

Common Tomato Disorders Under Desert Conditions

Whether you call it a fruit or vegetable, the tomato is the most popular of all home-grown foods in the United States. A survey by the National Gardener Association found 93% of the American gardeners surveyed grew tomatoes. The main reason for the popularity of this nutritious vegetable is its excellent flavor and yield. Unfortunately, there are more production problems growing tomatoes than growing many other vegetables.



Harsh climatic conditions, nutrient deficiencies, poor cultural practices and disease all bring on disorders that limit tomato production. Common problems include blossom drop, blossom end rot, curling leaves, sunscald, herbicide damage, cracking and poor overall growth. Gardeners can minimize these problems by using good cultural practices and common sense. Here's how.

Blossom Drop

The most often asked question by southwest tomato growers is, "Why do tomato blossoms drop?" Blossom drop may be caused by one or more of the following.

- Too low to too high temperatures
- Low humidity
- Unusually heavy fruit set
- Improper watering
- Poor fertility practices

Tomatoes grow best if temperatures range between 70°F and 90°F, but can tolerate temperatures lower than 55°F and higher than 100°F for short periods. However, extended periods lower or higher than these temperatures abort the blossoms. Temperatures lower than 55°F for four or more consecutive nights cause blossoms to drop.

Temperatures that are higher than 90°F during the day are the main cause of blossom drop. In fact, temperatures over 104°F for four hours or more cause the flowers to abort. Night temperatures higher than 75°F will also

cause blossom abortion. These sustained, hot temperatures at night burn up the food reserves the tomato produced during the day and the flowers abort.

A tomato flower has both male (stamen) and female (pistil) parts with the same flower. The yellow stamen wraps around the greenish pistil in the center of the flower. Under proper conditions, pollen from the stamen transfers to the sticky stigma or tip of the pistil. This transfer requires a jarring wind or a flick of the finger. Without pollination, which stimulates fruit set, the flower withers and dies.

Relative humidity plays a major role in pollen transfer. Tomatoes set best when humidity is between 40% and 70%. The Southwest has long, dry periods with the humidity below 20%. As a result, pollen does not stick to the dry stigma. Calm, windless summer days also contribute to flower drop.

Directing a strong jet of water at the blossoms twice during the heat of the day will improve blossom set when the daytime temperatures range between 90°F and 100°F and below 75°F at night. The evaporating moisture lowers the temperature, raises the humidity and jars the pollen loose, improving set. If daytime temperatures exceed 100°F and night temperatures stay above 75°F, this technique is not effective.

Many gardeners give up on tomatoes when the plants stop setting. Tomatoes will produce again in the fall when temperatures cool. Gardeners should continue to fertilize and water during the period of no fruit set to ensure well developed and productive plants for the fall.

An unusually heavy fruit set on young plants is another reason for blossom drop. Strong competition by developing fruits for existing food reserves within small or weak plants limits the energy available to the new flowers. Although the plant may set blossoms initially, its poor condition may not withstand the increased competition for food and many blossoms and fruit will abort. Those left will not develop or grow properly. Once fruit is picked, the plant

can redirect its energy and grow. A sufficient supply of food will be directed to the flowers and blossoms will then set again.

Excessive irrigations and water stress also cause blossom drop. Proper irrigation is important. The root zone should be kept uniformly moist throughout the growing season to develop a large, healthy root system. Tomato roots have a potential to grow to a depth of 3 to 5 feet. However, shallow watering, heavy wet, poorly-drained soils, caliche or hard pan interfere with deep rooting. Every effort should be made to avoid or remedy these adverse conditions.

Two or three deep irrigations during the first month after planting will help establish the plants. After that, deep irrigations should be continued throughout the growing season.

High or low application rates of fertilizer will also cause blossom drop. Over-fertilization may cause water stress resulting in tissue damage inside the tomatoes. Under-fertilization leads to spindly vines with low food reserves that cannot support a crop.

To determine the tomatoes' nitrogen needs, stems should be examined 6 inches back from the end of the major branches. Ideally the stems should be the thickness of your small finger. If smaller, nitrogen fertilizer should be applied. If stems are larger and growth is vigorous, fertilizer, especially nitrogen, should not be added.

