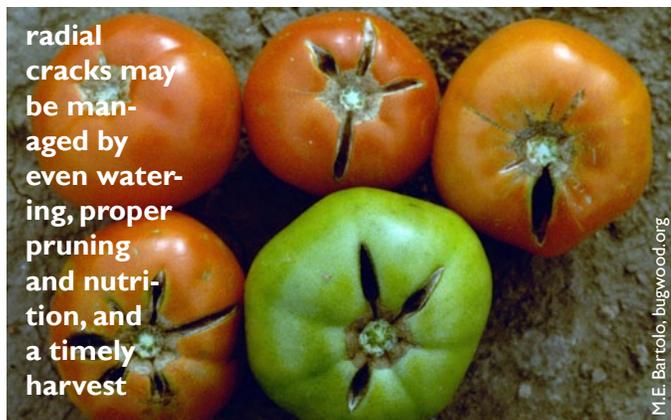
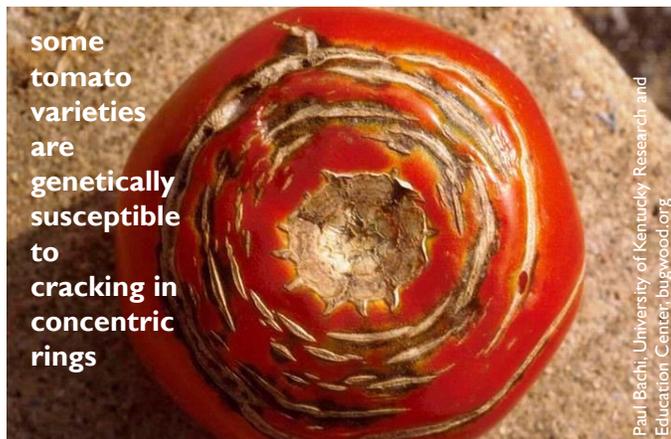


Insect/Disease Information

VEGETABLES

Why Tomatoes Crack



Cracks or splits can happen in tomatoes either in a circular pattern (concentric) or they may radiate out from the stem. Tomatoes crack when the skin of the tomato does not stretch enough to accommodate growth or internal pressure.

Cracking may happen when the tomatoes are green, but most often happen as the fruit nears maturity.

The most common cause of cracking is irrigation practices that lead to wide fluctuations of soil moisture from very dry to very wet. An influx of water after a dry spell causes the fruit to quickly expand and ultimately crack. Mulching the soil under the plants can help to regulate soil moisture.

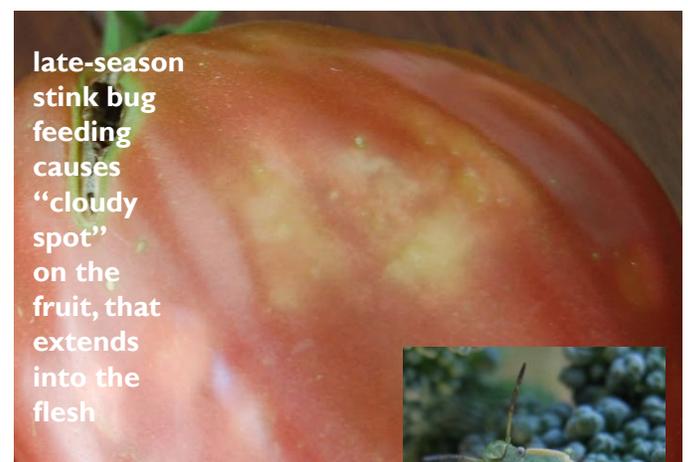
Cracking may also happen when tomatoes are pruned too early, exposing fruit to the heat of the sun. The fruit suddenly heats up during the day and cools relatively quickly at night. The temperature differential is bigger than it would have been had the fruit been shaded. The resulting expansion and contraction of the epidermis and its cells can result in cracking.

And finally, excess nitrogen fertilizer that leads to rapid, succulent growth, can also lead to cracking.

Most times, cracking is hard to prevent and just a genetic factor of the variety. Varieties whose fruits grow very fast in high temperatures and moisture are prone to splitting.

To manage cracking, the first step is to start with varieties that are less susceptible to splitting. According to Kansas State University, Mountain Spring, Mountain Pride, Mountain Fresh, Floralina and Sun Leaper are smaller-vined types that have shown good resistance to cracking. Resistant varieties and maintaining soil moisture and fertilization will help to prevent cracking.

Stink Bugs on Tomatoes



Stink bugs are the shield-shaped insects that can be green or brown in color. When disturbed, they can emit a foul odor. Stink bugs feed on tomatoes by piercing the skin with their straw-like mouthparts, and sucking out the juices. The visible damage



Insect/Disease Activity continued from previous page

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 pinprick-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 moved on, so control is impossible. Affected tomatoes are safe to eat.

