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

Pest Management for Utah Cut Flower Production: Insects and Their Relatives

Utah Vegetable Production Guide

Utah Vegetable Production Website

Tree Injury Due to Herbicides Demonstrates Importance of Reading Label Ingredients

In summer 2024, several Utah State University (USU) county Extension offices and the Utah Plant Pest Diagnostic Lab (UPPDL) received calls about unusual symptoms on landscape trees such as honeylocust, ash, boxwood, and Chinese pistache (*Pistacia chinensis*). Symptoms included witches' brooms, epicormic branching (sprouting from latent buds on the trunk), oozing resin or sap, branch dieback, small leaves and leaf chlorosis (yellowing).

The UPPDL conducted several diagnostic tests for an insect or disease cause, and they all were negative. The damage, however, matched symptoms caused by the herbicide ingredients, imazapyr and imazapic. Both are found in herbicides labeled with "extended control."

The UPPDL sent samples to a specialized testing facility, and one came back positive for imazapyr and another for imazapyr and imazapic.

Witches' brooms on honeylocust affected by herbicide injury.

Epicormic sprouts from honeylocust trunk due to herbicide injury.

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If used incorrectly, very small concentrations (13 parts per billion or more) of either herbicide can cause serious damage to woody plants. The herbicides break down very slowly in soils with high clay content, high pH, and drought conditions (Tu et al. 2004) and are very water-soluble.

To avoid damaging woody plants when targeting weeds, it is important to read the herbicide product's ingredients and apply it as labeled. Going by the product name alone is not sufficient.

PRODUCT NAMES ≠ INGREDIENTS

Example 1

- "WeedKilz" contains ingredient A.
- "WeedKilz Extended Control" contains ingredient A (often in a lower concentration) plus ingredient B (which could be imazapyr, imazapic or another related chemical).
- "WeedKilz with Ingredient C" may not contain ingredient A at all but be composed of entirely different ingredients.

Example 2

"WeederDozer" is a long-known product that has historically contained ingredient D.

Recently, the manufacturer changed the product, and it now contains ingredient E (and possibly additional ingredients) but the brand name remains the same.

Claudia Nischwitz, Plant Pathologist, and Ben Scow, Horticulture Associate Professor, Washington County

Reference

Tu, M. Hurd C and Randall J.M. (2004). Imazapyr. Weed Control Methods Handbook (https://www.invasive.org/gist/products/handbook/17.imazapyr.pdf (accessed: 3-28-2025).

Resin oozing from trunk of Chinese pistache due to herbicide injury.

Branch dieback of honeylocust from herbicides.

Small, deformed leaves from herbicide injury.

Evaluating Alternative Herbicide Effects on Noxious Weeds in Summit County

Author, **Wesley Crump** is an Extension Assistant Professor of Horticulture, serving USU Extension in Wasatch and Summit counties. He has expertise in fruit trees and other perennial crops, plant breeding, native plants, plant dyes, and home-gardening. He also serves on the Tree Advisory Board for Heber City.

Summit County, Utah has 37 registered noxious weed species (Summit County Noxious Weed ID), which threaten public health, livestock, and crops (Utah State Code 4-17-102). Due to growing demands for more environmentally-friendly practices in Utah (uphe.org), we are investigating alternative herbicides to control these noxious weeds effectively. We loosely define an alternative herbicide as one claiming to be "organic," "environmentally friendly," "for organic gardening/production," or "natural," whether certified by the Organic Materials Review Institute (OMRI) or not. A study in Prince George, Canada, evaluating control of Canada thistle (*Cirsium arvense*) with acetic acid showed encouraging results (Booth and Skelton, 2018). Presented here is a preliminary report of the as-yet, first-year, unpublished data. We plan for a second year of data in 2025.

We evaluated three alternative herbicides (and active ingredients), including Captain Jack's Deadweed Brew (caprylic and capric acid), Weed Pharm (acetic acid), and Firehawk Bioherbicide (nonanoic acid). These were compared to controls of no treatment and a standard herbicide for noxious weeds, WeedMaster (dicamba plus 2,4-D). The noxious weeds selected for testing were garlic mustard (*Alliaria petiolata*), musk thistle (*Carduus nutans*), and Canada thistle (*Cirsium arvense*).

