Many people in the Mojave, Sonoran, and Chihuahuan deserts notice a peculiar odor on the rare occasions when it rains. It is the scent of the creosote bush (*Larrea tridentata*) also called Greasewood. Although some refer to the smell of the crushed leaves as the “heavenly essence of the desert,” the Spanish word for the plant, hediondilla, means "little stinker," signifying that not everyone considers the odor heavenly or pleasing. The smell of coal tar from this plant is how creosote bush got its common name.

Creosote is a native, drought-tolerant, evergreen shrub that grows up to 13 feet tall and 10 feet wide, yet usually seen smaller. This plant has numerous branches with waxy green leaves coated with a resin to prevent water loss in the hot desert. In the Mojave Desert, yellow flowers bloom in May and again anytime during the summer if the plant receives enough rain. Flowers turn to round, white wooly puffs, which are the fruit of the creosote bush. Creosote grows below 5,000 feet elevation preferring full sun and non-compacted soils. It is believed that the bush produces a toxic substance through the roots to eliminate plants near it competing for water. Creosote bushes are slow growers yet live a long time, many of them existing (continued on page 3)
Companion Planting

Agronomists use the term “intercropping” to describe the spatial arrangements of companion planting systems. Intercropping systems range from mixed intercropping to large-scale strip intercropping. Mixed intercropping is commonly seen in traditional gardens where two or more crops are grown together without a distinct row formation. Strip intercropping is designed with two or more crops grown together in distinct rows to allow for mechanical crop production. No-till planting or transplanting into standing cover crops can be considered another form of intercropping. For complete article: [http://www.bt.ucsd.edu/what_is_bt.html](http://www.bt.ucsd.edu/what_is_bt.html)

June Reminders

1. Apply Iron to your lawn once per month.
2. Check drip emitters for proper coverage.
3. Deep water trees and shrubs weekly.
4. Check fruit trees for borers.
5. Hose off roses in the morning to increase humidity and control mites.
6. Check squash vines for squash bugs.
7. Apply ¼ cup of magnesium sulfate to roses.
8. Plant sweet potatoes.
9. Transplant palm trees if necessary.
10. Fertilize palms this month.
11. Fertilize roses at half the normal rate.
12. Prune only if necessary this month.
13. Sow seeds of basil, poppy, sunflowers, pentas, gerbera daisy, cosmos, lisianthus, Madagascar periwinkle, portulaca, marigold and zinnia.
14. As your melons come in, protect them from the moist soil.
15. Fertilize citrus this month.

Bacillus thuringiensis

Tomato horn worms have had enough degree days to possibly be active in your garden. The easiest way to eradicate them is *Bacillus thuringiensis* (Bt). Bt is a spore forming bacterium that produces crystals protein, which are toxic to many species of insects. Bt can be found almost everywhere in the world. Surveys have indicated that Bt is distributed in the soil sparsely but frequently worldwide. Bt has been found in all types of terrain, including beaches, desert, and tundra habitats. There are thousands of different Bt strains, producing over 200 cry proteins that are active against an extensive range of insects and some other invertebrates. Bt belongs to the family of bacteria, Bacillus cerus (*B. cerus*). *B. cerus* strains produce toxins that cause gastroenteritis (food poisoning) in humans. Bt is differentiated from *B. cerus* because it contains a plasmid that produces the protein crystals that are toxic to insects. Bt does not cause food poisoning. Bt is largely used in agriculture, especially organic farming. Bt is also used in urban spraying programs, and in transgenic crops.

### Corn and Tomato Sauté

Heat 2 teaspoons oil in a medium skillet over medium heat. Add 1 cup fresh corn and ½ cup diced shallots and cook, stirring occasionally, for about 5 minutes. Remove from the heat and let stand for 5 minutes. Stir in 1 pound tomatoes, 1 tablespoon chopped fresh basil, and ¼ teaspoon salt. Serve by itself, as a side dish, or on toasted bread as an appetizer.

Makes: 4 servings, about 2/3 cup each.
“You know you’re a Master Gardener if you have one hammer, one saw, one screwdriver, and seventeen different shovels.”

