EXTENSION
UtahStateUniversity

vegetable IPM ADVISORY

UTAH PESTS

Pest and Production Update, Utah State University Extension, **August 23, 2016**

Production

Sunscald

Sunscald occurs when ripening fruits are exposed to direct and prolonged sunlight, especially during hot, dry weather. Symptoms are large, light colored blisters on areas of fruits that are exposed to the sun. Common vegetables affected by sunscald are tomato, pepper, eggplant, watermelon, and summer squash. Sunscald most commonly occurs in plants that have lost foliage due to insect feeding or disease.

Fruit exposed to the sun is more susceptible to sunscald.

Management of Sunscald:

- Promote strong, healthy plants with good foliage cover.
- Control insect and disease problems (e.g. powdery mildew) before they begin to defoliate plants.
- Be careful during harvest to cut only fruit and not foliage.
- After harvest, place fruits in the shade as soon as possible (especially dark-fruited vegetables like eggplant, watermelon, cucumber, and squash).
- Manage nitrogen applications to maximize plant growth (especially during pre-flowering period).
- Maintain uniform soil moisture during hot weather.
- Install 18% to 30% shade cloth over the crop (e.g. pepper or tomato) after first fruits begin to reach maturity.
- Orient shade cloth horizontally above the crop (e.g. pepper or tomato) and consider adding vertical shade cloth in areas that receive the greatest sun exposure.

For additional information on Sunscald, click the following links (or search the internet for):

University of Maryland Sunscald Vegetables
Michigan State Prevention Sunscald in Vegetables
USU Sunscald Management in Bell Pepper Production
USU Peppers in the Garden

Diseases

Iris Yellow Spot Virus (IYSV)

Iris yellow spot virus (IYSV) is a damaging viral pathogen of onions. In onion fields, the virus is carried by onion thrips from one infected plant to another. It can reduce the ability of onions to develop bulb size and affect onion yields and quality. Infected onions can overwinter and harbor the disease serving as a reservoir of the disease the following season. Other possible hosts include several weed species.

IYSV is vectored by onion thrips; note the thrips nymphs in the new growth between the leaves of this onion.

Symptoms:

IYSV symptoms occur on onion leaves and can vary greatly as yellow- to straw-colored, dry, tan, spindle- or diamond-shape

lesions, with or without concentric light and dark rings. Later in the season, infected leaves may lodge (fall over). In Utah, the most typical lesion observed is a tan, necrotic, diamond-shaped lesion. These lesions can be small to very large. Larger lesions are less diamond-shaped and are longer than they are wide (along the length of the leaf).

Onion plants showing symptoms caused by IYSV.

Management:

Since there is no cure for infected plants, they should be removed and destroyed. The best management strategy is prevention.

CONTROL THRIPS

- Remove or destroy volunteer onion plants and debris.
- Avoid planting onion adjacent to alfalfa fields when possible.
- Plant younger fields upwind from older fields.
- Inspect transplants for thrips infestation and discard infested onions.
- Fertilize onions with adequate, but not excessive amounts of nitrogen.
- Mulch with straw or other materials.
- Use trap crops planted in small strips or patches (e.g. buckwheat, carrots, crucifer, cucurbits, phacelia) that can be sprayed with an insecticide or disked under when thrips populations increase.
- Use overhead sprinkler irrigation to physically wash thrips from plants and to form a soil crust that reduces thrips' ability to seek shelter.
- Plant onion varieties that are more tolerant to thrips injury.

  Highly Tolerant: 'White Keeper'

  Moderately Tolerant: 'El Charro', 'Snow White', 'Vega', 'X201', 'Zapotec'

  Susceptible: 'Blanco Duro', 'Brown Beauty', 'Brown Beauty 20', 'Colorado 6', 'Sweet Perfection', 'Tango', 'Valdez', 'White Delight'

  Highly Susceptible: 'Early Red Stockton', 'Mambo', 'Red Baron', 'Redman'

MAINTAIN WEED CONTROL

- Weeds can be a host for IYSV and thrips reproduction where they acquire the virus. Research in Utah indicates that fields with good weed control along field borders had lower IYSV infections than fields with weedy borders.