Garlic mustard (*Alliaria petiolata*) on June 7 immediately after initial treatment (left) and August 5 after three treatments of an organic herbicide (right).

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The three tested alternative herbicides are contact herbicides, meaning the herbicide only effects plant material that it contacts. This contrasts with systemic herbicides that can move or translocate within and throughout a plant.

Generally, contact herbicides are effective on young, annual weeds (Neal and Senesac, 2018). For control of perennial weeds, contact herbicides cause "burndown" of the aboveground plant parts and with repeated applications, can theoretically kill them.

We used three locations for each noxious weed where we sprayed the alternative herbicides three times over the course of the growing season, and the data we collected was percent ground coverage throughout the study.

Results

For Canada thistle, the average weed coverage was lowest in plots treated with WeedMaster, dropping from around 45% in June to just over 15.5% in September. In fact, the estimated daily reduction in Canada thistle and musk thistle coverage when treated with WeedMaster was significantly more than the plots treated with the alternative herbicides.

Interestingly, control of garlic mustard was similar among all tested herbicides, indicating control of this weed using alternative herbicides could be effective after additional evaluation.

Anecdotally, thistle plants sprayed with the alternative herbicides in all the plots showed a decrease in vigor and blooms (and thus seed set). Booth and Skelton (2008) demonstrated the importance of studying alternative-herbicide plots for multiple seasons to better understand the effect of the herbicide use on the regrowth and/or seed bank of the weed. We plan to do this in 2025.

These initial results can help homeowners and land managers understand what can be expected in the first season when using the three alternative herbicides addressed by this study. One takeaway is that multiple applications will be necessary, while always adhering to product labels. Even with multiple applications, these first-year data indicate that WeedMaster may be more effective at controlling the noxious weeds evaluated than the alternative herbicides used. More detailed recommendations will be forthcoming after an additional year of testing is completed.

—— Wesley Crump, Horticulture Assistant Professor, Wasatch County
Elizabeth Cohen, Natural Resources Assistant Professor, Summit County
Dr. Sara Jo Dickens, Ecologist and Owner, Ecology Bridge LLC
Dr. Xin Dai, Statistician, Utah Agriculture Experiment Station

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Organic Weed Management: Nuisance and Nuance

The 2025 growing season is upon us and one of the greatest challenges for producers is weeds. Weeds compete with crops for water, nutrients, and sunlight. They can set back crop establishment, undo hours of hard work, reduce yields, and reduce potential profit. It is no wonder growers often frame weed management as going to battle with an enemy.

USDA-certified organic producers and those using organic practices are no stranger to the challenges of weed management and are more limited in their options for herbicide. For these growers, it becomes even more important to understand why weeds occur and the local weed pressures, create a proactive management plan, and understand the control options available should other strategies fail.

What is a Weed?

Generally, a weed is a plant out of place. It is prolific, competitive, and interferes with the production crop. Soils "want" to be covered, and are filled with seed banks, ready to germinate should conditions arise. When land is cleared for agricultural production, it creates those ideal conditions. Weeds are a natural response to the low diversity and uncovered soil created by agricultural systems. Knowing what weeds are and why they grow is crucial in organic weed management. Armed with this knowledge, growers can keep them below a damaging level.

Keep the Ground Covered

Mulches such as straw, grass, leaves, or wood chips create a barrier between weed seeds and sunlight and air and reduce the number of weeds. Cover crops also keep the ground covered for longer durations and when crimped or mowed, can become a mulch for a subsequent planting. If practical, strategies like tighter planting or intercropping provide even more competition for weeds. Plastic mulch is allowed in organics but cannot be made of polyvinyl chloride (PVC) and must be removed from the field at the end of the growing season.

Reduce the Weed Seed Bank

Most seeds germinate within 2-4 inches of the soil's surface. While unmanaged soil may contain large numbers of weed seeds, diligent management can reduce the weed seed bank over time. Soil solarization over the soil kills seeds. Another option is to allow seeds to germinate and either blind-cultivate before seedlings show, flame weed, or light-cultivate to kill seedlings. Growers should target annual weeds before they go to seed, mow edges and paths, and bring rhizomes of perennial plants to the surface to desiccate. Once crops are planted, hand-pulling and row-cultivation can be used. Understand weed species dynamics and use targeted interventions when those weeds are weakest.