**Desert Favorite** *(continued from page 1)*

for one hundred years or more. Using radiocarbon dating and known growth rates of creosote, scientists have estimated the age of “King Clone” in Joshua Tree National Forest as 11,700 years (pictured below). The creosote plant was a pharmacy for Native Americans. The steam from the leaves was inhaled to relieve congestion and it was also used in the form of a medicinal tea to cure such ailments as flu, stomach cramps, coughs, colds, and others. Modern herbalists also have found uses for the ancient creosote. However, large doses have been shown to cause liver damage. Reptiles and many small mammals browse creosote bush as a food source and use it as a perch site to hibernate in burrows under it avoiding predators and excessive daytime temperatures. Desert tortoises are one of the many desert animals that bed in or under creosote. They dig their burrows under the bush where its roots stabilize the soil. It is host to an insect, Tachardiella larreae, which produces lac and deposits it on the stems of creosote bush. Lac is plastic when heated but hardens again on cooling, forming a strong bond like commercial sealing wax. Lac has been used by desert peoples to seal lids on food jars. This plant can be started from seed or purchased at local nurseries as established bushes. Beware these plants are very sensitive when transplanting and extra care will be needed. When supplied with water and fertilizer, creosote is useful in the home landscape as a privacy screen or addition to a southwest landscape. They are certainly an integral part of our desert environment and many desert animals depend on the creosote for food and shelter.

**June Planting**

<table>
<thead>
<tr>
<th>Jicama</th>
<th>Lisianthus</th>
<th>Marigold</th>
<th>Okra</th>
<th>Peppers</th>
<th>Pentas</th>
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</thead>
<tbody>
<tr>
<td>Basil</td>
<td>Black-eyed Peas</td>
<td>Cantaloupe</td>
<td>Carrots</td>
<td>Coreopsis</td>
<td>Gerbera daisy</td>
</tr>
</tbody>
</table>

**Organic Pest Control**

**Spider Mites** – Mix together 1 cup buttermilk, 2 cups wheat flour, and 2½ gallons water. Mix, strain and spray. This mixture causes mites to stick to plants and the mites seem to explode as the mixture dries.

**Caterpillars** – Bacillus thuringiensis (purchased online or at a hardware store) is effective against most leaf-feeding caterpillars while not harming any beneficial species that might be present.

**American Cockroach Bait** – Combine 1 part each: flour, cocoa, oatmeal, plaster of paris and boric acid – spread on a piece of cardboard – set out where cockroaches will eat, and children and/or pets will not eat.
Blossom-End Rot and Calcium Nutrition of Pepper and Tomato

Summary

The purpose of this publication is to introduce the problem of blossom-end rot and provide a guide to effectively diagnose and treat this problem.

Blossom-End Rot and Calcium Nutrition of Pepper and Tomato

Joshua L. Mayfield and William Terry Kelley

Introduction

Had the ancient Roman Empire not developed concrete and cement, the domed buildings, arched bridges and aqueducts we see today would not still give testimony to the Romans’ ingenuity or to the durability of a simple mineral: limestone. Although calcium (Ca) is well known as the main ingredient in limestone, it has also been used for building strong plant cell walls since long before man discovered its uses for lasting architecture.

Calcium serves several functions in plants, including cation-anion balance, transport processes of cell membranes and assisting with extension of primary root systems. For vegetable producers, calcium’s most important function during the crop fruiting stage is its role in cell wall/cell membrane stability. If Ca is deficient in developing fruits, an irreversible condition known as blossom-end rot (BER) will develop. Blossom-end rot occurs when cell wall calcium “concrete” is deficient during early fruit development, and results in cell wall membrane collapse and the appearance of dark, sunken pits at the blossom end of fruit. Many farmers and gardeners may treat this condition as a fruit disease; however, nutrient and water management regimes are the culprit. The purpose of this publication is to introduce the problem of BER and provide a guide to effectively diagnose and treat this problem.

