UTAH PLANT HEALTH
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Utah IPM Program and Utah Plant Pest Diagnostic Laboratory
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IN THIS ISSUE

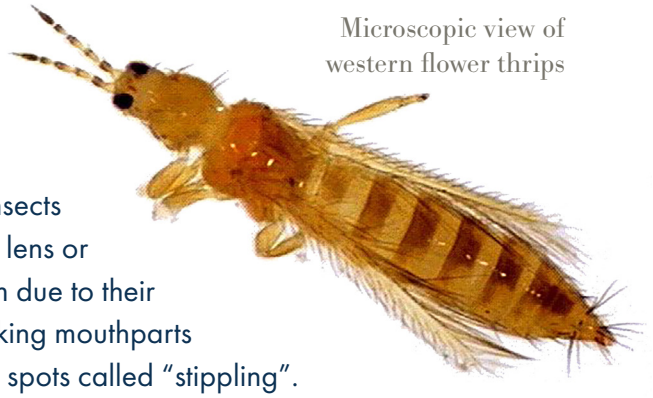
NEW MEDIA

Common Insect Vectors of Plant Diseases in Cut Flowers

In the past ten years, cut flower production in Utah has quickly expanded, with more than 200 farms reported in 2023. With this increase, we are seeing pest problems we did not consider in the past, threatening the viability and profitability of small farms. Some of these pests are insect vectors of plant diseases. Because this winter was very mild, pest populations during spring and summer may be higher than usual, and preventive methods to limit infestation are important. More information on cut flower pests can be found in this extension publication or on the USU Plant Health Fact Sheets.

Most insect vectors of plant pathogens belong to the order Hemiptera, which have piercing-sucking mouthparts. They insert their needle-like stylet into plant tissue, allowing the acquisition or inoculation of plant pathogens (viruses, bacteria, and phytoplasmas, which are bacteria without a cell wall).

Thrips: In Utah, the western flower thrips (*Frankliniella occidentalis*) and onion thrips (*Thrips tabaci*) are the most common species. Adult thrips are tiny, elongated, and yellow-brownish insects with two pairs of fringed wings. A hand lens or magnifier is often needed to detect them due to their minute size. Thrips use their rasping-sucking mouthparts to puncture plant tissue, creating yellow spots called "stippling".



Microscopic view of western flower thrips

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The onion thrips vector Iris yellow spot virus (IYSV), which primarily infests onions, but iris and lisianthus can also be hosts. IYSV causes yellow to straw-colored and diamond-shaped lesions and eventual plant decline. Both western flower thrips and onion thrips vector the tomato spotted wilt virus, which can affect tomato but also chrysanthemum, impatiens, begonia, and dahlia. Infested leaves are bronzed, have necrotic spots, and are cupped downward.

Aphids: Common species include green peach aphid (*Myzus persicae*), potato aphid (*Macrosiphum euphorbiae*), and melon cotton aphid (*Aphis gossypii*). Aphids suck plant sap and excrete the excess of sugars as sticky residue called honeydew. Aphids are soft-bodied and rounded insects distinguishable by two tuber-like appendages on the tip of their abdomen called cornicles. Damage include curled leaves, chlorosis, and stunted plants. Green peach aphids and potato aphids are both vectors of Dahlia mosaic virus.

Melon aphid

Leafhoppers: Aster leafhopper (*Macrosteles quadrilineatus*), beet leafhopper (*Circulifer tenellus*), and potato leafhopper (*Empoasca fabae*) are three of the more common species in Utah, but further surveys are needed to confirm species assemblages. Leafhoppers cause white-yellow feeding marks called stippling, which are similar to thrips damage. The aster leafhopper spreads a phytoplasma, causing aster yellows in dahlia, cosmos, zinnia, and more. Symptoms include plant discoloration, stunted growth, abnormal production of shoots, and leafy flower structure.


Aster leafhopper

Preventive Control Methods

One of the major challenges with pest management in cut flowers is that farms are very diverse in terms of varieties planted, soil types, production methods (high tunnels, low tunnels, open field), bloom time, and management practices. This makes general recommendations difficult, as farms typically deal with specific pest issues. Additionally, there is very little information on cut flower pests published in the U.S. The Ball Redbook Volume 2 (19th edition) is an extensive resource, but not available for free.

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Weed Management. An important management strategy for plant disease vectors is to eliminate alternate hosts, which are often weeds. Removing these hosts limits the survival and reproduction of thrips, aphids, and leafhoppers. For example, to reduce the spread of IYSV (onion thrips), remove jimsonweed, tobacco, and redroot pigweed. To reduce tomato spotted wilt virus (onion and western flower thrips), remove nightshade, chickweed, and lamb's quarters. Reducing aster yellows is difficult because the aster leafhopper has more than 350 host plants, but removing dandelion, ragweed, and thistle can decrease the availability of favorable reproduction sites.