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Use Diverse Plantings

Crop rotation is not only a useful practice but a requirement in organic systems. Shifting between crops with different nutrient and water requirements and life cycles changes the growing environment for potential weeds and makes it harder for them to thrive or adapt. By creating shifting crop cycles, growers can utilize the natural preference for diversity rather than fight it.

Explore Additional Options

Organic growers should rely on the above practices first and foremost, but there are USDA organic-approved herbicides. These herbicides commonly contain active ingredients like vinegar and botanical oils that come from natural sources rather than synthetically-derived options available to conventional producers. Look for an organic approved label like OMRI and check with your organic certifier before applying any inputs.

Whether growing at a small or large scale, organically or conventionally, weeds are one of the biggest challenges to a grower's success. There are no silver bullets or one-sized fits all solutions to weed management. Creating a proactive plan that meets your specific circumstances can save you time down the road and contribute to a successful growing season. Happy weeding!

— Michele Schahczenski,
USU Extension Organic Outreach Coordinator

USU Pesticide Safety Education Program Empowers Applicators with Free Education

Since 2020, the USU Pesticide Safety Education Program (PSEP), with vital support from the Utah Department of Agriculture and Food (UDAF), has offered free educational resources and safety training to pesticide applicators across Utah. Through a combination of free study guides, Continuing Education Units (CEUs), and webinars, the program has enabled pesticide applicators to stay compliant with regulations while enhancing their safety practices—without facing any financial barriers. This initiative is a testament to the collaborative efforts aimed at promoting public health, environmental protection, and responsible pesticide application.

Impact and Reach

The USU PSEP has made a profound impact on pesticide applicators across Utah, particularly through its webinars. These webinars have averaged over 100 participants per session. Each session provides three CEUs, which are essential for applicators to maintain their certifications and stay current with the latest safety protocols. Since inception, the program has reached approximately 5,500 applicators across 150 Utah zip codes.

This impact demonstrates the program's accessibility and importance to pesticide applicators in both rural and urban areas. With more than 10,500 CEUs awarded—valued at an estimated $210,000—the program has provided substantial educational resources at no cost to the applicators. These CEUs not only support applicators' legal compliance but also improve their knowledge and practices, fostering a safer environment for both the applicators and the public.

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Commitment to Safety

Applicators benefit from the USU PSEP training because it addresses critical concerns, such as proper pesticide handling, application techniques, and the potential risks to wildlife and the broader ecosystem. The program equips applicators with the knowledge they need to minimize risks, protect the environment, and make informed decisions when using pesticides.

With ongoing support from UDAF, the USU PSEP has introduced new CEU topics, keeping the content relevant to industry developments and public health issues. In addition to traditional pesticide safety, the program now covers critical areas such as suicide prevention, first aid, and the opioid addiction epidemic. This expansion reflects the program's commitment to applicators' overall well-being, addressing both their technical skills and personal health.

Michael Wierda (center) with parents Ron and Sue, receiving the 2024 Western Region Excellence in Extension Award for an Individual

The inclusion of mental health awareness and crisis intervention is especially important given the challenges pesticide applicators face. By offering training in these areas, the program ensures applicators are equipped not only for safe pesticide use but also to manage their well-being. The USU PSEP efforts in suicide prevention and substance abuse are reaching a new and often underserved audience, fostering a safer and more supportive environment for applicators across Utah.

A Collaborative Effort

The strong partnership between USU and UDAF is key to the success of the USU PSEP. This collaboration has allowed the program to offer educational resources and training at no cost to pesticide applicators, making it accessible to everyone, regardless of financial status. By removing the financial barriers to education, the program ensures that all applicators, whether they are small-scale farmers, pest control professionals, or landscapers, can access the necessary tools to apply pesticides safely and responsibly.

Looking to the Future

The USU PSEP is poised to continue its vital work in Utah, offering new CEU topics, reaching more applicators, and expanding its educational resources. As pesticide safety concerns evolve, the program will adapt, ensuring that applicators are well-prepared to face emerging challenges and continue applying pesticides safely and effectively.

— Michael Wierda, Extension Associate Professor and PSEP Director

Lettuce Be Vigilant with Leafy Greens Pests


Snail


Downy Mildew


Loopers on Lettuce

Leafy green vegetables are a staple in spring and fall production across Utah. Whether grown in open fields or under the protection of high tunnels, these crops are highly valuable in fresh market sales. Despite their appeal and productivity, leafy greens face significant challenges from insect pests and diseases in Utah's varied growing conditions, and having a strong integrated pest management (IPM) program—whether growing conventionally or organically—will help minimize losses.