Onion plants severely damaged by infection with IYSV.

For more information on IYSV, see pgs. 97-98, and 103 of the 2016 Vegetable Production and Pest Management Guide:

http://utahpests.usu.edu/IPM/files/uploads/Publications/UT-veg-guide-2016.pdf

For additional information on IYSV, click the following links (or search the internet for):

UC Davis Iris Yellow Spot Onion and Garlic
Cornell Vegetable MD Iris Yellow Spot Virus on Onions
USU Iris Yellow Spot Virus in Onions

Late Blight of Potato

Causal Agent:

Phytophthora infestans is a fungal-like organism that causes late blight.

Symptoms:

Phytophthora affects foliage, stems, and tubers of potatoes. Initially, foliar lesions are greasy-appearing, with a light yellow halo around them. They quickly enlarge and turn black-brown. Infected tubers decay and become smelly either in the soil or in storage.

Early symptomatic lesions of late blight may have a yellow halo (top). Late blight lesions quickly enlarge and turn black-brown (bottom).

Tomatoes are also susceptible to late blight and show similar symptoms in the leaves and stems. Infected fruit develop dark brown, firm lesions that are often followed by rot and decay as described for potato tubers.

Disease Cycle:

Phytophthora overwinters in the soil and in decaying potato tubers or cull potato/tomato piles. It produces spores that are blown by wind or splashed by rain onto new host tissue. The disease and sporulation occurs primarily between 60-70°F and leaf wetness of 10-12 hours.

Management:

- Remove cull piles, volunteer potatoes, and infected plant material.
- Irrigate early in the day to allow leaf drying.
- Allow potato plants with infected foliage to dry for 2-3 weeks before harvest to ensure Phytophthora has died. It cannot survive on dry, dead plant material.
- Apply a fungicide.

TREATMENT: (commercial) azoxystrobin (Equation SC), chlorothalonil (Bravo), pyraclostrobin (Headline), famoxadone + cymoxanil (Tanos), cymoxanil (Curzate), dimethomorph (Forum), fenamidone (Reason), propamocarb hydrochloride (Previcur Flex) mefenoxam + chlorothalonil (Ridomil Gold Bravo SC) **(homeowner)** *Bacillus subtilis* (Serenade Garden Disease Control[B]), copper (Natural Guard Copper Soap), chlorothalonil (Ortho Max Garden Disease Control)

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Potatoes infected with late blight decay and become smelly either in the soil or in storage.

For additional information on Late Blight of Potato, click the following links (or search the internet for):

USU Potatoes in the Garden
APS Late Blight of Potato and Tomato
Cornell Vegetable MD Late Blight of Potatoes and Tomatoes
UC Davis Late Blight Potato
USU Common Vegetable Diseases

Blossom End Rot

Blossom end rot (BER) affects tomatoes, peppers, and cucurbits and is caused by localized calcium deficiency brought on by poor water management, excessive nitrogen, root pruning, and drought.

Damage:

Symptoms occur as small, light brown spots at the blossom end of immature fruit. Affected areas gradually enlarge into sunken, brown or black, leathery lesions as the fruit ripens. Hard, brown lesions may also develop inside the fruit even when no external symptoms are visible.

Symptoms of blossom end rot on tomato fruit (top) and pepper fruit (bottom).

Management:

Penn State Extension educator Tom Ford explains that "foliar calcium sprays historically have not been very effective in curbing blossom end rot because calcium is transported in the plant through the xylem tissue. When transpiration rates are high, the water transporting the calcium often moves to the foliage and bypasses the fruit completely". Utah soils generally have plenty of calcium and calcium additions are not recommended.

Control blossom-end rot by using cultural practices that allow for proper uptake of calcium by the plant.

