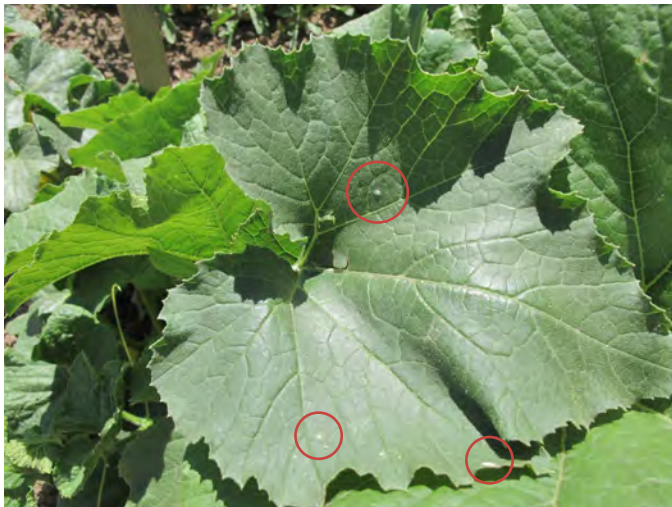


Diseases

Watch for Powdery Mildew and Treat When Spots Appear

Description and Hosts:

We have seen the early spots of Powdery mildew on a squash plant. This fungal disease initially shows up as small white “powdery” spots that continue to enlarge and eventually envelope entire leaves. Powdery mildew can occur on melons, squash, cucumber, pumpkins, and watermelon. Infections damage the plant by reducing photosynthesis and can cause yield loss. Heavily infected leaves become necrotic (turn brown and die) and fall off the plant, which can result in sunburn of fruit.



Initial symptoms of powdery mildew on a squash leaf; note the white powdery spots in the red circles.

Treatment:

It is critical to treat powdery mildew just as the first spots of mycelium (threads of fungal growth) appear on the leaves. One option for control is to mix 3 tablespoons of horticultural oil (e.g. Bonide All Seasons Spray Oil) with a gallon of water and 3 tablespoons of baking soda. Be sure to spray control products on both the upper and lower surfaces of the leaves.



Spots can be on both upper and lower surfaces of leaves; note several powdery spots on the underside of this infected squash leaf.

For fungicides to be effective, they must be applied as soon as symptoms are noticed. Repeat treatment throughout the growing season as new spots appear. Do not apply horticultural oil if the temperature is greater than 90°F, as this may burn the leaves. It is best to apply treatments in the evening after temperatures cool down, or very early in the morning. Baking soda should be used sparingly as it can have adverse effects on soil structure.

For more information on powdery mildew, search the internet for (or click the following links):

[Utah Pests News Powdery Mildew Part I](#)

[Utah Pests News Powdery Mildew Part II](#)

[Cornell Powdery Mildew of Cucurbits MD Online](#)

[UC Davis Cucurbits Powdery Mildew](#)



Close-up of powdery spots on the back of an infected squash leaf.

Insects

Apply Baits Now for Grasshopper Control

Grasshopper nymphs are still young, so it is the perfect time to use control products that contain *Nosema locustae* (e.g. Nolo Bait and Semaspore).



A grasshopper nymph on a chard leaf; note the underdeveloped wing pads or lack of wings, indicating that this is a young grasshopper.

When:

Nosema locustae baits must be applied to early nymph stages. It is best to apply baits in the morning when grasshoppers do their feeding. Applications can be made as often as every few days to once a week.

Where:

Target areas with the heaviest grasshopper infestations. Depending on grasshopper densities, higher application rates and frequencies may be helpful.

How:

After feeding on the attractive bait, grasshoppers are infected with a disease, become lethargic, and die. The disease is contagious and will infect other grasshoppers that cannibalize diseased grasshoppers in the area.

Why:

When baits are applied at the proper time (when the predominate summer species are about 1/2 grown) and under ideal conditions, a 5-70% population reduction is possible, with 35-50% of the remaining grasshoppers infected. Even if they do not die, infected grasshoppers are weakened, feed less, and produce fewer eggs. If applications are made too late in the season, when grasshoppers are older, control percentages are substantially lowered.

This material is environmentally safe because it only infects various species of grasshoppers and crickets. Baits become less attractive to grasshoppers when they are wet, so avoid applications when rain is forecast within the next 4-6 hours or if a heavy dew is present on application areas. Another option for protection from moisture is to place the bait inside containers, such as PVC pipe segments, that will protect the bait from rain and irrigation but still allow the grasshoppers to enter.