Monitor and Treat When Needed. Monitor insect migrations into your plots by setting up yellow sticky cards or by scouting at least once per week. Apply insecticidal soap or horticultural oil as soon as you detect thrips, aphids, or leafhopper nymphs (soap and oil will not work on leafhopper adults). In addition for thrips, dipping ornamental transplants in a mixture of an entomopathogenic fungi (BotaniGard) and beneficial nematodes (NemaShield) could help with the control of below-ground pupal stage. The use of insecticides is not a sustainable approach as they negatively affect pollinators.

Many natural enemies can be released preventively to ensure predators can keep pest populations under control. Lady beetle larvae and adults feed on aphids, while green lacewing larvae (*Chrysoperla carnea*) control both aphids and thrips. Predatory mites like *Neoseiulus cucumeris* are voracious predators of thrips larvae but not thrips adults.

Reflective mulches can deter insect vectors.

Exclusion netting in a tunnel over the plants is the most effective option. The cost of the netting and support frame can be offset by the reduced use of insecticides, limiting losses to insect feeding and plant diseases.

Neoseiulus cucumeris, a predatory mite, feeding on a thrips larva.
Image courtesy of Dragonfli, dragonfli.co.uk

— Emilie Demard, Extension Entomologist

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Wireworms in Small-Grain Systems: Biology, Damage, and Management

Wireworm damage to small grains.
Image courtesy Haley Catton, Alberta Farmer Express

Inset: Click beetle life cycle stages (eggs, larva, adult).
Image courtesy of Art Cushman, USDA Systematics Ent. Lab., Bugwood.org

Wireworms are the larval stages of click beetles or snapping beetles (family: Elateridae). These larvae are active in the soil during the growing season and can cause significant injury to the below-ground parts of annual crops such as small grains (wheat, barley, oat), corn, sugar beets, beans, potatoes, and other field crops across the Intermountain West.

Although wireworms are not new to growers in Utah and surrounding states, reports of early season seedling loss and patchy stands have increased in recent years. Much of their damage is associated with their feeding on planted seeds, germinating seedlings, or young roots during crop emergence.

Biology and Life History

Adult click beetles are slender, hard shelled, and generally dark. They are usually less than 1 inch long, though size and color vary among species. They are called click beetles because when a disturbance flips them onto their backs, they snap upward with a distinct "click". The rear portion of the thorax of adults is pointed toward the abdomen, and some species have spots or lines on the thorax and elytra. More than a dozen wireworm species occurs in the Intermountain West region. Most adults overwinter in the soil and emerge between April and June (typically late April to early May in northern Utah, though emergence timing can shift with warming temperatures). After emergence

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and mating, females lay 50–400 eggs in the upper 6 inches of soil, often in grassy areas or fields.

After hatching, wireworms seek out plant roots. They are slender, hard bodied, and shiny, ranging from white and yellowish to brown or coppery. They are about ¼ to ¾ inch long, depending on species and timing. Wireworms feed for many years and take 2 to 6 years to reach maturity. Some species may take 10 or more years under unfavorable conditions. Mature larvae pupate in the soil, and newly formed adults remain underground until the following spring, when they emerge to start the cycle again.

Larval movement in the soil is strongly influenced by temperature and moisture. In spring, overwintering larvae move upward from 1 to 2 feet deep as soil temperatures reach 50°F in the upper 6 inches. During hot or dry summer periods, they tunnel deeper into the soil, where they may remain inactive until conditions are favorable again.

Host Plants and Crop Damage

Adults cause little to no injury while the larvae of several species, including Pacific Coast, sugar beet, western field, and Columbia Basin wireworms (*Limonius* spp.), are known for significant crop damage. In addition, the Great Basin wireworm (*Selatosomus pruininus*) is very destructive in potato, grains, and annual crops in dryland systems.

Wireworms feed aggressively on below-ground plant tissues of potatoes, legumes, sugar beets, and cereals. Early season damage includes seed-boring, stunted, wilted, or dead seedlings, or delayed emergence. Damage to the growing point or stem base kills seedlings, creating thin or patchy stands that resembles nutrient or germination issues. These poor stands and empty sites favor weed establishment, increasing crop competition. Direct feeding on roots, tubers, and underground parts of crops reduces yield and marketability. Additionally, larval feeding wounds provide entry points for soilborne pathogens.

