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College of Agricultural, Consumer and Environmental Sciences

report on
PLANT
DISEASE

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BLOSSOM-END ROT OF TOMATO

Blossom-end rot is a noninfectious disease or disorder of tomato (and pepper) fruits caused by low levels of calcium in fruit. The disease occurs to some extent wherever tomatoes are grown. Losses of fruit vary from a tracer up to 70 percent, depending on the year, variety, method of culture, weather, and location. Few to many fruit on each plant may be affected. Blossom-end rot occurs frequently where large fluctuations in soil moisture are allowed to occur. It is usually more serious on plants that are pruned and staked than on other plants.

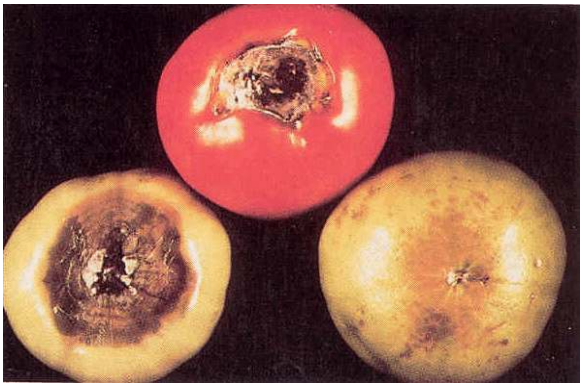

Figure 1. Blossom-end rot of tomato.

SYMPTOMS

The first external symptom is a small, somewhat watersoaked spot at or near the blossom end of the fruit. It occurs most often on fruit one-third to two-thirds mature. The area enlarges and becomes dry, sunken, flattened, brown to black, and papery or leathery (see illustration). The veins may show through the lesions as black lines. When the disease is severe, 560 percent or more of the tomato may be affected. There is no soft rotting of the fruit unless the affected areas are invaded by secondary decay fungi and bacteria. Affected fruits usually ripen earlier than healthy ones.

Predisposing Factors

Conditions favoring blossom-end rot also favor noninfectious leaf roll. Blossom-end rot is most common when there are: 1) prolonged dry periods; 2) frequent or heavy rains followed by an extended period of dry weather; 3) soil conditions unfavorable for uptake of calcium; 4) excessive soil salinity; and, 4) root damage from infectious diseases. Other factors favoring blossom-end rot include early planting in cold soils, poor fruit setting, and high temperatures.

Any condition that reduces the ability of the roots to absorb water and, hence, soluble calcium salts predisposes the plant to blossom-end rot. Some factors that could affect the roots are root-rotting fungi, nematodes, underwatering, overfertilizing, root pruning due to cultivation or insect feeding, and lack of aeration due to soil compaction or overwatering.

Losses from blossom-end rot increase when the soil contains an excess of total soluble salts in relation to soluble calcium salts. An excess of soluble ammonium, potassium, magnesium, or sodium salts

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reduces calcium uptake by the plant. Blossom end rot is rarely a problem in soils where calcium is available in proper balance with other available nutrients.

Sometimes rapid luxuriant plant growth accentuates development of the disorder, because the new growth draws heavily on the available supply of calcium in the soil. Calcium is not translocated within the plant from older to younger tissues. Therefore, injury may appear on the blossom end of the young fruit, which is especially sensitive to a lack of calcium.

Some tomato varieties are much more susceptible to blossom-end rot than others (see Table 1). Generally, elongated pear and plum tomatoes used for processing and canning are prone to this disorder.

Table 1. Incidence of some tomato varieties to blossom-end rot grown at the Dixon Springs Agricultural Center under irrigation.

Low Incidence Losses less than 10% in severe years	High Incidence Losses of 15 to 30% or more in severe years
Celebrity	Big Boy
Fresh Pak	Castle King
Jet Star	Fantastic
Manapal	Independence
Mountain Pride	Supersonic
Pik Red	Surprise
Sunny	Whopper
Winter	Wonder Boy

CONTROL

1. Grow tomatoes in well-drained soil high in organic matter with a soil reaction (pH) between 6.5 and 7.5.

2. Apply fertilizer and lime according to a soil test. The balance of phosphorus, potassium, and magnesium with calcium is very important. Avoid excessive use of commercial fertilizers containing large amounts of ammonia or nitrate nitrogen and highly soluble potassium, magnesium, or sodium salts. A light application (50 pounds per 1,000 square feet) of dolomitic limestone, gypsum, super phosphate, or hydrated lime (household or builder's lime) may be worked into the soil to a depth of 4 to 6 inches before planting. In home gardens, mixing a tablespoon of hydrated lime with the soil before setting a tomato (or pepper) transplant has given satisfactory control.

3. When practical, grow varieties that are less susceptible to blossom-end rot. Although there seems to be no clear-cut line between resistant and susceptible varieties, some varieties have consistently exhibited some degree of resistance (Table 1). In variety trials at the Dixon Springs Agricultural Center, conducted by J. W. Courter, losses from blossom-end rot have varied widely among different varieties and from year to year. In one year, losses were as high as 70 percent of all fruit on an individual variety. The most significant factor influencing blossom-end rot in field trials, other than varietal susceptibility, seems to be rainfall. Average losses were greatly reduced when greater than normal amounts of rainfall occurred during the ripening period; regardless of the moisture conditions prior to this period.

4. Avoid close, deep cultivation after fruit set, especially in dry weather. Scraping the oil lightly with a hoe is usually sufficient to control weeds in the home garden.

5. Maintain as uniform a supply of soil moisture as possible. During the growing season, especially as the fruit is developing, tomatoes require at least 1 inch of water per week, supplied as rainfall or irrigation. Watering with a soaker hose is preferable in the home garden. Do not let the plants undergo moisture stress.

6. Mulching tomatoes helps to conserve moisture in the soil. Suitable materials are straw free of weed seed, corncobs, grass clippings, peat moss, and black plastic.

7. Transplants should be grown slowly and not hardened-off severely before going into the field or garden.

8. Spraying calcium nitrate solution (4 pounds dissolved in 100 gallons of water or 1 level tablespoon in a gallon of water) on the foliage may reduce losses under favorable weather conditions. Apply the spray when the first fruits are the size of grapes. Continue at weekly intervals until at least four applications have been made. This places calcium directly where it is most needed. Foliar applications of calcium, however, are not a substitute for proper soil treatment before planting for maintaining an adequate supply of calcium. Foliar applications can only supplement soil calcium during unfavorable periods.

9. Calcium deficiency is not a problem in greenhouse tomatoes if limestone is added in amounts large enough to maintain a pH of 6.8 to 7.0. The soil calcium level should range from 150 to 200 parts per million (ppm). Greenhouse tomato growers with a blossom-end rot problem may apply calcium to the growing crop by side-dressing with 50 pounds of gypsum or 6.5 pounds of calcium nitrate per 1,000 square feet. Avoid excessive application of nitrogen in the ammonium form.