Diagnosis Guide

Although no data exists to quantify how much annual economic impact blossom-end rot has on Georgia’s bell pepper and tomato industries, it is safe to say that significant loss of fruit occurs during the spring crop season, especially during hot, dry years. What is also unknown in the vegetable research realm is if a single cause leads to BER, or if (as past research indicates)
multiple factors contribute to its occurrence. One fact that everyone can agree on is that when BER is first noticed in the field, prompt action is essential to halt further incidence. Four simple questions in the field will lead to a timely diagnosis and treatment of the problem:

**Question 1. Is the problem disease- or nutrient-related?**

![Figure 1. Buckeye rot of tomato caused by Phytophthora. (Photo by D. Langston, UGA)](image)

There are only a few common fruit disorders resembling BER that can lead to an incorrect diagnosis of the problem. Fruit anthracnose may occur on pepper and tomato fruit, but only on the side walls. The same is true for sunscald, which appears on pepper fruit sidewalls and is pale in color. Buckeye rot, caused by *Phytophthora*, and cucumber mosaic virus (CMV) also resemble BER, but these disorders occur more infrequently than anthracnose. Blossom-end rot is uniformly dark brown and black in color, and appears ONLY on either the lower fruit sidewall or the blossom end of smaller and developing fruit. Often, symptoms will occur as far as 1/3 to halfway up the fruit, but will NEVER start at the stem (calyx) end. Also, BER symptoms will tend to appear during the first fruit set as, early on, growers are unaware of the problem until it’s too late. If these symptoms all correspond, the fruit has BER.

**Recommendation:** If these conditions all hold true, proceed to Question #2.

**2. Is calcium fertilization adequate?**

Examine liming and gypsum application records, along with the current season’s pre-plant soil test reports. If pre-plant soil test Ca levels are in the medium (801 to 1,200 lbs. Ca/acre) or high range (>1,200 lbs. Ca/acre), it is assumed that soil Ca levels are sufficient for crop growth. This is even more true for soil pH ≥ 6.0, with supplemental gypsum or lime being applied pre-plant at levels of 500 to 1,000 lbs./acre or higher.

**Recommendation:** If these conditions exist, proceed to Question #3.

Equally important to soil test results is plant tissue analysis. For bell pepper, sufficient leaf tissue percent Ca content just prior to (or at) early bloom stage should be within the range of 1.0 to 2.5 percent. For tomatoes, percent Ca content prior to (or at) early bloom should be within the range of 1.25 to 3.20 percent. Tissue levels below these would point to a possible emerging Ca deficiency.
Recommendation: No specific recommendations exist for alleviating a low soil Ca level after planting. However, calcium nitrate (CaNO$_3$) is a water soluble source of Ca and nitrogen (N) and is routinely injected in drip irrigation systems. Some research has begun on a relatively new material, calcium thiosulfate (CaS$_2$O$_3$), which also is available for drip injection systems. Injections of soluble Ca sources should begin at bloom and proceed until fruit is approximately golf ball-sized. This is believed to be the critical time when calcium must move into developing fruit to avoid onset of BER.

![Figure 2. Blossom-end rot of tomato. (Photo by Joshua Mayfield)](image)

![Figure 3. Severe BER symptoms progress from the blossom to the stem (calyx) end of the fruit. (Photo by Joshua Mayfield)](image)

Although some people believe foliar sprays can correct Ca deficiency in developing fruits, research is very inconclusive on this issue. What is well known is that Ca only moves in the plant via the xylem and moves with the transpirational water flow from the roots, up the plant and into developing leaves. Calcium has no ability to flow from the leaves via the phloem to the developing fruit. In addition, once fruit has grown to golf ball size, the waxy outer layer has developed and is believed to be quite impermeable to water. Therefore, it is recommended that all Ca supplied to fruiting vegetables be applied via the irrigation water so as to maximize uptake by roots.

**Recommendation:** If liquid fertilizers are already being used, proceed to Question #3.

**Question 3. Is nitrogen and potassium fertilization excessive?**
Research has shown that Ca in soil solution competes with potassium (K), magnesium (Mg) and ammonium-nitrogen (NH₄-N) for uptake in the plant. Although no established guidelines exist to determine what proportions of these nutrients in soil or plant tissue are appropriate, it is known that excessive shoot growth resulting from overfertilization of N and K during early bloom and fruiting stages is a major contributor to BER in developing fruit. Since Ca moves with the transpirational water flow, water is going to go to areas of new shoot growth that have the greatest transpirational demand. Calcium will therefore be deposited in the new shoot and leaf tissues that result from excess fertilization, and little will end up in developing fruit where it is needed most. At early bloom stage for bell pepper and tomato, leaf N and K analysis should both be within 4.0 to 6.0 percent. Levels higher than these may indicate excess fertilizer.

