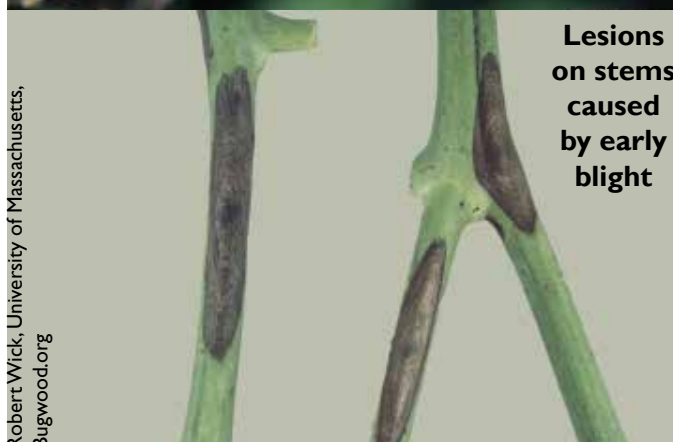


## HIGH MOISTURE PROBLEMS

The frequent rain storms and warm temperatures we have had in Utah lately can create ideal conditions for bacterial and fungal diseases. The following are some diseases to look out for.

### Early Blight on Tomato:

Early blight is caused by the fungus *Alternaria solani* and infects leaves, stems, and fruit. Early blight causes irregular necrotic spots on leaves that are often surrounded by a halo. Large lesions on leaves, stems, and fruit infected with the fungus may show concentric rings. Stem lesions are sunken and oval shaped. Stems on seedlings or transplants are often girdled. Severely infected plants may have leaves and fruit that fall off the plant prematurely.



In order for plants to become infected by the fungus, warm (75-84°F) and humid conditions are needed. Free water on

leaves can result in spore germination in less than one hour at temperatures above 80°F. Spores can then be spread by wind and splashing water. It usually takes 5 to 7 days for symptoms to appear after a plant has been infected. Early blight affects tomato, pepper, eggplant, potato and some weeds.

### Management:

Use disease-free seed and remove infected plant material (vines, leaves, and fruit) from your fields. Prior to planting next spring, remove volunteer tomatoes, peppers, eggplant, potatoes, and weeds in the nightshade family. Avoid overhead irrigation and space plants so that there is good airflow.

### Chemical Treatment Options:

- Chlorothalonil (application every 7-10 days)
- Azoxystrobin (Quadris)
- Boscalid (Endura)

### Bacterial Spot of Pepper and Tomato:

Bacterial spot, caused by *Xanthomonas vesicatoria*, is not very common in Utah unless we have warm, wet, rainy weather like we have seen lately. The source of first infection is usually contaminated seed, transplants, or carry-over in infested plant debris in the field. Once an infection occurs, bacteria are further spread from plant to plant by splashing water, or driving rain and wind-blown debris and soil from rain storms. This type of weather can injure leaves and fruits, allowing entry for the bacteria to cause infection.



Spots on leaves first appear as small, dark, water-soaked lesions. The spots often enlarge, and may be either dark brown or have tan-colored centers with dark margins and a yellow halo. Leaves with too many spots turn yellow and

## Disease Activity continued from previous page

drop, resulting in defoliation and a greater chance of sun scald on the fruit. Fruits on the plants are also susceptible to infection. Fruit blemishes begin as small, water-soaked spots which enlarge, becoming blister-like, rough, and warty. The spots are brown and seldom exceed 1/4 inch in diameter. Injury from this disease allows secondary fruit rotting organisms to get into the fruits, causing further damage.

### Management:

Prevent spread by avoiding overhead irrigation and pruning/tying plants when they are wet and diseased. Next spring, use certified disease-free seeds and transplants. (Bacterial seed treatments are available for use before planting if seeds are untreated.) Rotate peppers and tomatoes with non-related crops for at least 1 to 2 years.

### Chemical Treatment Options:

Fixed coppers (Champ, Cuprofix, NuCop, Kocide, Kop-R-Spray) at 5-10 day intervals during wet weather. Sonata is a biological control that works as a bacterial antagonist.

### Alternaria Leaf Spot on Beans:

Alternaria leaf spot has been seen on beans in Cache and Box Elder counties. Alternaria leaf spot is a fungal disease that causes small, brown, irregular-shaped lesions that develop into large, gray-brown oval lesions with concentric rings. Sometimes the infected area will fall out, resulting in the appearance of "shothole" damage. Older leaves are more susceptible than younger leaves. New infections occur when leaves remain wet for 24 hours or longer. Once spores develop, they can be spread by rain, wind, insects, and seed. The fungus overwinters on infected debris.



Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org

Howard F. Schwartz, Colorado State University, Bugwood.org

Alternaria leaf spot symptoms on melon

### Management:

Remove infected plant debris. Avoid overhead irrigation. Rotate crops, and ensure wider row spacing when planting.

## Insect Information

### Stink Bugs

Stink bugs are shield-shaped insects that can be green, brown, or black in color. When disturbed, they emit a foul odor.