Monitoring and Action Thresholds

Wireworm damage is often unnoticed until symptoms such as poor or patchy stands, damaged seeds, or wilted seedlings appear. Because populations could persist across a few rotations, begin scouting early in the season in fields that have a history of high weed pressure, poor grain stands, or recent grassy hosts (e.g., small grains).

- Conduct soil sampling when temperatures are ≥ 45°F in spring or < 80°F in fall, before planting, so seed treatment rates can be adjusted.
- Wireworm injury is often worse in cool and wet springs (easier to move in moist soil), when seedling emergence is slow.
- Use the shovel method by collecting soil cores approximately 10 inches deep and 6 inches wide.
- Examine at least 20 shovel samples per field; the action threshold is 4 wireworms per 20 samples.

A ***Modified Solar Bait Trap*** at a rate of about 10 traps per field, can also be used at 4-inch depth when soil is around 45°F.

1. Prepare the bait using ½ cup of untreated wheat + corn, soaked 24 hours in a nylon stocking.
2. Bury the bait 3 to 5 inches deep in an 8- to 10-inch-wide hole, leaving the string exposed.
3. Cover with soil, then place black plastic followed by clear plastic to warm the soil.
4. Retrieve traps after ~1 week, collect larvae, and record the average per trap:
   - 0–1 per trap: moderate risk; possible need for treatment.
   - 1–2 per trap: probable economic damage; treat at recommended rates.
   - 2–4 per trap: high risk; treatment recommended.
   - >4 per trap: extreme risk; use the highest allowable neonicotinoid rate, high seeding rates, and consider delayed seeding.

Management

Cultural Controls

- Avoid continuous small-grain crops in high risk fields, by rotating with broadleaf crops.
- Tillage exposes beetle larvae to predators and can reduce survival.
- Soil packing after planting improves emergence and seed to soil contact.
- Manage grassy weeds and volunteer cereals to reduce egg laying sites.

Biological Controls

- Natural enemies include predatory ground beetles, spiders, birds, entomopathogenic fungi, and nematodes.
- Biological control is generally supplemental, but maintaining soil cover and using narrow spectrum, lower risk insecticides can help support these natural enemies.

Chemical Controls

- Seed treatments are effective in fields with known high wireworm pressure.
- Neonicotinoids (e.g., imidacloprid, clothianidin, thiamethoxam) reduce early feeding injury but mostly act as deterrents and may negatively affect soil organisms.
- Newer non-neonicotinoid products (e.g., Teraxxa, a.i. broflanilide) are known to be effective at killing wireworms.

—— Subodh Adhikari, Extension Entomologist

Insect Pest Expectations After a Mild Winter

At several points during winter of 2026, we asked ourselves, "where is the snow?" and "when is it going to get actually cold?". Ultimately, Utah experienced a very warm winter. This has led many farmers, gardeners, and Extension experts to wonder what this means for insect activity, especially in the upcoming seasons. Winter conditions play an important role in regulating insect populations, so milder temperatures can shift both the timing and severity of pest outbreaks. Although it does not guarantee a "bad year," a warm winter can influence which species show up earlier, in greater numbers, or show extended activity periods or number of generations.

Impacts of a Warm Winter

One of the most immediate effects of a warm winter is increased overwinter survival. Insects survive the cold months either as immature stages (eggs, larvae, pupae, or nymphs) or as adults, often tucked into soil, bark, leaf litter, or structures that keep them protected. Extended periods of deep cold typically reduce their populations. However, when temperatures remain mild as they were this winter, more individuals are expected to survive into spring.

Another key impact is reduced overwinter time and earlier emergence and activity. Insect development is

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closely tied to temperature. Warmer late-winter and early-spring conditions can accelerate their life cycles, resulting in earlier feeding and reproduction. This can lead to higher and earlier-starting pest populations. We have already noticed pests appearing days or even weeks ahead of what is considered average. For example, the UPPDL received pest samples as early as January, and reports of aphids, thrips, elm seed bug, red firebug, and wasps. This shift can be challenging for management timing, especially for those relying on traditional calendar-based treatments.

An early spring can also increase the number of generations that some insects complete in a single growing season. When pests get an early start, the extended period of appropriate temperatures for their activity may be conducive to an additional generation before fall. This is particularly important for pests like spider mites (an arachnid pest) and some leaf-feeding insects, whose populations can build rapidly under favorable conditions. More generations often mean greater cumulative damage over the season if not managed effectively.

It's Not all About the Warm Winter

It is important to recognize that winter temperature is only one piece of the puzzle. Spring weather conditions, especially moisture and temperature fluctuations, play a major role in regulating pest populations.