**Recommendation:** Cut rates of N and K if excessive top growth is occurring. Switch N source to Ca(NO₃)₂ or begin injections of CaS₂O₃ at bloom stage. If these steps are already being implemented, proceed to Question #4.

**Question 4. Is irrigation adequate?**

Some people believe the relative humidity and transpirational rates of tomato and pepper during the spring season are the real keys to understanding what factors trigger BER in fruiting vegetables. Fluctuations of soil moisture, as happens during a week of off-and-on rain, may trigger BER due to irregular transpiration rates, affecting the quantities and timing of water and
Ca moving up the xylem. Conversely, during hot, dry weather when transpiration is occurring at a much faster rate, developing vegetative parts such as growing leaves and stems become greater sinks for Ca than developing fruits. Lastly, as the waxy outer layer of a tomato or pepper fruit develops, the fruit’s transpiration rate decreases because water movement through the epidermal cells and evaporation into the outside air become difficult. The resulting decrease of Ca that flows into those young fruit tissues via xylem transport is believed to contribute to the onset of BER.

**Recommendation:** Some research findings have quantified a decrease of BER incidence with increased irrigation rates. However, no recommendations exist for determining the critical moisture levels required in soils to minimize this disorder, nor is information available regarding the severity of moisture deficits triggering BER.

![Figure 6. Blossom-end rot of bell pepper. (Photos by E. Maynard, Purdue University)](image1)

For now, the “feel” method is still the most tried and true method of assessing soil moisture in the field. Along the row and out to the shoulders of the bed, the soil should be moist enough to form a ball in your hand and not break apart. The optimal time to increase irrigation and ensure that adequate moisture is being supplied is from first bloom set through fruit development. If BER initiates in fruit, it is believed to be during this early stage of development.
Certain occasions exist where farmers run irrigation pumps “round the clock” and soil still will not form and hold a good ball shape. This may indicate that irrigation demand during the fruiting period is greater than that for which the pumping system was designed.

**Summary**

It is believed that both nutritional and environmental factors need to be considered when diagnosing BER and recommending treatments. First, a correct diagnosis must be made to avoid recommending costly fungicide sprays when none are needed. Next, a careful examination of a grower’s soil test and leaf analysis records, in addition to their irrigation management practices, will help determine if additional Ca alone or in combination with increased irrigation scheduling will solve the problem. Equipped with a basic knowledge of plant growth, fruit development and Ca movement in soils and plant xylem tissue, growers will have the tools necessary for diagnosing and correcting the adverse effects of blossom-end rot.

**Further Reading**


Hansen, M.A. 2000. Blossom end rot of tomato. Publication 450-703W. Virginia Cooperative Extension Plant Disease Factsheets, Virginia Polytechnic Institute and State University, Blacksburg, VA.


For complete article: [http://www.caes.uga.edu/applications/publications/files/pdf/C%20938_2.PDF](http://www.caes.uga.edu/applications/publications/files/pdf/C%20938_2.PDF)
Quick Facts...
- Squash bug eggs are shiny, slightly oval, and copper colored.
- Squash bugs can be the most destructive insect pest of squash and pumpkins.
- Both nymphs and adults feed by sucking sap from plants causing great damage.

Weather conditions appear to be very important in the severity of squash bug problems. Mild winter temperatures allow the overwintering adult bugs to survive from season to season.

In small plantings, hand-picking can be very effective. Attention should be given to the eggs which are easily detected in garden surveys and can be crushed when detected. Egg surveys should be done at least once a week during June when egg laying is likely to begin.

Since squash bugs often seek shelter around the base of plants, this area should be cleared of debris. Mulches often provide protective cover for squash bugs and damage can be worse on plants that are mulched compared to those grown over bare soil.

The area around the base of the plant is also a site where insecticide applications should be concentrated. Diatomaceous earth/pyrethrins applications around the base of the plant can be an effective method to control squash bug and is a treatment allowed in Certified Organic vegetable production.

A few other insecticides, including those with esfenvalerate, permethrin, or carbaryl as the active ingredient, can also control squash bugs. It is recommended that these treatments be applied early in the season. A first application should be made when eggs are first detected followed by a second application a week or two later to provide excellent early season control on young plants. This also reduces early population growth numbers that are available to lay eggs during the second generation later in the season.