Common Pests

Aphids are among the most persistent insect pests, feeding on sap from tender plant shoots and the undersides of leaves. **Caterpillars**, especially on Brassicas, can be especially destructive due to extensive foliar feeding. Examples include armyworms, cabbage loopers, diamondback moth, and cutworms. The small and fast-moving **flea beetles** chew round holes in leaves, reducing marketability. **Leafminers** create winding trails inside leaves, reducing both appearance and photosynthetic capacity in crops like spinach, chard, and beets.

Below-ground threats can be just as serious. **Cabbage maggots** damage root systems, often causing young seedlings to wilt or collapse, particularly in early spring when soils are still cool. **Slugs, snails, and earwigs** prefer moist, shaded areas and feed heavily on tender foliage during overnight hours. Soil-dwelling organisms such as **symphylans and springtails** may affect seedling emergence and root development, especially in poorly-drained soils. These pests can cause considerable damage if populations are allowed to build.

Diseases are another major concern for leafy green growers. **Damping-off**, caused by several soilborne pathogens, affects seedlings of all species shortly after germination, leading to plant death. Spinach is particularly susceptible to **downy mildew,** which appears as yellow leaf spots with gray fuzzy growth on the undersides. Lettuce growers may encounter **verticillium wilt**, a soilborne pathogen that causes progressive yellowing and plant decline. Sclerotinia rot, or "**drop**," is an issue in dense plantings and results in crown rot accompanied by white, cottony fungal growth. Spinach and chard are also prone to **leaf spot diseases** caused by *Stemphylium* and *Cladosporium*, while *Phoma* species may damage both foliage and roots.

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Adopt an IPM Plan

To manage these threats effectively, a comprehensive IPM program that includes monitoring and preventive measures should be used. Monitoring involves weekly visual scouting for pests and hanging yellow sticky traps (aphids, thrips, fungus gnats) and pheromone traps (caterpillar moths).

Cultural controls are low-cost but effective preventive measures. Several disease-resistant varieties, particularly those with resistance to downy mildew and common leaf spot pathogens, are available as seeds or starts. Pre- and post-season sanitation such as removing plant debris and weeds, help eliminate overwintering sites and alternative hosts. Floating row covers can shield young plants from aphids, flea beetles, and caterpillars, especially early in the season. Raised beds and drip irrigation promote good drainage and reduces surface moisture, thereby minimizing the risk of damping-off and root rot. In high tunnel environments, proper ventilation reduces humidity and prevents diseases like downy mildew.

Enhancing natural biological control in the soil and environment further prevents pest incidence and supports a more balanced ecosystem. Crop rotation, cover crops, amendments, and mulches not only break pest life cycles but promote a healthy soil microbiome. Beneficial insects such as lady beetles, lacewings, and parasitoid wasps help minimize aphids and caterpillars. Predatory beetles and beneficial nematodes target soilborne pests.

When pest pressure becomes too high, a pesticide may be necessary. Base the decision of spraying on pest monitoring results and prioritize a reduced-risk option to minimize harm to beneficial insects and the environment.

Using IPM practices improves the resilience and productivity of leafy green crops while reducing reliance on chemical inputs. These strategies promote long-term soil health and reduce pest pressure. For more in-depth information, visit the leafy greens section on the Utah Vegetable Production website.

— Nick Volesky, Vegetable IPM Associate


Rot


Flea Beetle


Cabbage Loopers

Pesticide Label Changes for ESA

This article is part one in a series discussing upcoming pesticide label changes for Utah agriculture. Part two will address label changes to reduce runoff and drift.

The Environmental Protection Agency (EPA) is an independent agency tasked with protecting people and the environment from significant health risks. In doing so, it sponsors and conducts research and develops and enforces environmental regulations. For decades, however, environmental groups have argued that the EPA has not appropriately protected endangered species.

The EPA oversees and follows the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which regulates the entire pesticide industry to protect human health and the environment. Under FIFRA, EPA is responsible for the registration of pesticides and pesticide label updates for all products in the U.S.

