYMPTOMS:

- Round holes in tomato fruit.
- Chewed and distorted leaves.
- Discarded cast skins and frass on and around plant.

MANAGEMENT: Monitor for plants for eggs and larvae. Encourage natural enemies. Avoid planting tomatoes near post-silking corn fields. Remove and destroy cull fruits at harvest. Disk or plow soil and plant debris at the end of the season to disrupt the overwintering pupae stage. If populations are high, consider using an insecticide with an active ingredient such as carbaryl, permethrin, spinosad, *Bacillus thuringiensis*, or plant-based oils.

Potato Psyllid

SEVERITY: low

OTHER HOSTS: potato, eggplant, pepper, bindweed, nightshade weeds

GENERAL INFO: Adults resemble small cicadas or winged aphids that jump when disturbed. They have black bodies with white markings. Nymphs are flat and green-yellow with red eyes and an oval-shaped body with spines around the edges (Fig. 12). Potato psyllids are present season-long; they are responsible for the spread of the bacterium *Candidatus Liberibacter solanacearum*. Potato psyllids do not overwinter in northern Utah; they migrate north on air currents from warmer areas. Multiple generations occur each season depending on the temperatures.

SYMPTOMS:

- Leaf chlorosis (*Candidatus Liberibacter solanacearum*).
- Stunted plant growth (*Candidatus Liberibacter solanacearum*).

MANAGEMENT: Monitor for potato psyllids by visually inspecting tomato leaves for eggs or nymphs. No effective non-chemical controls exist; however, chemical control options are often unnecessary for home gardens.
Bacterial Speck

SEVERITY: low to moderate

OTHER HOSTS: none

GENERAL INFO: Bacterial speck is caused by Pseudomonas syringae pv. tomato. It spreads by infected transplants, seed, previously-infected plant debris, field equipment, and tools. Infections mainly occur during cool (63 °F to 75 °F), wet conditions. Bacteria survive up to three years on plant debris and for several months on plant stakes and equipment.

SYMPTOMS:
- Black spots with a yellow halo on foliage (Fig. 14).
- Pinpoint-like, scabby spots on fruit (Fig. 15).

MANAGEMENT: Monitor by examining the underside of leaves soon after planting, especially following cool, wet weather. Delay planting until susceptible conditions are over. Avoid overhead irrigation. Rotate tomatoes with other crops.

Big Bud

SEVERITY: low to moderate

OTHER HOSTS: pepper, potato

GENERAL INFO: Tomato big bud is caused by the phytoplasma Candidatus phytoplasma sp. spread by beet leafhoppers (Circulifer tenellus) (Fig. 17).

SYMPTOMS:
- Large, swollen green buds (fail to develop; do not set fruit) (Fig. 16).
- Thick apical stems.
- Shortened internodes and distorted small leaves.

MANAGEMENT: There are no chemical controls for big bud, and insecticide applications directed at beet leafhoppers are ineffective. Exclude leafhoppers with a floating row cover. Remove infected plants immediately upon detection.

Early Blight

SEVERITY: low to moderate

OTHER HOSTS: potato, pepper, eggplant, and Solanaceae weeds

GENERAL INFO: Early blight is caused by the fungus Alternaria solani (Fig. 19), and is spread via rain-splashed spores from plant debris or through with infected seed or transplants. Infections occur during warm temperatures (82 °F to 86 °F), on older, lower leaves.

SYMPTOMS:
- Brown spots with distinctive rings and a yellow margin (older foliage) (Fig 18).

MANAGEMENT: Plant resistant cultivars. Rotate out of nightshade family crops for at least two years. Remove infected plant debris at the end of the season. Fungicides are available but rarely needed as fruit is typically unaffected in Utah.
**Tomato Spotted Wilt Virus**

**SEVERITY:** moderate

**OTHER HOSTS:** bean, pepper, lettuce, eggplant, spinach, potato, buttercup, dandelion, lambsquarters, sowthistle

**GENERAL INFO:** Tomato spotted wilt virus (TSWV) is spread by thrips. TSWV is becoming more common in Utah tomato production. Once a plant is infected, there is no cure. The virus occurs more readily in fields infected in the past.

**SYMPTOMS:**
- Stunted plant growth (more severe in young plants).
- Necrotic tissue and mosaic ring pattern on foliage (Figs. 20 & 21).

**MANAGEMENT:** Plant resistant cultivars. Source healthy transplants. Remove and destroy infected plants. Monitor for thrips activity throughout the growing season and manage them when needed. Control weeds in and around the garden. No chemical controls exist for viruses therefore management should be directed toward thrips.