- A warm winter followed by a cool, wet spring can suppress some insects while favoring others. For instance, fungal diseases of insects thrive in wetter conditions, helping keep certain pest populations in check (especially grasshoppers).
- Not all insects respond negatively to cold winters, and not all benefit from warm ones. Some species actually rely on cold periods to complete their development properly.

The pea aphid (*Acyrthosiphon pisum*) overwinters as eggs on stems of perennial legumes and typically hatches in spring as plants start growing. This one was submitted to the Utah Plant Pest Diagnostic Lab in January 2026.

- Natural enemies such as predators and parasitoids are also affected by winter conditions. For example, lady beetles have been active since late February. As such, beneficial insects may be able to respond timely to pest populations in spring, helping to reduce their overall impact.

Ultimately, it is important to be observant and proactive. A season like 2026 requires early monitoring and may require earlier intervention (see articles on pages 12 and 13). Maintain good plant health via proper irrigation, fertilization, and pruning, and be mindful about herbicide use around them. Healthy plants are more resilient and better able to tolerate some level of insect feeding without significant damage. If you have problems, please reach out to us at the UPPDL for help.

— Ernane Vieira-Neto, Arthropod Diagnostician
Claudia Nischwitz, Plant Pathologist

Buffering Trees from the Effects of a Warm, Dry Winter

Author, Miles Becker, is the Urban Forestry Extension Specialist in USU's Department of Wildland Resources. He focuses on tree care and improvement, community engagement, and workforce development. Recently, he initiated a nationally-recognized project called "Talking Trees" on the campus of USU to strengthen people's connection to the environment and each other.

Needle drop (left) and marginal necrosis (leaf scorch; right) due to lack of water.
Images courtesy of Larry Rupp.

The forecast for spring and summer 2026 in northern Utah is dry. This is after the Utah Division of Water Resources reported a record low state-wide snowpack level on February 1, 2026. Only two watersheds, the Bear and Price Basins, are expected to have close to normal levels of surface water. Conserving water in reservoirs, now only 67% full on average, should motivate us to turn on the tap less often, both indoors for ourselves and outdoors for irrigation. Trees and other woody plants may feel the pinch of combined drought and heat without extra help this year.

Trees start using water as soon as they are active in the season. They lose water through their leaves when photosynthesizing to produce energy. Evergreen species, such as Austrian pine (*Pinus nigra*) and our native curl-leaf mountain mahogany (*Cercocarpus ledifolius*), can be active even on warm winter days. Water demand for deciduous trees that lose their leaves in winter is timed with bud break in spring. Deciduous species are genetically pre-programmed to break dormancy after winter's cold temperatures by reaching a threshold number of growing degree days.

Warmer winter temperatures this year resulted in faster accumulation of growing degree days. As a result, trees are leafing out weeks earlier and demanding water weeks earlier. Watering early in spring 2026 will help trees to store water in reserve and use it later in the season when less water is available in the soil. Surplus water banked from early irrigation may be what sustains our trees during the heat of July and August when they need more water than usual.

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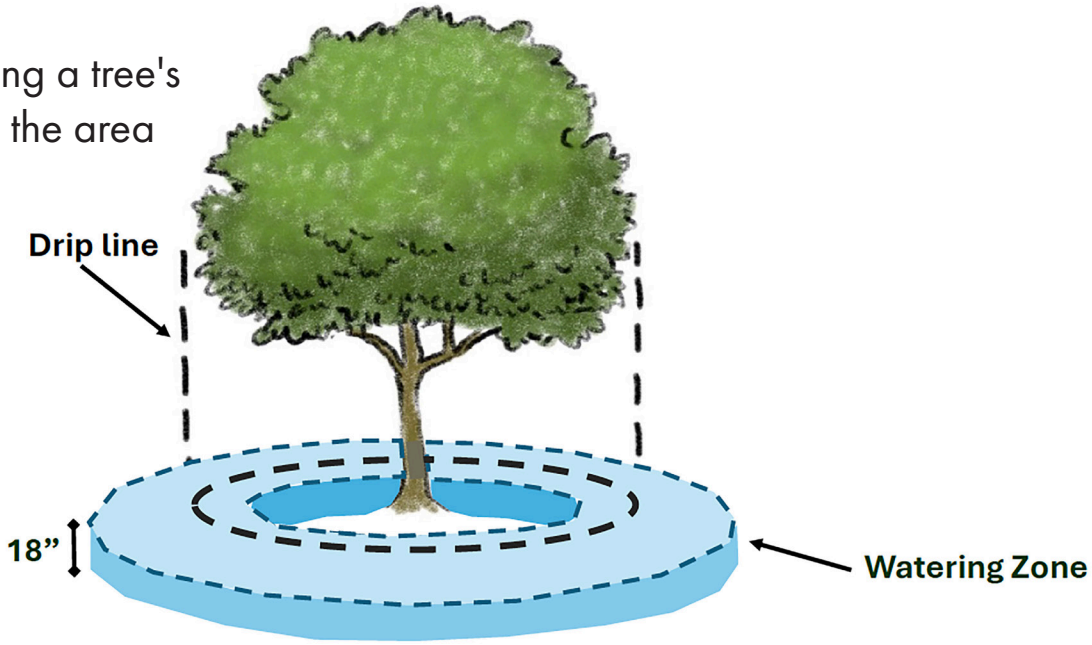
Understanding a tree's dripline and the area to water.