The Endangered Species Act (ESA) is designed to protect the 1,300 endangered or threatened species or their habitats listed in the U.S. Section 7 of the ESA mandates that the EPA consult the U.S. Fish and Wildlife Service or the National Marine Fisheries Service during pesticide evaluations to ensure that it does not jeopardize any listed threatened or endangered species or critical habitats. If a pesticide is likely to cause jeopardy, EPA must designate mitigation measures to reduce runoff and drift.

The process for pesticide registrations, reviews, and new uses is highly complex. After initial registration, a pesticide ingredient is rigorously evaluated every 15 years for label language, packaging, safety, and environmental protections. The process involves the creation of a work plan, draft biological and human risk assessments (followed by public comment), draft proposed decision (followed by public comment), final decision with responses to comments, and label changes. This process takes anywhere from 4 to 15 years for each ingredient.

Unfortunately, EPA has faced complex challenges integrating FIFRA and the ESA into the pesticide registration process. EPA conducts thousands of reviews, and a recent audit showed that the agency is only meeting the Section 7 requirement for 5% of those reviews. This lack of compliance opened EPA up to over 20 lawsuits covering 1,000 pesticides.

One of the major lawsuits was filed in 2011 by the Center for Biological Diversity and the Pesticide Action Network North America. The settlement ended in 2023, forcing significant reforms in the largest ESA case ever filed against the EPA. The reforms include development of mitigation strategies to protect endangered species, assessment of eight hazardous pesticides by 2027, pilot programs focusing on species most at risk from pesticide exposure, and collaborations with industry representatives to improve compliance with endangered species protections.

— Mair Murray, IPM Specialist

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Box Tree Moth and Boxwood Leafminer in Utah Landscapes

Boxwood (*Buxus* spp.) is a common shrub in many Utah landscapes due to its evergreen foliage, tidy growth habit, and suitability for shaping and hedging. However, these shrubs face increasing pressure from two insect pests, the box tree moth (or boxwood moth; *Cydalima perspectalis*) and the boxwood leafminer (*Monarthropalpus flavus*).

Box Tree Moth – Not Detected in Utah

The box tree moth (order Lepidoptera) is native to temperate and subtropical regions in Asia. In Europe, it has spread widely and caused significant damage to boxwoods since its detection in 2007. In North America, it was first detected in Canada in 2018, and in the U.S. in 2021. To date, box tree moth has not been reported in Utah. However, sightings and established populations in nearby states suggest that it could find its way here.

Adults are small, with a wingspan of about 1.5 inches. Generally, they have white wings bordered in dark brown, although a darker form exists with mostly brown wings. Mature larvae are an inch long and greenish-yellow with black stripes.

Severe infestations can cause defoliation or plant death. Symptoms include chewed or skeletonized leaves, silken webbing and frass (caterpillar droppings), thinning foliage or entire sections of boxwood appearing dead, and defoliation that often starts from the inside of the shrub and progresses outward.

Preventing introduction into Utah is important. Purchase only from certified pest-free nurseries to avoid or minimize chances of acquiring infested plants. If you suspect boxwood moth in Utah, immediately contact the UPPDL and/or submit a sample or contact the Insect and Pest Program at the Utah Department of Agriculture and Food.

Where this pest occurs in other states, plant managers are doing the following:

1. Hanging pheromone traps May - Sept to detect adult moths and inspecting shrubs for signs of larvae and damage.
2. For smaller infestations, removing larvae and webbing by hand and pruning and destroying affected plant parts.
3. Promoting natural enemies such as parasitic wasps, flies, and birds.
4. Using an insecticide labeled for boxwood and caterpillars such as *Bacillus thuringiensis* or spinosad for young larvae, or permethrin or bifenthrin (with caution) for older larvae.

Boxwood moth caterpillar feeding (left, by Ferenc Lakatos) and the two variations of the adult moth (center/right, by Szabolcs Sáfián). Photos courtesy of bugwood.org.

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Boxwood leafminer larvae that have been exposed from within their mines on a boxwood leaf.

Boxwood Leafminer – Occasional in Utah

The boxwood leafminer (*Monarthropalpus flavus*), a long-established pest in the U.S., occurs in Utah. Although it typically causes cosmetic damage rather than plant death, repeated infestations can weaken shrubs and reduce their aesthetic appeal.