- Use infrequent, deep irrigation to keep the soil uniformly moist and avoid water stress of fluctuating soil moisture.
- Consider using drip irrigation for more direct and uniform watering.
- Do not allow plants to be water stressed at night.
- Maintain even soil moisture by using organic or plastic mulch. Grass clippings/straw/etc. (2-3 inches thick) can be placed around the base of the plant to keep the soil cooler and reduce water loss.
- Avoid over-fertilizing. Do not use ammonium-based nitrogen fertilizers.
- Avoid injuring roots. Do not hoe or cultivate near plants. Pull weeds next to plants or use a plastic mulch.
- Do not overwater, especially in heavy clay soils.

Raised beds can contribute to BER because the soil is exposed to the sun and heats more on the tops and sides of the beds. Mulch helps in these situations.

Blossom end rot symptoms on watermelon. BER symptoms may have slightly different appearances (e.g. weepy, fuzz-like fungal growth, cracks).

For additional information on BER, click the following links (or search the internet for):

Penn State Blossom End Rot
USU Blossom End Rot
Larry Sagers Utah's Heat Blossom End Rot
USU Tomatoes in the Garden
UC Davis Blossom End Rot

Insects

Corn Earworm (CEW)

Corn earworm (CEW) moths typically lay eggs singly on fresh, green corn silks. Newly hatched larvae crawl down the corn silk and into the ear tip where they chew into developing kernels, but larvae will also chew on silks and leaves.

Corn earworm larva.

Damage:

CEW causes direct damage by chewing into kernels near the ear tip and/or chewing on silks, decreasing pollination, and leading to poor ear-fill. Frass within the ear produced by feeding can reduce quality, storage life, and increase mold growth. Additionally, injury at the ear tip provides openings in the husk that can attract sap beetles and earwigs.

Corn earworm damage on the ear (top) and the husk (bottom).

CEW larvae are cannibalistic and so usually only one larva is found per ear, but several larvae per ear can occur under high population pressure.

Management:

CULTURAL:

- *Plant resistant corn.* Corn varieties with long, tight husks are physically more difficult for earworms to enter. Some varieties with reported resistance are 'Country Gentlemen', 'Staygold', 'Golden Security', and 'Silvergent'.
- *Plant early.* Plant corn early enough so that the corn will silk before major moth activity occurs to escape injury.
- *Use clothes pins.* Place a clothes pin at the point where silk enters the ear. This helps keep worms out of ears, and should be done soon after the first silk emerges. Leave pins in place until the ear has filled and is ready for harvest.
- *Till soil in the fall.* In places where pupae overwinter, fall tillage of corn fields decreases their survival.
- *Use traps and lures* to monitor CEW populations.

Corn earworms lay their eggs on fresh corn silk; note the tiny white eggs stuck on the silks.

BIOLOGICAL:

Many predators and parasites attack corn earworm eggs, including several species of *Trichogramma*, an egg parasitoid wasp. These wasps lay their eggs inside the eggs of the earworm (they are tiny!). Most parasitized CEW eggs turn black, but there may be a lag period before they do so. *Trichogramma* occurs throughout North America, and releases of this parasite into corn fields to control corn earworm have been successful, achieving 50% to 100% parasitism; however, there has been limited success in Utah. Several insectaries offer these biological control agents for sale.

Green lacewings, which are generalist predators, occur naturally and are also available to purchase. Other predators include a native soldier beetle (eats larvae in ear tips), minute pirate bugs (eats eggs and larvae on silk), and damsel bugs. A natural bacterial pathogen, *Bacillus thuringiensis* (Bt), and a nuclear polyhedrosis virus also kill earworm larvae. Insecticides made from these natural pathogens target earworm more specifically and are safer for beneficial insects.

TRAPS AND LURES:

- Use the net style Heliothis trap and a pheromone lure for baiting CEW monitoring traps.
- Place the trap by early June along the edge of the corn field; attach the trap to a stake or post so the bottom of the trap is about the same height as the corn silk. Move the trap to different areas of the field to keep it near fresh corn silk.
- Check twice weekly until first catch, then check daily for best results.
- Calculate the average number of moths per night, and follow threshold guidelines provided below for deciding when to take treatment action.