Some trees are more sensitive to drought and heat. The vulnerable include young trees within 3 years of planting whose trunk diameters are less than 3 inches, trees surrounded by hot surfaces (pavement, rock ground cover, buildings), and trees in small spaces with low soil volume. Research on species-specific responses to drought suggest that a few of our more common urban trees—elms (*Ulmus species*), flowering pear (*Pyrus calleryana*), honeylocust (*Gleditsia triacanthos*) and hackberries (*Celtis* spp.)—are better at resisting drought and recovering in following years. Species from drier regions than where they are planted may be more adapted, but they would also need to tolerate Utah's cold hardiness zones.

Other than proper plant selection, there are ways to minimize the effects of drought on established trees:

1) **Avoid fertilizers**. Chemical fertilizers are salts that can damage target trees during droughts.
2) **Water early in the morning or evening**. Daytime watering will be more likely to evaporate before it reaches the tree roots.
3) **Water around the tree's dripline**. Most feeder roots on most trees function best in the area under the outer branches.
4) **Use high volume emitters**. Dripline irrigation systems designed for shrubs and perennials are not sufficient to water larger trees. Replace 1 gph emitters with 20 gph emitters around trees.
5) **Water deeply every 2 weeks**. Saturate the soil to a depth of 18 inches in the area under the branches. Check the depth with a long probe or screwdriver. It should penetrate wet soil easily with little resistance.
6) **Beat the heat**. Give your trees extra water 2 to 3 days before a forecast of extreme heat over 95°F. They will use the water to cool their leaves during short bouts of high temperatures.
7) **Keep it cool**. Increase shade with more canopy from nearby trees and vegetation. Cover the ground under the tree with a wood chip mulch or coarse compost.

If you are unsure of how much water is enough, watch for symptoms of water-related stress in your trees. Leaf wilt occurs when water is needed immediately, similar to house plants wilting. Leaf scorch in broadleaf trees and needle drop in conifers are short-term responses to high heat exposure in combination with low water availability. Seasonally drought-stressed trees will lose their leaves in late summer instead of fall. Trees often conserve water at the cost of reduced growth—look for shorter stem elongation as an indicator of thirsty trees.

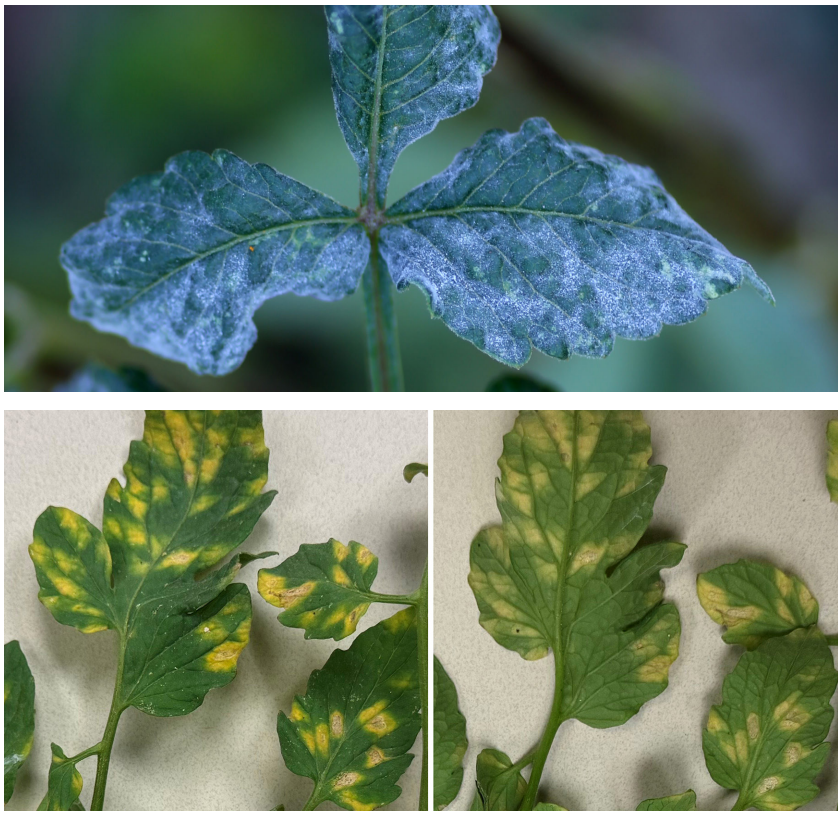
Powdery Mildew – A Common Fungal Pathogen on Many Plants

Powdery mildew on peony (*Paeonia* spp.). The black dots that look like dirt are the fruiting bodies produced on the mycelium. This is how most powdery mildew fungi overwinter.