Green stink bug adult on tomato fruit



Herb Pilcher, USDA Agricultural Research Service, Bugwood.org

Green stink bug nymph

### Feeding/Damage

Stink bugs feed on tomatoes by piercing the skin with their straw-like mouthparts, and sucking out the juices. The visible damage shows up as the fruit ripens, and is sometimes not seen until after harvest. The skin at the feeding site turns a mottled golden-yellow, light pink, or white. The insect may probe in several locations, resulting in the cloudy appearance. Under heavy feeding, the entire tomato may develop a golden color. On close inspection, you may see the pinpoint-sized puncture wounds in the middle of the spots. Hard, whitish, callous tissue develops beneath the skin at the area of wounding. By the time symptoms are visible, stinkbugs have often moved on, making control very difficult. Affected tomatoes are safe to eat.

## Insect Activity continued from previous page



Stink bug feeding can cause yellow blotches on ripe fruit



Hard, whitish, callous tissue develops beneath the skin where stink bugs have fed.

### Management

Stink bugs should be managed starting at the point when tomatoes reach 1 inch in diameter. The first step is to monitor for their presence by shaking foliage over a tray and counting fallen nymphs (wingless, young stage) and adults. The rule is that on average, one-half of a stink bug per tray shake will result in about 5% damaged fruit.

You can also look for stink bug eggs, nymphs, and adults on plant foliage. Stink bug eggs can be squashed or crushed. Nymphs and adults can be hand picked and put into a bucket of soapy water. Stink bugs can also be sprayed with a soapy water solution (mix water with a mild soap like laundry detergent). This method is most effective against the young nymphs and only works if the spray solution comes in contact with the bugs (the soapy water doesn't work if it's dried on the plant already). Nymphs are more susceptible to sprays than adults. Sprays made with garlic or mint oil can act as repellents and may help protect your plants.

### Chemical Treatment Options:

**Commercial growers:** most pyrethroid insecticides, such as bifenthrin (Tundra) or lambda-cyhalothrin (Warrior) work. Kaolin clay (Surround) can act as a repellent.

**Residential growers:** permethrin (Hi Yield), kaolin clay (Surround), carbaryl, insecticidal soap, pyrethrin (Safer Brand End All Insect Killer).

See the new [Utah Vegetable Production and Pest Management Guide](#) for more information on stink bugs (pages 37-38) and insecticides registered for stink bugs in Utah for commercial and home use (pages 50-55).

## Insect Activity continued from previous page

# Natural Enemies Spotlight: Big-eyed Bugs

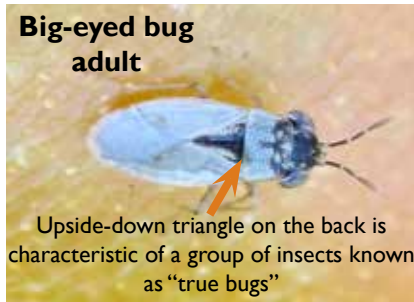
Big-eyed bugs are abundant and found in various sites from agricultural fields to small backyard gardens. They are small, fast, and have excellent vision, and often scurry away quickly.

Big-eyed bugs are predatory “true bugs”. This means they have the characteristic features of adult true bugs which includes a hardened upside-down triangle on their backs and membranous wing tips.

### What They Feed On:

Big-eyed bugs are generalist predators and actively search for prey. Nymph and adult big-eyed bugs are voracious predators and consume a wide variety of small prey including insect eggs, mites, aphids, flea beetles, and small nymphs, caterpillars, and larvae.

Their widely separated eyes give them an extensive field of vision for spotting their prey. When they catch their prey, big-eyed bugs pierce the prey with their needle-like mouth and suck up their body contents until dry, killing the prey immediately. A single nymph may consume several individuals to complete its development. Big-eyed bugs also supplement their diet by feeding on plant tissue, but plant-feeding is minor and does not result in noticeable plant damage.



### Appearance and Life Cycle:

Big-eyed bugs are small (about 1/6 of an inch long), oval, stout bodied insects that have relatively thick antennae. Their head is broad with large, widely separated bulging eyes providing them with a wide field of vision. The big-eyed bug mouth is needle-like, and tucked under the head and body at rest but is flexible and can be positioned in front of the head when feeding. Big-eyed bug species in the western U. S. vary in color from shiny black to grey or yellowish with red-brown spots.



Big-eyed bugs have multiple generations per year and are present throughout the plant growing season. They overwinter as adults in sheltered sites, weedy areas, and within perennial crops and shrubs. Adults become active in spring and begin depositing eggs on plants or soil duff. A female big-eyed bug can deposit an average of 150 eggs, which hatch in approximately 10 days, depending upon temperature. Nymphs emerge and develop over 3-4 weeks.

### How To Attract Them:

Encourage big-eyed bug populations and enhance their activity by providing them alternative places to hide, eat, and live. In general, habitats with diverse plants are more attractive to predators. Consider planting cover crops or flowering plants such as crimson clover, fennel, marigold (lemon gem), alfalfa, cosmos, and spearmint which can provide alternative food sources, shelter, and overwintering sites.



**Precautionary Statement:** Utah State University Extension and its employees are not responsible for the use, misuse, or damage caused by application or misapplication of products or information mentioned in this document. All pesticides are labeled with ingredients, instructions, and risks. The pesticide applicator is legally responsible for proper use. USU makes no endorsement of the products listed herein.

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