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.



learn to recognize stink bug nymphs; they look different from the adults; these are green stink bug nymphs

Treatment

commercial growers: most pyrethroid insecticides, such as bifenthrin (Tundra) or lambda-cyhalothrin (Warrrior), kaolin clay (Surround) can act as a repellent

residential growers: permethrin (Hi Yield), kaolin clay (Surround), carbaryl, insecticidal soap

Tomato Russet Mite

Tomato russet mite is a tiny mite that feeds on the undersides of leaves. It is not visible to the naked eye and barely visible using a 20x lens. The damage it causes—yellow leaves, dead shoots—may be mistaken for a disease. With russet mite, the lowest leaves show symptoms first.

Feeding by the mites causes leaves to turn yellow, curl upwards, dry out, and eventually drop. Injury resembles nutritional deficiencies, plant disease or water stress. In a heavy



tomato russet mite can cause a tomato plant to collapse quickly

infestation, the entire plant may be affected. Damage from mites can be recognized by examining the leaves for a greasy texture and a bronzy appearance. If in doubt, get the problem identified by the Utah Plant Pest Diagnostic Lab.

Treatment:

sulfur or horticultural oil are both effective, but should not be used when temperatures will reach 85°F within 4 hours of treatment; commercial growers can use any miticide

Tomato Powdery Mildew

tomato powdery mildew affects the lowest leaves first

In northern Utah, tomato powdery mildew is not as common as mildews on other crops like melons, primarily because the fungus that causes this disease cannot survive the winter. Each year, spores must be blown from the Southwest, so symptoms usually won't appear until near the end of the season, and as a result, this disease does not cause losses. Therefore, treatment is usually not necessary.

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Powdery mildew on tomato may be hard to recognize because the fungus does not produce the white powdery spores that we are used to seeing on other plants. Infected plants will show symptoms on the lowest leaves first. They appear as small, bright yellow spots. The spots enlarge and eventually the tissue turns brown. As infections progress, the entire leaf withers and dies but remains attached to the stem. There will be no symptoms on the stems or fruit.

Harvesting Onions to Prevent Neck Rot



Neck rot is a disease of onions caused by a fungus called *Botrytis*. It is usually not seen until after the onions are stored, but with the proper harvesting techniques, the disease can be prevented.

Onions should be harvested when the tops of about half the plants in the garden or field have fallen over. This is a sign that the onions are mature and need to be pulled out of the ground, keeping the foliage attached. (If you wait too long, the bulbs may sunburn without the foliage to protect them.) The next, and most important step, is to allow the foliage to dry completely before removing it from the bulb. If green foliage is cut from the bulb and the bulbs are not dried, a soft rot such as *Botrytis* can easily set in soon after storing.

To dry, leave the onions in a dry, shady, and well-ventilated area right after harvest. After tops are completely dry and crispy, remove the foliage and store the onions in a cool, dry location. Do not store in plastic bags or buckets because they prevent air circulation and shorten the onions' life span. Open, mesh bags hung from hooks work best.

Cucumber Beetles

The western striped and western spotted cucumber beetles both occur in Utah, and feed on leaves, flowers, and fruit rinds. Both species begin activity in the spring, and are around for most of the summer. They are in their second generation



striped cucumber beetles gathering in a squash flower to feed on the petals and pollen, and seek cool shelter

now, actively feeding on the skins of watermelon, cantaloupe, zucchini, winter squash, pumpkin, and cucumber. The ripest vegetables are most attractive to feeding.

The first step in managing these beetles is to monitor for their presence. Examine all plant parts including undersides of leaves, at least once/week, starting when vegetables begin to ripen. No thresholds have been set for mature plants, but in general, 4-5 beetles per plant may warrant attention. Keep in mind that most mature plants can support substantial numbers without serious damage.

Three alternatives to an insecticide application are to hand pick beetles (and drop in soapy water), use strips of yellow sticky traps baited with a cotton ball soaked in clove or cinnamon oil, or spray the plants/melons with Surround (kaolin clay), which acts as a deterrent.

In general, clean up your field or garden at the end of the season to remove overwintering sites, and eliminate weeds in and around the garden. Keep a diverse landscape to attract predators and parasites that are enemies of cucumber beetles. Consider using a trap crop that will attract the beetles and prevent them from moving to the desired crop.

Treatment (for adults)

commercial: acetamiprid (Assail), carbaryl (Sevin), kaolin clay (Surround), Lannate, synthetic pyrethroids (Baythroid, Battalion, Tombstone, etc.)

residential: neem oil, pyrethrin (Ace Flower and Vegetable Insect Spray), carbaryl (Sevin, Bayer Advanced), kaolin clay (Surround), synthetic pyrethroids (many)

Where populations are high, adults can easily reinfest an area after treatment. Re-check plants 7 days later to determine if another application is warranted.

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Sap Beetles on Corn



Sap beetles are tiny black beetles with clubbed antennae. They feed primarily on decaying organic matter, but are opportunistic invaders of sweet corn and other fruits. Adults may feed on pollen or silks, and lay eggs in silks at the tip of ears. The small white larvae, if they enter the corn, will hollow out kernels of the upper half of the ear. They are particularly a problem in super sweet corn varieties with poor tip coverage. But where populations are high, they can still enter corn with tighter tips.

Because sap beetles feed on decomposing organic matter as well as ripe fruit, their populations can build where compost or cull piles occur adjacent to crops or gardens. Populations can be reduced for the following years by removing or burying debris and old or unwanted fruits and vegetables.