Powdery mildew is caused by a group of fungi that consists of several genera and hundreds of species. There are only a few plant groups and species that are not infected by powdery mildew including conifers, peanut, and ginkgo. A sign of powdery mildew is a white layer of fungal mycelium and spores on the surface of leaves, green shoots and fruit. The fungal growth is not just on the plant surface. Specialized cells called haustoria extend into plant cells (without destroying them) to absorb nutrients.

Powdery mildews produce two types of spores. Ascospores are borne within in a round fruiting body that enables the fungus to survive adverse environmental conditions (winter, dying plant tissue). As conditions improve (early spring), the ascospores germinate and new fungal growth starts. The new growth will then produce the second type of spore called conidia (asexual spores). During spring, summer, and fall, conidia travel fast and far (wind can spread spores for many miles) to susceptible hosts to cause new infections of the fungus.

Without a microscope, powdery mildews all look the same and even with a microscope, it is sometimes



Typically, powdery mildew is identified by the white mycelium on the leaf surface, shown at top on dahlia (*Dahlia variabilis*).

Tomato powdery mildew (*Leveillula taurica*) looks different. It causes yellow spots that are tan on the leaf undersides (bottom image). Mycelium is rarely visible.

Tomato images courtesy of Stephen Beck, SLC Extension

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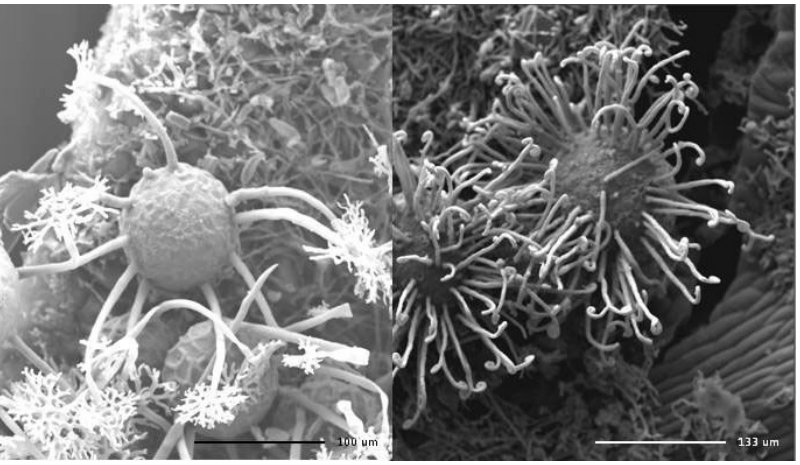

Top: Germinating conidium of powdery mildew (400x magnified)

Middle: Ascus with ascospores inside (1000x magnified).

Bottom: Scanning electron microscopy images of powdery mildew fruiting bodies with appendages. On the left is *Erysiphe palczewskii*, powdery mildew of the Siberian pea shrub and on the right is *Sawadea bicornis*, powdery mildew of Norway maple.

not easy to identify the genus or species. Conidia of powdery mildews look barrel-shaped. Identification may require staining the spores to see specific features, or molecular tools such as PCR.

If fruiting bodies containing ascospores are present, identification is much easier. The fruiting bodies have appendages of various shapes that are specific to genera and the number of asci (sac-like structures containing the ascospores within the fruiting body) vary by species, as does the number of ascospores in an ascus.

To every rule there is an exception. There is one powdery mildew, *Leveillula taurica*, which does not grow on the plant surface and is therefore not easily visible. It grows spore-bearing structures out of the stomata (openings in the leaves for gas exchange by the plant). The spores are cylindrical or spear shaped and fruiting bodies are rarely produced. When should you consider having UPPDL check for this particular powdery mildew? If you see yellow spots (shown on previous page) developing on tomato, pepper or onion leaves.

Host-specificity of powdery mildew fungi varies. Some species are very host specific (*Erysiphe paeoniae* only goes to peony species) whereas others have a wider host range but usually within one family (*Blumeria graminis* infects grasses and small grains).