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**Tobacco/Tomato Mosaic Virus**

**SEVERITY:** moderate

**OTHER HOSTS:** tobacco, pepper, potato, and Solanaceae weeds

**GENERAL INFO:** Tobacco/Tomato mosaic virus (TMV and ToMV) spreads through seed, grafting, human handling, tobacco cigarettes, soil, and occasionally, chewing insects. TMV and ToMV are common throughout Utah and can survive up to 50 years in plant debris. Infection occurs when the virus enters the plant through wounds. It can be a problem throughout the growing season.

**SYMPTOMS:**
- Abnormal colors and patterns on leaves (Fig. 23).
- Distorted growing points.
- Abnormally shaped fruit, fruit lesions, and reduced fruit size (Fig. 22).

**MANAGEMENT:** Remove infected plants immediately. Source certified disease-free seed. Plant resistant varieties. No chemical controls exist for viruses therefore management should be focused on cultural practices.

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**Beet Curly Top Virus**

**SEVERITY:** high

**OTHER HOSTS:** beet, cucurbit, pepper, potato, spinach, Swiss chard, kochia, lambsquarters, mustards, and pigweed

**GENERAL INFO:** Beet curly top virus is vectored by the beet leafhopper (*Circulifer tenellus*) (Fig. 25). It is a concern during spring and summer. Beet leafhoppers acquire the virus when feeding on infected weeds or other plants and transmit it when feeding on healthy plants. The virus overwinters in living host plants. Severity of symptoms can vary from plant to plant, and outbreaks vary from year to year.

**SYMPTOMS:**
- Small, twisted, curled leaves (Fig. 24).
- Purple veins.
- Thickened, stiff, and crisp leaves.
- Downward curling petioles.
- Stunted growth.
- Yellowing and death of mature leaves.
- Premature fruit ripening.
- Reduced fruit quality and yield.

**MANAGEMENT:** There are no chemical control options for curly top, and insecticide applications directed at beet leafhoppers are ineffective. Exclude leafhoppers with floating row covers. Remove infected plants immediately upon detection.
Verticillium and Fusarium Wilts

SEVERITY: high

OTHER HOSTS: wide range of vegetable crops and ornamentals

GENERAL INFO: Both verticillium wilt (Verticillium albo-atrum) and fusarium wilt (Fusarium oxysporum f.sp. lycopersici) are soilborne fungal diseases that infect tomato plants through the roots. Fusarium wilt is highly specific; the special forms that infect tomatoes will not affect peppers or other vegetables. Fusarium wilt is a concern during high temperatures (90 °F) and moisture. Verticillium wilt is a concern during cooler temperatures (68 °F to 74 °F). Fusarium wilt can be seed-borne as well.

SYMPTOMS:
- Wilting, chlorosis, and possible red/purple discoloration of leaves or stems.
- Brown discoloration in vascular tissue (verticillium wilt) (Fig. 27).
- Distorted growth, necrosis, and premature plant senescence (Fig. 26).

MANAGEMENT: Plant resistant cultivars. Use raised beds for better water drainage. Clean equipment and shoes from attached soil when moving around the garden. Rotate out of susceptible host crops. There are no chemical controls for fusarium or verticillium wilts.

Buckeye Rot

SEVERITY: low

OTHER HOSTS: tobacco, onion, tomato, ornamental, cotton, pepper, and citrus (many other hosts)

GENERAL INFO: Buckeye rot is caused by the fungus Phytophthora parasitica (Fig. 29). It is common during warm, wet weather and spores are spread in water droplets. High soil moisture can increase risk of infection. Buckeye rot should not be confused with blossom-end rot, which is caused primarily soil moisture irregularities and not a pathogen.

SYMPTOMS:
- Small brown spots on fruit (eventually becoming large lesions with concentric rings of light and dark brown discoloration) (Fig. 28).
- Lesions are firm with smooth margins (eventually becoming soft and decayed).

MANAGEMENT: Reduce soil compaction and provide good drainage. Mulch and stake tomatoes to avoid contact with the soil. Rotate tomatoes with non-solanaceous crops.

Leaf Mold

SEVERITY: low

OTHER HOSTS: none

GENERAL INFO: Tomato leaf mold is caused by the fungus Passalora fulva (Fig. 31). Tomato leaf mold is most common during extended periods of leaf wetness and high relative humidity (risk increases in greenhouses and high tunnels). The optimal temperature for leaf mold is the low 70s. The fungi overwinters on old plant debris or in the soil as resting structures called sclerotia.

SYMPTOMS:
- Yellow spots on the upper leaf surface.
- Clusters of olive-green spores on undersides of affected leaves (Fig. 30).
- Older foliage that becomes infected first will die prematurely.

MANAGEMENT: Properly space and trellis tomatoes to allow air flow. Use drip irrigation instead of overhead. Apply a preventive fungicide that use an active ingredient such as copper hydroxide, Bacillus amyloliquefaciens, or hydrogen dioxide.
REFERENCES & FURTHER READING


IMAGE CREDITS

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