Chemical control of sap beetles is very difficult, because the beetles are inside the corn, making them almost impossible to reach with conventional topical pesticide applications. The only option that commercial growers could try, if necessary, is the pyrethroid Warrior.

Wilting Melons, Pumpkins, Cucumber

We have had many emails and phone calls this summer about melon or pumpkin plants collapsing and dying suddenly. Sometimes the cause may be a disease.

The main soil-borne root and stem diseases in Utah are fusarium wilt, verticillium wilt, and Phytophthora crown rot. They are all caused by a different pathogen, but their symptoms and treatment are similar.

The first symptom is wilting of individual vines with recovery at night or with watering. Eventually the entire plant wilts



verticillium wilt is identified by brown streaks in the stem

and dies. The affected plants will occur in low-lying areas or areas that have poor soil drainage or receive excess water.

The individual diseases are sometimes difficult to identify and require a diagnosis from the Utah Plant Pest Diagnostic Lab.

There are a few characteristics growers and gardeners can look for to determine if the wilting is caused by a disease. It is best to examine a dying plant by removing it from the soil. Examine the roots, and cut the stem lengthwise to see the inner tissue. Look for the following symptoms:

- gummy exudate from the stem near the soil
- constriction of the stem at the soil line
- brown streaking inside the stem
- brown lesion just under skin of stem
- brown, soft roots
- poor root system

The only option for dealing with root or stem diseases is to implement preventive measures. Crop rotation is of the



University of Maryland Crop Update, agdev.anr.udel.edu/weeklycropupdate/?p=338

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utmost importance because the pathogens can survive for several years even without a host plant. Make sure your soil is well-drained and fertile through amendments with compost. If you get the disease diagnosed, plant resistant varieties in subsequent years (in the new location). Plant labels or descriptions will provide disease resistance information. And finally, minimize plant stress with even irrigation.

Tomato Bacterial Spot



The Utah Plant Pest Diagnostic Lab received a tomato sample with a disease called bacterial spot, caused by *Xanthomonas campestris*. This disease is somewhat rare in Utah because it needs moist, humid conditions to spread.

Bacterial spot can infect tomato and peppers, and although spots can occur on both leaves and fruit, they are most commonly found on fruit. Spots are brown to black in color, circular, and surrounded by a yellow halo. They are slightly sunken and scabby.

The pathogen that causes this disease may be introduced to a field on infected seeds or transplants. It can then survive up to a year on plant debris that was infected the prior year. The pathogen becomes active once temperatures heat to the 80s and 90s, and when several hours of moist conditions occur. The bacteria are splashed onto leaves and fruit, causing infections. If conditions stay moist, new infections will continue until the plants are removed.

This disease is best managed through good sanitation (removing weeds and all plant debris at the end of the season), mulching (to prevent water splash from the soil), irrigating from the ground (to limit foliar wetness), pruning to promote good airflow, staking plants up from the ground, and removing the lowest leaves on the plants.

BERRY CROPS

Grape Leafhopper



Grape leafhopper is a sporadic pest in Utah, but can increase to high numbers in some areas. There are several generations per season, and populations in grapevines are the highest at this time of year. They feed on cell contents, leaving behind a distinctive stippled appearance to the leaves.

When leafhopper populations are high enough to cause the leaves to turn yellow and drop prematurely, fruit can become sunburned, resulting in delayed ripening. In addition, small black drops of excrement will mar the appearance of table grapes.

Treatment

commercial: acetamiprid (Assail), pyrethrin (Pyrenone-good coverage important), methomyl (Lannate), horticultural oil (0.1%)

residential: horticultural oil (0.1% only when temperatures are below 85F), insecticidal soap, kaolin clay (Surround), pyrethrin (Lilly Miller, Pyganic), carbaryl (Bayer Advanced Complete), Malathion

Stinkbug Injury to Fruit

We often see blackberry and raspberry fruit with white or tan drupelets on the berry. Two common reasons for this are stinkbug damage or sunscald.

Stink bug damage is different in that the affected drupelets in the berry are random, and may occur on all sides. As the insect feeds on the berry receptacle, it injures drupelets on either side.

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this stink bug is a nymph (young); they develop wings at the adult stage



Neither sunscald nor stink bug feeding affects the eating quality of the fruit. By the time damage is seen, it is too late for control.

Cane borers

damage from rose stem girdler will affect the entire cane; damage from raspberry horntail just affects the top of the cane

Both raspberry horntail and rose stem girdler adults are finished egg-laying, and their larvae are happily feeding away inside canes. There they will remain for the winter unless the affected canes are pruned out and destroyed.

Before fall, examine your raspberry and blackberry plants for wilting and or dead foliage, which more than likely may mean it is affected by a cane borer. Prune out all canes to help reduce the population for the following year.

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.

if you suspect a cane borer, slice the cane lengthwise to see the thick brown frass (excrement)



rose stem girdler (top) has a flattened head, while raspberry horntail (bottom) has a rounded head

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Editor: Marion Murray, marion.murray@usu.edu

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