For more information on grasshopper control search the internet for (or click the following links):

[USU Community-Wide Grasshopper Control](#)

[USU Grasshoppers and their Control](#)

Colorado Potato Beetle Found on Potatoes

Description:

Eggs, Larvae, and Adults of Colorado potato beetle have been found. Adults are similar in size (3/8 inch long) and shape as lady beetles, but have a yellow and black striped abdomen. Eggs are small, bright yellow to orange ovals that are laid in clusters of about 20-45 on the underside of host leaves. Larvae are small reddish to brown, bulbous insects with two rows of black spots along either side their body. Pupae are oval in shape and cream to orange in color.



An adult Colorado Potato Beetle (CPB) on a potato plant.

Damage:

Colorado potato beetle (CPB) adults and larvae feed on foliage and can defoliate plants if not controlled. The last (4th) instar larva causes most of the feeding damage. Potatoes in the vegetative stage can usually tolerate up to 30% defoliation, but when tubers start to bulk, plants can tolerate no more than about 10% defoliation. Thus, it is crucial to manage CPB



A CPB larva (top) and CPB eggs on potato plants.

soon after flowering as this is when tuber bulking begins. Other CPB hosts include eggplant, tomato, pepper, and other nightshade or solanaceous plants. Larvae prefer to feed at the tops of plants making it simple to scout by checking these areas when walking through fields or gardens. Because small populations are easier to manage than large ones, the goal is to limit population growth and spread.

MANAGEMENT:

Cultural:

Crop rotation and sanitation. Crop rotation delays and reduces infestations. If potatoes follow potatoes, overwintering CPB will immediately infest the new crop. Destroy any solanaceous plant residues that may provide alternate food sources.

Biological:

Damsel bugs and big-eyed bugs feed on eggs and young larvae; predatory stink bugs will attack larvae. Two bioinsecticides are effective on young larvae: the bacterium, *Bacillus thuringiensis* var *tenebrionis* (Bt), and the fungus, *Beauveria bassiana*.

Chemical:

CPB has developed resistance to nearly every class of chemicals. Thus, it is critical to carefully rotate insecticide modes of action. In spring, wait until eggs have hatched for the first application. Border sprays may provide a more economical choice, especially early in the season before populations increase and spread throughout fields. Several economic treatment thresholds have been developed. In general, 1 adult or larva per plant early in the season may warrant control. After flowering/tuber bulking, treat when there are an average of 1.5 large larvae or adults per plant.

See the Colorado Potato Beetle Articles in our previous advisories by searching the internet for (or clicking the following links):

[USU Colorado Potato Beetle Using Trap Crops](#)

[USU IPM Advisory Colorado Potato Beetle 2008](#)

[USU IPM Advisory Colorado Potato Beetles 2010](#)

For more information on the Colorado potato beetle, search the internet for (or click the following links):

[Pacific Northwest Insect Handbook Colorado Potato Beetle](#)

[Penn State Colorado Potato Beetle](#)

[University of Minnesota Colorado Potato Beetle in Home Gardens](#)

[Virginia Cooperative Extension Colorado Potato Beetle](#)

Spider Mites

Description:

Two-spotted spider mites have been found on bean, pea, and tomatillo plants. Spider mites are very small and difficult to see without the aid of a 10x hand lens. The two-spotted spider mite looks like small black spots that move around on infested leaves. They feed on host plants with piercing-sucking mouthparts which causes overall yellowing/bronzing, white to yellow spots, or stippling on host plant foliage. Initially, spider mites are found on the lowest leaves first because they overwinter as eggs in the soil. Spider mites especially favor dry, hot (>90°F) weather and during these ideal conditions, colonies can exponentially increase in less than two weeks. When heavy infestations occur, webbing may also be present. Severe infestations in the garden may cause plants to die.



Yellowing foliage of bean and pea plants infested with spider mites.

Spider Mites (Cont.)

Hosts:

Spider mites primarily infest bean, tomato, and cucurbits (cucumber, squash, melons). Other vegetable hosts include; beet, carrot, corn, eggplant, parsley, pea, pepper, and sweet potato as well as strawberry and other fruits.

Monitoring:

To monitor for spider mites, look for leaves (especially older leaves) that are fading in color. Inspect the top of leaves for stippling and search the undersides for webbing. Under heavy feeding, leaves will turn yellow and brown and may die. Use a hand lens to view mites on the undersides of leaves, or tap suspect leaves over a white sheet of paper and watch for moving dots.



The small black dots on the underside of this bean leaf are two-spotted spider mites.