Adults are tiny, orange, mosquito-like flies that emerge in late spring. After mating, females lay eggs inside the leaves of boxwood plants. The larvae are small, flattened, and yellowish-orange, resembling miniature maggots. The larvae feed between the upper and lower surfaces of the leaf, producing a blistered or bubble-like appearance. Often, several larvae inhabit a single leaf. They grow to about 1/8 inch (3 mm) in length when mature. If you hold a blistered leaf up to the light, the larvae and their frass (droppings) are often visible inside. When disturbed, they may wiggle briefly before retreating deeper into the leaf tissue.

Damage often becomes most apparent in mid to late summer, though it originates earlier in the season. Symptoms include swollen or blistered leaves, yellowing or browning of leaf tissue, premature leaf drop, and thinned-out or stressed-looking plants.

There are multiple approaches for managing leafminers, including:

1. **Monitoring:** Check plants regularly for overall plant health and examine foliage for symptoms.
2. **Cultural control:** Prune boxwoods to improve air circulation and remove infested foliage in late fall or early spring before adult emergence.
3. **Biological control:** Some parasitic wasps target leafminer larvae, though their impact is generally modest at best.
4. **Chemical control:** A systemic insecticide (such as imidacloprid or dinotefuran) should be applied in early spring before larvae mature. During adult emergence (typically May), a foliar spray of a pyrethroid can help reduce egg-laying. Always follow label instructions or seek professional assistance.

While the boxwood leafminer remains a common nuisance, the potential arrival of the box tree moth raises new concerns. With informed planting choices, careful monitoring, and timely interventions, these pests can be effectively managed, preserving the health of boxwoods for years to come.

— Ernane Vieira-Neto, Arthropod Diagnostician

Boxwood Blight

Boxwood blight is a fungal disease caused by *Calonectria pseudonaviculata*. It has been reported from 20 states. Over the years, clients have sent images to the UPPDL of boxwood leaves and branches with symptoms that resemble this disease, but physical samples were either too dry or unable to be sent. Therefore, the status of this disease remains that it has not been detected in Utah.

All species of boxwood are susceptible to *C. pseudonaviculata* as well as other members in the boxwood family including pachysandra. Possible pathways of introduction into Utah include infected but symptomless nursery plants or wreaths and other decorations made of infected boxwood material that is disposed of near hosts.

Initial symptoms are black spots on boxwood leaves. The spots enlarge and merge resulting in brown blotches. A characteristic symptom is black streaks on green stems. The black streaks are unique to this disease, allowing differentiation from other boxwood diseases. The disease leads to rapid defoliation of infected plants. White spores become visible on the underside of leaves and on the black stem streaks during periods of high humidity.

The pathogen spreads when splashing water from rain or overhead irrigation carries spores to healthy leaves and plants. Utah's hot, dry weather is not suitable for spread of boxwood blight, but overhead irrigation may increase the chances for infection since spores need high humidity to develop. The fungus overwinters on fallen leaves and stems of infected plants. Other pathways of spread include movement of infected nursery plants and contaminated pruning tools.

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Boxwood hedge infected with boxwood blight.
Image courtesy of Mary Ann Hansen, Virginia Polytechnic Institute and State University, Bugwood.org

Black spots on infected boxwood leaves.
Image courtesy of David L. Clement, University of Maryland, Bugwood.org

Brown blotches on leaves.
Image courtesy of Yonghao Li, The Connecticut Agricultural Experiment Station, Bugwood.org

Preventing introduction by purchasing certified disease-free plants is the best management option. Some nurseries participate in a program called the Boxwood Blight Cleanliness Program. The program uses a systematic approach to clean plant sourcing, early detection, and prevention of spread.

If boxwood blight is ever suspected in Utah, please collect a physical sample containing healthy and diseased branches, and submit it to the UPPDL.

If boxwood blight is detected in Utah, it will be important to care for boxwood and related plants that may include the following management tools.

1. Prune boxwood only when plants are dry.
2. Sterilize pruning tools between cuts with a dip in 15% household bleach or using disinfecting wipes.
3. Collect and dispose of fallen leaves in the trash. Infected plant material should never be composted.
4. Apply a preventive fungicide (chlorothalonil, fludioxonil or tebuconazole) at temperatures above 60° F where rain is in the forecast. Applications may need to be repeated every 7 to 14 days, depending on the product and label requirements.