Management Options

- Using resistant plant varieties when available.
- Chemical products containing sulfur (do not apply above 90°F), potassium bicarbonate, or chlorothalonil.
- Note that sulfur products work very well on most powdery mildew but make sure the product is registered for the crops it will be used on. Some plant species are sensitive to sulfur.

— Claudia Nischwitz, Extension Plant Pathologist

Pest Monitoring More Important than Ever This Spring

In almost all cases, the most important factor in successful pest management is not the management tool or product, it is the timing. The winter of 2026 was the warmest on record in Salt Lake City and the trend is continuing into spring. In northern Utah, many pests such as aphids and caterpillars, emerged much earlier than we were prepared to even think about them! But getting out onto the farm or garden at least once per week is more important than ever this year–starting now.

Integrated pest management (IPM) emphasizes assessing population levels and whether the damage justifies action. Even though pests have emerged earlier than typical, applying a treatment that is not necessary wastes time and resources and may have unintended consequences for beneficial organisms. Check for pests at your own site to determine the need for intervention.

Know Where and When to Look

Effective timing starts with regular monitoring. In early spring, focus on:

- Undersides of new growth, where many insects feed and reproduce
- Bark of trees in the sun, where some newly-emerging pest insects may congregate

The **TRAPs** decision-aid web tool can help in determining when to monitor for certain pests. For pests that affect ornamental trees and shrubs, this information can be found in about three clicks.

1. Select the weather station closest to you
2. To the right of the map, click on "Select a Pest", then "Landscape and Turf", and then "Ornamental Pests"
3. Hit Submit
4. On the results table, find today's date, and scroll down to future dates to see which pests will be active in the next few weeks.

Catching pests early doesn't always mean immediate treatment; it means having the information needed to make a good decision. You'll need to decide—based on the level of infestation—whether a treatment is needed.

Early Intervention Makes Control Easier

If a decision is made to make a treatment, keep in mind that most plant pests are easier to manage when they are in a young life stage, or before their populations explode. The earlier life stages (nymphs or larvae) of aphids, leafhoppers, plant bugs and other insects are more vulnerable to treatment because they are less mobile. For example:

- Soft-bodied arthropods like spider mites, are easiest to manage early in their development.
- Caterpillars like cankerworms, are only susceptible to organic treatments up to ½-inch in size.
- Scale insects such as the lecanium scale, are best controlled during their crawler stage.
- And finally, leafhoppers (whitefly-looking insects) on grapes, apples, roses, and other plants are very noticeable when the adults are present because they are flying around. But it is the young life stage (nymphs) of this pest that needs to be targeted, and they take more time to detect.

Once populations are large and damage is obvious, pests are more difficult to control and may require more intensive management. A well-timed management can reduce the need for repeat applications and improve overall effectiveness.

Choosing an appropriate management tool is important, but even the best option will be less effective if implemented at the wrong time. By focusing on when pests are most vulnerable, you can:

- Improve control outcomes
- Reduce inputs
- Support long-term plant health

This spring, take a little extra time to monitor and understand what's happening in your landscape. The payoff often provides better results with less effort.

— Marion Murray, IPM Specialist

Appreciate the Hard Work of Early Spring Beneficials

Predatory syrphid fly maggots (right) and lady beetle larvae (far right) match their activity with hatching aphids.

As plants leafed out about three weeks earlier than average this spring, we are also seeing plenty of beneficial species. While it's easy to focus on the damage caused by aphids or other early-season pests, it's important to remember that natural enemies are also active and already helping manage those populations.

Natural enemies we have seen earlier than ever include lady beetles, syrphid flies, and parasitic wasps. These organisms are playing a key role in keeping pest populations below damaging levels this spring. Encourage them by providing habitat (shelter, nectar, pollen) and prey so that pests are less likely to reach damaging levels.

Aphids and Rust Mites: A Food Source, Not Just Pests

Aphids are often one of the first pests to appear in spring. While they can cause leaf distortion and produce sticky honeydew, they are also an important food source for beneficial insects. In many cases, aphid populations decline naturally as predators and parasitoids increase. Allowing aphids to exist where they are not causing losses promotes this process by keeping both the pest and its natural enemies.

Rust mites are tiny mites (too small to see without the aid of a microscope) in the eriophyid group. As they feed on leaves, they remove chlorophyll, but not enough to cause damage. In fact, these tiny leaf-feeders are beneficial in that they serve as an alternate food source (prey) for predatory mites that also feed on spider mites.

Rust mites feeding in early spring causes a stippled appearance to new foliage. They rarely cause economic damage and serve as an early-season food source for predatory mites.

Like these two examples, not all pest presence requires action. Before treating, consider if the damage is mostly cosmetic, if beneficial insects are present, and if the pest population is increasing, stable, or declining. If a management is necessary, consider an option that is less disruptive to beneficial insects.