Heliothis trap with a pheromone lure to catch and monitor CEW moths.

CHEMICAL:

Good control is dependent on applying insecticides before larvae enter the ears. Start spraying within two days of the beginning of silking, or as indicated by trap counts. About half of the eggs are laid within two days of silk emergence, and the remainder are laid within the next nine days. Reapply insecticides to keep an active residue on new silk. Once silks turn brown, they are no longer attractive as egg laying sites.

The following reapplication intervals are based on guidelines from the University of Maine Extension and seem to work for Utah. Reapply insecticides using the suggested intervals while silks are still actively growing. Stop sprays when silks turn brown.

Number of Moths Trapped Per Night	Insecticide Reapplication Intervals (Days)
Less than 0.2	None
0.2 to 0.6	5
0.7 to 6.5	3
More than 6.5	2

TREATMENT: (commercial) spinetoram (Radiant), chlorantraniliprole (Coragen), flubendiamide (Belt), *Bacillus thuringiensis* (Biobit[B], Dipel[OB]) **(homeowner)** carbaryl (Sevin), bifenthrin (Ortho Bug-B-Gon Max Lawn and Garden Insect Killer), cyfluthrin (Bayer Vegetable and Garden Insect Spray), pyrethrins + sulfur (Bayer Natria Insect Disease and Mite Control[B])

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The information in the following table (CEW Trap Catches for 2016) is from one location only and is meant to provide an idea of CEW trap catches for one area of Utah this year.

It is very important to realize that trap capture can be influenced by factors that affect insect flight behavior at night, such as temperature, wind, humidity, etc. CEW trap catches will differ depending on location.

CEW Trap Catches for 2016

County	Location	Date	Average CEW Moths Trapped Per Night
Cache	Benson	Jul 27 - 29	9.3
		Jul 30 - Aug 1	5.3
		Aug 2 - 5	9.0
		Aug 6 - 7	8.0
		Aug 8 - 13	2.7
		Aug 14 - 16	No Data, Trap Fell
		Aug 17 - 18	4.0

If your corn was planted early and formed silks in June, you may have avoided injury by corn earworm.

Spray applications that treat individual ears (e.g. in home gardens), as opposed to general sprays over the top of corn plants (e.g. in fields), may protect against CEW for a longer period of time. Thus, longer reapplication intervals may be sufficient in home garden situations.

For more information on CEW, see pgs. 148-149, 181-183, and 192-194 of the 2016 Vegetable Production and Pest Management Guide:

http://utahpests.usu.edu/IPM/files/uploads/Publications/UT-veg-guide-2016.pdf

For additional information on CEW, click the following links (or search the internet for):

USU Corn Earworm Fact Sheet
UC Davis Corn Earworm
Penn State Corn Earworm in Sweet Corn
Purdue Vegetable Insects Corn Earworm
Purdue Vegetable Crops Hotline Corn Earworm

Tomato Russet Mites

Tomato russet mites are most abundant during hot, dry weather in the mid- and late summer. They attack a variety of vegetables including tomato, eggplant, pepper, potato, and other solanaceous plants. Mite feeding is usually concentrated on the lower part of the plant, but when infestations are severe and plants become heavily damaged, mites will disperse to upper leaves. Tomato russet mites can crawl between closely spaced plants that are touching, and can be carried by the wind.

Damage:

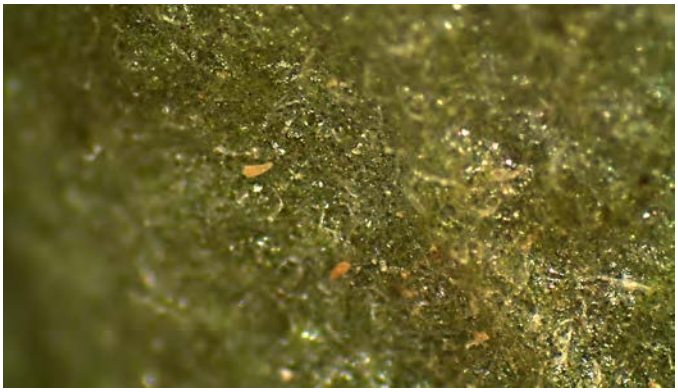
The presence of tomato russet mites often goes unnoticed due to their microscopic size until feeding injury is evident. Adults and nymphs insert their piercing-sucking mouthparts into plant tissue to imbibe plant juices. Injury from mite feeding can cause bronzing or "russeting" of the surface of stems, leaves, and fruits. Damaged leaves may turn yellow, curl, wither, and fall from plants. Mite feeding on fruits can cause longitudinal cracks and bronze coloration.