Black streaks on boxwood stem.
Image courtesy of David L. Clement, University of Maryland, Bugwood.org

Spores on the underside of boxwood leaves.
Image courtesy of David L. Clement, University of Maryland, Bugwood.org

Spores on black streaks of boxwood stem.
Image courtesy of David L. Clement, University of Maryland, Bugwood.org

— Claudia Nischwitz, Plant Pathologist

IPM In The News

Combining Pest Treatments Protects Honey Bees

A study from Penn State University shows that employing multiple treatments against Varroa mites can significantly enhance honey bee colony survival during winter. Varroa mites are parasitic pests that weaken honeybee colonies by feeding on their bodily fluids and spreading deadly viruses. The teams research also found that both organic and synthetic chemicals used to treat varroa mite were equally effective. Additionally, while spring, fall, and winter precipitation correlated with increased bee survival, excessive summer rainfall was linked to decreased survival, possibly due to reduced foraging opportunities.

High-Flavonoid Corn = Natural Pest Resistance

Penn State researchers found that corn earworm larvae feeding on high-flavonoid corn lines grew slower, suffered higher mortality, and showed signs of gut damage compared to those feeding on regular corn. Both genetically-engineered and conventionally bred high-flavonoid corn had similar effects, suggesting potential for developing pest-resistant corn varieties suitable for organic agriculture. The teams findings were published in *Plant Stress* in 2025.

Plant Protein Protection Against Spider Mites

Researchers from Tokyo University of Science in Japan discovered two new proteins, Tet3 and Tet4, which are secreted from the salivary glands of spider mites. Spider mites are tiny arachnids that feed on plant sap, causing leaf damage and triggering defense responses in host plants. These defense responses appear to reduce mite reproduction, offering a potential path to developing mite-resistant crops and reducing the need for pesticides.

Study Warns Against Overuse of Bt Corn

A 12-year study across 10 U.S. Corn Belt states reveals that the overuse of genetically engineered Bt (*Bacillus thuringiensis*) corn, designed to prevent rootworm larvae, can diminish farmers' profits. Corn rootworms are major agricultural pests whose larvae feed on corn roots, leading to plant instability and significant yield loss. Uniform use of Bt corn, regardless of actual pest levels, leads to unnecessary costs and accelerates insect resistance. Researchers advocate for more targeted use of Bt traits, aligning pest management strategies with regional needs to sustain effectiveness and profitability.

Detecting Plant Stress in Real Time

A team from Iowa State University developed a low-cost, reusable patch that quickly detects hydrogen peroxide—a stress signal in plants—by measuring electrical current changes. The patch, which attaches to the underside of leaves using microscopic needles and a special hydrogel, accurately identified stress in infected soybean and tobacco plants within a minute. This innovation offers a fast, affordable way for farmers to monitor plant health in real time and respond early to stress, potentially boosting crop yields.

Technology to Improve Pesticide Stickiness

Researchers at MIT have developed a new spray technology that enhances the adhesion of pesticides to plant leaves, resulting in reduced chemical use and environmental runoff. Each droplet is coated with a thin layer of oil, making the droplets less likely to bounce off the hydrophobic surfaces of leaves. This method increases the pesticides "stickiness" by up to 100 times and could lead to significant cost savings for farmers and a decrease in pesticides washing off plants. The study was published in *Soft Matter*.

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Featured Picture of the Quarter

These cauliflower-like structures used to be poplar buds. In spring, poplar bud gall mites took up residence at the base of the buds, and the growth hormones in their saliva caused a pocket to form around the mites in which they happily feed and reproduce.

The mites (*Eriophyes parapopuli*) are so tiny that five of them, lined up end to end, barely stretch across a 12-point period. They remain active inside their galls for up to 4 years.

— Image by Marion Murray, IPM Specialist

Preventive Insecticides May Increase Weed Pressure

A study led by Penn State researchers indicates that insecticide seed treatments may inadvertently increase certain weed populations, such as marestail, by disrupting beneficial insects that consume weed seeds. Over a three-year period, soybean and wheat fields planted with treated seed, but lacking cover crops, exhibited higher weed growth. In contrast, fields with cover crops mitigated this effect, even when treated seeds were used. The findings suggest that adopting integrated pest management strategies alongside cover cropping can enhance weed control and reduce unnecessary pesticide use.

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