- Targeted applications are safer than a broad-scale spray.
- Products with a lower toxicity rating on the label will be less harmful to non-target organisms.
- Apply in early morning or evening to avoid peak activity of pollinators and predators.

Beneficial insects are already at work early this spring. By detecting them during your scouting this spring, you will appreciate their role and avoid unnecessary treatments.

— Marion Murray, IPM Specialist

IPM In The News

Honey Bee Heat Stress

Researchers from Arizona State University found that extreme heat can overwhelm honey bees' ability to regulate hive temperature. By studying nine colonies in Arizona during a summer with temperatures above 104°F, they discovered that bees, especially those on the edges of the hive, were exposed to harmful temperature swings for hours each day. These conditions led to population declines, with smaller colonies being affected the most. These findings, published in *Ecological and Evolutionary Physiology*, will help improve beekeeping practices to support stable pollinations under heat.

Hidden Structures Found in Bacteria

A multinational research team discovered a previously unknown tubular structure inside the bacterium *Candidatus Profftella armatura*, which lives within the Asian citrus psyllid, a major citrus pest. Using advanced 3D electron microscopy, the research, published in *npj Imaging*, found that these large, helical tubes filled with ribosomes may play roles in protein production and structural support within the unusually long bacterial cells. The study offers new insights that could inform future pest control strategies.

Spiders Lack Conservation Data

Scientists from the University of Massachusetts-Amherst examined the conservation status of insects and arachnids across North America. By analyzing over 99,000 species, they found that nearly 90% have no conservation status, revealing major gaps in knowledge about their populations and needs. The study, published in *Proceedings of the National Academy of Sciences*, also showed that protection varies widely by state, with less attention given to arachnids and species in regions focused on extractive industries. These findings highlight how overlooked these organisms are despite their critical roles in ecosystems.

Viruses Trigger Queen Bee Replacement

Understanding factors that weaken honey bee colonies is critical for agriculture. New research, published in *Proceedings of the National Academy of Sciences*, revealed that viral infections can shrink a queen bee's ovaries and reduce her production of methyl oleate, a key pheromone signaling health to worker bees. When this signal drops, workers initiate supersedure, replacing the queen and potentially disrupting colony productivity. The study also found that adding synthetic methyl oleate can help prevent unnecessary queen replacement, offering a potential tool for beekeepers to maintain stable hives.

Soil Nutrients Reduce Locust Damage

As locust and grasshopper pests continue to threaten crops in the West, finding sustainable control methods is increasingly important. Researchers from Arizona State University and Université Gaston Berger investigated locust management strategies and how soil nutrients influence locust damage in crops. By working with farmers in Senegal, they found that millet grown in nitrogen-rich soil had fewer locusts, less damage, and produced up to twice the yield compared to untreated fields. The study, published in *Scientific Reports*, showed that protein-rich plants are less suitable for locusts, highlighting a simple, sustainable method, to naturally control pests.

Nanotech Cleans Soil

A recent study developed a novel biochar-based nanomaterial to tackle soil contamination by herbicides and soil and plant health. Researchers at Shenyang Agricultural University in China developed a nitrogen-rich biochar

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Featured Picture of the Quarter

This picture was emailed to us, showing the massive colonies of giant conifer aphids that have been almost everywhere in spring 2026.

There are many species of this aphid (*Cinara* spp.) and they are typically host-specific, overwintering as eggs on bark, needles, and buds of pine, juniper, spruce, and fir.

They are prominent this spring due to the warmer winter (increased egg survival).

and iron nanoparticle composite that removed over 95% of the herbicide acetochlor from soil while reducing its uptake in maize plants by over 80%. The material also formed a protective iron layer on plant roots and improved crop growth, boosting biomass by more than 200% in greenhouse tests. In addition to cleaning soil, the treatment helped restore beneficial microbial communities and was significantly cheaper than traditional methods. This research, published in *Biochar*, presents a new approach to improving soil health and food safety in agriculture.

Fungi Protects Crops

Researchers at Colorado State University are exploring an IPM tool of beneficial fungi that live within plant tissues and infect insect pests. Endophytic fungi can enhance plant defenses, improve nutrient uptake, and stimulate the production of compounds that both deter pests and attract natural enemies. Although their effectiveness can vary depending on environmental conditions and application methods, CSU's research on quinoa pests shows strong potential for use of these endophytic and entomopathogenic fungi in organic and low-input farming systems as a flexible approach to pest control.

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NPDN National Plant Diagnostic Network

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USDA United States Department of Agriculture National Institute of Food and Agriculture

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