Blossom-End Rot

Blossom end rot is a large, dark, sunken, leathery spot found on the bottom or blossom end of tomato fruits. Disfigured fruits usually appear in late spring and early summer, particularly following a heavy fruit set or a sustained dry period. To avoid continued development of blossom end rot, fruit should be thinned and adequate irrigation provided.

A lack of calcium also contributes to blossom end rot. Calcium is required for proper cell wall development. However, calcium moves slowly in water stressed plants. Light, infrequent irrigations cause more blossom end rot than the lack of calcium in the soil. Light, frequent irrigations also contribute to blossom end rot because an ade-

quate root system is not developed to allow enough calcium to be removed from the soil. Deep, infrequent irrigations are best.

Blossom end rot can be controlled by continuously providing ample water and good drainage. The soil around the tomato should be heavily mulched during the summer to reduce moisture fluctuation. A calcium fertilizer such as calcium nitrate should be applied if needed.

Curly Top Virus

Virus diseases in crops are very difficult to control and can result in severe losses. It is also hard to predict severity and incidence from season to season due to complex interactions that exist among the pathogen (virus), host (plant attacked), vector (organism that transmits the virus), virus source, and environment. Because of these uncertainties, it is difficult for growers to adopt control strategies and apply them year to year.

Curly Top Virus (CTV) is widely distributed across the west and is transmitted by the beet leafhopper. Beet leafhoppers feed on many crops including tomatoes, beets, peppers, squash, beans, cucurbits (squash, melons, and cucumbers), spinach, potatoes, and other crops. Weeds and ornamentals are also susceptible. As the plant becomes infected, leaves become puckered and stunted. Tomato leaves curl and roll upward and the main leaf petiole curves downward. The leaves also become leathery and turn yellowish. Eventually the plant stops growing and dies. The infected tomatoes turn red even when immature and edible size fruit may be bitter tasting.

Spraying insecticides on tomato plants is not an effective leafhopper control strategy. In fact, leafhoppers do not prefer tomatoes as a food source. They inadvertently land on the plant, feed, then move on. Their preferred food source is often weeds. As the weeds dry up, the leafhoppers move into cropped areas to forage.



As far as we know, there is little secondary spread of the CTV from one tomato plant to the next within a field.

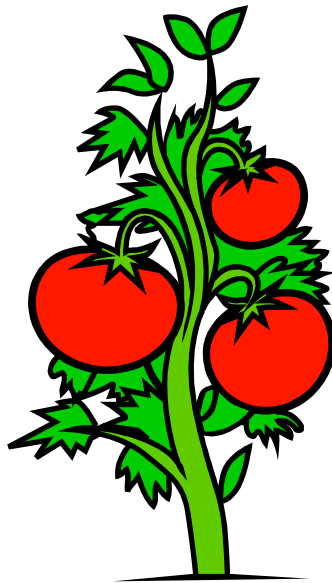
One preventative strategy is to control weeds adjacent to cropped areas before transplants are planted. Tumbleweed (Russian thistle) is a favorite food source of beet leafhoppers. Fine mesh barriers (ramie or other horticultural fabric) are another strategy to prevent leafhoppers from feeding. There are also four CTV resistant tomato varieties. These are: Roza, Rowpac, Columbia and Saladmaster. These four varieties are also resistant to Verticillium and Fusarium.

Splitting Fruit

Split fruit is often caused by erratic or excessive irrigation. Some tomato varieties are prone to splitting.

Tomato Hornworm

The tomato hornworm (Manduca quinquemaculata) is a sphinx moth. The word “hornworm” described the distinctive pointed structure on its tail. The tomato hornworm larva is green with diagonal white lines on the side of each segment that form L-shapes. The adults are large gray moths with a wingspan of five inches. They have four yellow-orange patches on each side of their abdomen. The larvae (hornworms) can reach four inches in length. Experienced tomato growers monitor for damage (chewed leaves and stems) and frass (droppings). The hornworms are usually in the interior of the plant during daylight hours. Hand picking the larvae is the best control option.



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