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report on
PLANT
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PHYSIOLOGICAL DISORDERS OF TOMATO

Important physiological disorders of tomatoes are blossom-end rot, catface, growth cracks, sunscald, yellow shoulder, chemical injury, and adventitious root.

BLOSSOM-END ROT. Blossom end rot is a very common problem on green and ripe tomatoes. It begins with light tan, water-soaked lesion, which then enlarges, turn black and leathery (Figure 1). Although blossom end rot itself causes only local injury, secondary organisms frequently invade the lesion and cause complete rot of the fruit. It often occurs in rapidly developing fruit during periods of hot, dry weather and tends to have the greatest impact on the earliest maturing fruit. A localized calcium deficiency in the distal end of the fruit results in blossom-end rot because calcium is not a highly mobile element, a deficiency can occur with a fluctuation in water supply, even for a short period of time. Thus, moisture extremes promote the likelihood of the disorder. Other conditions that reduce calcium uptake by the plant, such as high salts, the use of ammonium nitrogen, and high relative humidity can intensify the problem. Rapidly growing plants are more subject to the disease. Blossom-end rot can be managed by proper fertilization, water management, and planting cultivars tolerant to blossom-end rot. Soil testing is recommended to determine if there is a shortage of calcium. Liming with high-calcium limestone 2-4 months before planting can alleviate blossom-end rot. If calcium deficiency occurs, foliar spray of anhydrous calcium chloride may be helpful.

Figure 1. Blossom-end rot of tomato. (Photo courtesy Garden of Eden)

Figure 2. Catface of tomato.

CATFACET. Catface tomatoes are misshapen, with enlarged scars and holes in the blossom end of the fruit (Figure 2). Cold weather at the time of

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blossom set distorts and kills certain cells that should develop into fruit, resulting in the deformities. The disorder is most often observed among first-formed fruit. Catface can be controlled by planting cultivars not subject to this damage. In greenhouse, heating to avoid low temperatures can reduce catfacing. This includes temperature control for the growing of transplants for field planting.

Figure 3. Growth cracks of tomato. (Photo courtesy Missouri Botanical Garden)

GROWTH CRACKS. Two types of cracking occur in tomato fruit. Concentric cracking is a splitting of the epidermis in circular patterns around the stem scar. Radial cracking is a splitting that radiates toward the blossom end from the stem scar (Figure 3). Cracks occur on tomatoes as they near maturity, depending on the cultivar. Less susceptible cultivars do not crack until the breaker stage; more tolerant cultivars do not crack until they are red ripe; resistant cultivars rarely crack at all. Cracking is associated with rapid fruit development and wide fluctuations in water availability to the plant. Fruit that has reached the ripening stage during dry weather may show considerable cracking if the dry period is followed by heavy rains and high temperatures. Growth cracking could be minimized by planting cultivars tolerant to cracking, proper water management, practicing good nutritional program to prevent overly succulent plants, and preventing defoliation due to foliar diseases to limit fruit exposure.

Figure 4. Sunscald of tomato. (Photo courtesy Missouri Botanical Garden)

SUNSCALD. Sunscald occurs on green tomato fruit exposed to the sun. The initial symptom is a whitish, shiny area that appears blistered. The killed, bleached tissues gradually collapse, forming a slightly sunken area that may become pale yellowish and wrinkled as the fruit ripens (Figure 4). The killed tissue is quickly invaded by secondary organisms and the fruit decays. Fruit most subject to sunscald are those that have been exposed suddenly to the sun because of pruning, natural spreading of the plant caused by a heavy fruit load, or loss of foliage from diseases. The extent of the injury is more serious during periods of abnormally high temperatures. Sunscald can be managed by careful pruning and harvesting, good foliar disease control, and planting cultivars with good foliage cover that does not break open and expose the fruit.

YELLOW SHOULDER. Yellow shoulder (also referred as yellow top or persistent green shoulder) affects the shoulders of tomato fruit exposed to the sun. Chlorophyll in this area is slow to break down as ripening occurs, resulting in a patch that either remains green or eventually turns yellow but not red

(Figure 5). The disease may affect the entire shoulder or only a small irregular patch. The outer pericarp in the affected area is hard and white. The cause of yellow shoulder is not fully understood. Apparently fruit exposed to high temperatures during fruit maturation and ripening express this disorder. Tomato varieties vary in susceptibility to yellow shoulder, with those having dark green shoulders being more susceptible than uniform ripening varieties. Yellow shoulder can be managed by planting resistant cultivars, avoiding exposure of fruit to the sum, and picking fruit at the breaker stage (first pink color) and are allowed to ripen at room temperature.

Figure 5. Yellow shoulder of tomato.

CHEMICAL INJURY. Major chemical damages to tomatoes are caused by herbicides. A common herbicide injury problem in tomatoes is caused by phenoxy herbicides such as 2,4-D and dicamba. These are hormone-type herbicides that are common components of products used to control broadleaf weeds in lawns, pastures, and grain crops. These herbicides are prone to drift or move with water to non-target sites. Symptoms of phenoxy herbicide injury appear primarily as a distortion of new growth that occurs following exposure to the herbicide. Young leaves do not fully expand, are narrow and pointed, and tend to curl downward (Figure 6).To avoid herbicide injury, spray of the herbicide should be avoided when wind may carry spray drift toward tomatoes or other sensitive crops. Also, herbicide-spray should be with low pressures coarse-spray nozzle, and spray should be applied as close to the ground as possible.

Figure 6. 2,4-D damage on tomato foliage. (Photo courtesy Clemson University)

ADVENTITIOUS ROOTS. Tomatoes may form roots along the stem aboveground when humidity is high. Sometimes it is in reaction to stress or disease. Some varieties are more likely to develop adventitious roots than others. The adventitious roots may be a reaction to drought-stressed. It might also be in reaction to a common leaf disease, early blight, which causes yellow leaves.

Figure 7. Adventitious roots on tomato stems.