

## DIAGNOSIS AT A GLANCE

<b>Causal agent:</b>	Calcium deficiency in developing fruit.
<b>Hosts:</b>	Many vegetable crops, notably peppers, tomatoes, and watermelons.
<b>Symptoms:</b>	Light tan to brown lesion at the blossom end of fruit. Lesions become sunken and leathery with time. Lesions turn black when invaded by secondary organisms.
<b>Conditions for disease:</b>	Moisture stress; too much nitrogen (N), magnesium (Mg), potassium (K), or sodium (Na) fertilization; high salt levels in soil or water.
<b>Management:</b>	Good water and fertilizer management. Avoid injury to roots.

Every year many commercial growers and home gardeners become concerned about a large tan to black spot on the bottom of fruit, especially on peppers and tomatoes. No fungi, bacteria, or any other living disease organisms are known to cause the condition, and it is not spread from one plant to another. This is “blossom-end rot,” a physiological disorder caused by a calcium deficiency in the developing fruit compounded by an imbalance in water and plant nutrients.

The disorder first appears as a brown discoloration on the blossom end of the fruit (the end opposite the stem) (Figures 1A and 1B). On chile fruit, the spot occasionally will be off to the side of the blossom end. The spot enlarges as the fruit matures and may eventually cover up to half the fruit. With age, the lesion tissue becomes sunken and leathery. Eventually, secondary fungi or bacteria may invade the tissue. Secondary invasion results in a black or watery appearance (Figures 2A and 2B). Affected fruit ripens faster than unaffected fruit.

Calcium deficiency may result from insufficient calcium in soil or the plants’ inability to take up sufficient amounts of calcium. Insufficient uptake can occur due



Figure 1A. Blossom-end rot on peppers.



Figure 1B. Blossom-end rot on tomatoes.

to 1) too much nitrogen, magnesium, potassium, or sodium fertilization; 2) very wet or very dry conditions; 3) high salts; or 4) a combination of these factors. As the weather warms and the plants begin to grow more rapidly, requirements for water and calcium increase. Because calcium is not a highly mobile element, a

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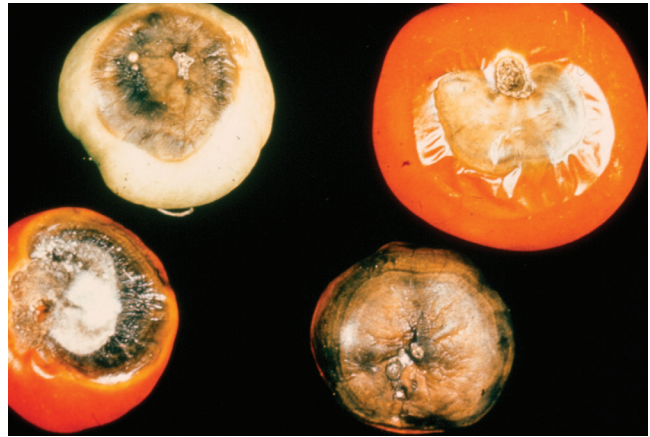
**Figure 2A.** Secondary infection in chile pepper after developing blossom-end rot.

fluctuation in water availability—even for a short period—can result in a deficiency. It is at this time that fruit begins to show symptoms of blossom-end rot.

Blossom-end rot is best prevented or greatly reduced by following a management program that includes pre- and post-planting practices. Using some or all of these management practices, when possible, should help reduce the incidence and severity of this disorder.

### PRE-PLANT TREATMENTS

1. Take a pre-plant soil test to determine pH and nutrient levels (for more information on soil tests, see Guide A-146, *Appropriate Analyses for New Mexico Soils*, available at [http://aces.nmsu.edu/pubs/\\_a/A146.pdf](http://aces.nmsu.edu/pubs/_a/A146.pdf)).
2. Adjust pH of the soil to between 6.8 and 7.2.
3. Use only moderate amounts of fertilizer—enough to keep plants green and vigorous, but not too lush. About 1 1/2 pounds of 10-20-10 per 100 square feet mixed into the topsoil just before planting is usually enough. Remember to check your soil test and adjust to your specific needs.
4. Select cultivars that are more tolerant of conditions that lead to blossom-end rot (for peppers, shorter, rounder-fruited varieties tend to be more tolerant than long-fruited varieties).
5. Plant in an area with good drainage. Plants sitting in saturated soils for prolonged periods may develop problems associated with disorders and diseases that result from a loss of roots.



**Figure 2B.** Secondary infection in tomatoes after developing blossom-end rot.

### POST-PLANT TREATMENTS

1. Water carefully so the soil is never too wet or too dry, to a depth of 2 feet. Routinely check the soil moisture in the root zone by digging with a trowel to a depth of 1 foot. To avoid water stress, the soil in the root zone should be moist enough to easily form a ball. This technique can be used to determine when to irrigate.
2. Fertilize with a nitrogen sidedressing only if necessary to maintain “normal” green color and moderate growth. Use calcium nitrate or ammonium sulfate at the rate of 1/4 pound per 100 square feet.
3. Restrict all cultivations to the top inch or two of the soil to avoid damage to the roots, or use a mulch to eliminate the need for cultivation.
4. Although erratic, some success has been found using calcium sprays during the growing season. To try this treatment, spray the plants (leaves and fruit) with a mixture of 2 level tablespoons of calcium chloride in 1 gallon of water. Apply 2 more sprays at 1-week intervals. Be careful not to wash spray residues off the leaves and fruit with irrigation water.



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