Tomato russet mite feeding can causing "russeting" on plants.

Management:

CULTURAL:

- *Use clean transplants*. Inspect transplants carefully to be sure they are free of russet mites.



Tomato russet mites; note the microscopic, yellowish, cigar shaped bodies.

- *Avoid planting during hot, dry periods*. Stressed seedlings are more vulnerable to attack by the mites.
- *Avoid transplanting seedlings near infested crops or weeds*.
- *Promptly remove or destroy infested plant debris*.
- *Sanitize equipment*. Make sure any tools or equipment used on infested plants are properly cleaned before being used on healthy plants.

BIOLOGICAL:

There are several predatory mites that feed on tomato russet mites; however, there is often a lag time between increase in populations of tomato russet and predatory mites.

CHEMICAL:

Once russet mites are present on plants, insecticide treatment is the primary control option. Apply the insecticide to the undersides of leaves where most mites are located.

TREATMENT: (commercial) endosulfan (Thionex^{R}), pyrethrins (Pyganic^{OB}), spirotetramat (Movento), sulfur (Golden Micronized Sulfur^{O}), *Chromobacterium subtsugae* (Grandevo^{OB}), *Metarhizium anisopliae* (Met52^{OB}), insecticidal soap (M-Pede), sodium tetraborohydrate decahydrate (Prev-AM) **(homeowner)** pyrethrins + canola oil (Monterey Take Down Garden spray), pyrethrins + sulfur (Bayer Natria Insect Disease and Mite Control), insecticidal soap (Bayer Natria, Natural Guard)

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For more information on Tomato Russet Mite, see pgs. 149, 159-161, and 164 of the 2016 Vegetable Production and Pest Management Guide:

http://utahpests.usu.edu/IPM/files/uploads/Publications/UT-veg-guide-2016.pdf

For additional information on Tomato Russet Mite, click the following links (or search the internet for):

UC Davis Tomato Russet Mite
Texas A&M Diagnostic Lab Tomato Russet Mite
University of Florida Tomato Russet Mite

Beneficial Insects

Feather-legged Fly: Natural Enemy of Squash Bugs

Feather-legged fly adult.

The feather-legged fly (or hairy-legged fly) belongs to the Tachinidae Family and the *Trichopoda* Genus. It is a parasitoid of true bugs including squash bugs and green stink bugs. This fly has been observed pupating from an adult squash bug collected from a Salt Lake City garden this year.

Females typically lay eggs on the underside of the host (e.g. squash bug). Only one larva per host will survive, although more than one egg may be laid on a given host. The newly hatched maggot bores into the body of the host and feeds

Feather-legged fly pupal case and the squash bug that served as its host; note the white egg on the underside of squash bug.

on the host's fluids for about two weeks. Eventually, the maggot grows to almost the size of the host's body cavity and emerges as the third instar, killing the host. It then pupates in the soil and will emerge as an adult in about two weeks. Second instar larva overwinter in the host's body.

Plants that attract or conserve feather-legged flies include plants in the carrot family (bishop's weed, caraway, dill, parsley, Queen Ann's lace, fennel), goldenrod, sweet clover, *Phacelia* spp., sweet alyssum, buckwheat, amaranth, buckthorn, and *Heteromeles arbutifolia*.

For additional information on Tomato Russet Mite, click the following links (or search the internet for):

BugGuide Genus Trichopoda Feather-legged Flies
Farmscaping to Enhance Biological Control

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