Frank Peairs, Colorado State University, Bugwood.org

A close-up of two-spotted spider mites.

Management:

- Hose off plants and undersides of leaves to dislodge mites (they like hot, dry, and dusty conditions).
- Keep plants healthy and reduce stress with proper watering and fertilizing practices. Avoid excessive nitrogen fertilization, which can increase mite populations.
- Dispose of severely infested plants and clean up overwintering sites (especially bean plant debris).
- Predatory mites are commercially available for release. Avoid toxic sprays to encourage naturally occurring predatory mites.
- Maintain weed control to help eliminate other overwintering sites.
- Use horticultural oil or insecticidal soap when damage is first observed. Spray in the morning when it is cool.

Note: Sprays may further injure badly damaged leaves.

For more information on spider mites, search the internet for (or click the following links):

[UC Davis Pests in Gardens and Landscapes Spider Mites](#)

[University of Minnesota Two-Spotted Spider Mites](#)

[University of Maryland Spider Mite Vegetables](#)

[Twospotted Spider Mite Scouting Purdue Youtube Video](#)



A hand lens can be used to monitor for very small insects like spider mites.

To find your own hand lens for monitoring, search for (or click the following link):

["loupe 30x 25mm" on Amazon.com](#)

Thrips

Description:

Thrips are very small, elongate, yellow- to brown-colored insects that rasp plant tissues and suck up the exuding sap. Damaged plant parts take on a white speckled appearance where silvery-black excrement can often be seen. In general, thrips do not kill vegetable hosts but can cause noticeable cosmetic damage. Young plants are especially susceptible. Thrips may also carry diseases such as tomato spotted wilt virus, which was written about in our May 31, 2016 newsletter (click [here](#) for this newsletter or search the internet for: [USU Vegetable IPM Newsletters May 31, 2016](#)).



Thrips (red circle) on the underside of a leaf; note the white areas from thrips feeding and the black dots of frass (insect excrement).

Damage and Hosts:

Onion thrips and Western flower thrips are both common species in Utah. Onion thrips can cause reduced onion bulb size when feeding is moderate to severe. They prefer onion, garlic, leek, cabbage, cauliflower, bean, tomato, cucumber, and asparagus hosts. Beans may also be weakened by thrips feeding. Bean and pea pods often show cosmetic damage from thrips feeding. Western flower thrips feed on melons, cabbage, cucumbers, lettuce, tomatoes, and peas.



Stipling from thrips feeding on squash (left) and peas (right).

So far, this year, we have seen cosmetic damage from thrips feeding on onions, leeks, peas, tomato, potato, squash, broccoli, kale, lettuce, melons, and cabbage.



White speckles on a pea pod fed on by thrips.

For more information including management options, search the internet for (or click the following links):

[USU Thrips on a Variety of Vegetables](#)

[UC Davis Thrips in Gardens and Landscapes](#)

[USU Onion Thrips](#)

Leafminers

Description:

Leafminers are active and have been seen feeding on chard, watermelon, peas, and spinach. Eggs have been found on the undersides of host leaves. Leafminer maggots burrow into leaves and eat the contents between the upper and lower epidermis leaving a visible, discolored, winding trail. Feeding results in cosmetic damage and possible contamination of leaves (maggot present in harvested leaves).



Chard damaged by leafminer feeding; note the discolored winding trail.



Leafminer eggs (top) and leafminer larva (bottom).

Management:

- Weed control is the first line of defense. Weed hosts such as lambsquarters, chickweed, nightshade, and Amaranthus species can harbor leafminers.
- Rotate crops and remove infested leaves to help reduce population damage.
- Apply row covers just before and during egg-laying (June, August) to exclude flies and protect plants.
- Chemical control is not recommended unless leaves are to be used for consumption. (Homeowners may cut away mined portions instead of using chemicals.) If chemicals are used, they should be timed with egg deposition or hatching.

If using chemicals, treat when eggs or the start of new mines are found. Repeat treatment in 7-10 days.

Product options include: Agri-mek (abamectin), Coragen (chlorantraniliprole), Admire (imidacloprid), azadirachtin^H, insecticidal soap^H, spinosad^H

^H=homeowner use

For more information on leafminers, search the internet for (or click the following links):

[Maryland Extension Leafminer Vegetables](#)

[University of Minnesota Leafminers in Home Vegetable Gardens](#)

[PennState Control Spinach Leafminer at the Time of Planting](#)

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.

Vegetable IPM Advisory
is published by Utah State University Extension

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