Summer 2022
Vol. XVI

UTAH PESTS QUARTERLY

NEWSLETTER

Utah Plant Pest Diagnostic Laboratory

USU Extension

IN THIS ISSUE

NEW MEDIA

New Virus Diseases Discovered on Utah Cut Flowers

Tobacco Rattle Virus on Peony

In early June 2022, peony samples were submitted to the plant pathology lab at Utah State University with foliar damage resembling symptoms caused by Tobacco rattle virus (TRV). The symptoms on the foliage ranged from none to yellow ringspots and wavy, yellow lines or mosaic symptoms. We sent the sample to a commercial testing lab that confirmed TRV. This virus is listed as occurring in Utah; however, this is the first diagnosis by the USU plant pathology lab.

TRV belongs to the Tobraviruses, a genus that is transmitted by stubby root nematodes (*Trichodorus* and *Pratrichodorus* spp.). In addition, the virus could be introduced into a garden or farm by infected planting material. The virus has a large host range of over 400 ornamentals such as sunflower, tulips, hosta, and bleeding hearts, and

Discoloration of peony foliage caused by Tobacco rattle virus.

vegetables such as potatoes (causing corky ringspot of potato), cucumber, pepper, spinach, beets and many weeds. In many host plants, the virus does not

continued on next page

Extension
UtahStateUniversity

UTAH PESTS TEAM

Diane Alston
Entomologist
Head, Dept. of Biology
diane.alston@usu.edu
435-797-2516

Marion (Mair) Murray
IPM Project Leader
Utah Pests News Editor
mair.murray@usu.edu
435-797-0776

Claudia Nischwitz
Plant Pathologist
claudia.nischwitz@usu.edu
435-797-7569

Ricardo Ramirez
Entomologist
ricardo.ramirez@usu.edu
435-797-8088

Zach Schumm
Arthropod Diagnostician
zach.schumm@usu.edu
435-797-2435

Lori Spears
Prof. Practice Associate Prof.
USU CAPS Coordinator
lori.spears@usu.edu

Nick Volesky
Vegetable IPM Associate
nick.volesky@usu.edu
435-797-0319

Utah Plant Pest Diagnostic Lab
BNR Room 203
Utah State University
5305 Old Main Hill
Logan, UT 84322

To subscribe, click here.

cause symptoms; however, other hosts can have stunted growth, produce fewer flowers, or have undesirable ring spots on the foliage.

Spread of the virus within a planting can be caused by stubby root nematodes. It has been reported that transmission from plant to plant can also occur by using contaminated knives and pruning tools, for example, while cutting flowers and not disinfecting tools between plants. Therefore, symptomatic plants should be removed to minimize infection risk to other plants.

Yellow mosaic symptom on peony foliage from Tobacco rattle virus.

First Occurrence of Freesia Sneak Virus in Utah

In early spring 2022, we received samples of freesia plants with chlorotic, necrotic (brown) and purple lesions and streaks. The symptoms matched what is known as Freesia sneak virus (FSV). Using molecular tools, the suspected virus was confirmed both in the USU plant pathology lab and by USDA APHIS. Other than this Utah detection in the U.S., the virus has been intercepted in California and found once in Virginia. Freesia sneak virus has just two known hosts – *Freesia* sp. and *Lachenalia* sp. Both plants are monocots that produce bulbs.

Small flecks of bleached, purple, and brown spots on freesia foliage caused by Freesia sneak virus.

FSV is transmitted by the soilborne fungus, *Olpidium brassicae*. The fungus can survive as resting spores for up to 20 years in the soil and the virus can survive within the spores for several years. The fungus infects plant roots, and introduces the virus after infection. In the freesia sample submitted to USU, the fungus was not found in the soil or roots. Another mode of spread is by infected plant material, which likely happened with this sample.

The virus only affects leaves, causing small flecks of bleached, purple, and brown spots. It does not cause symptoms on flowers, and effects on cut-flower yield are unknown. The only management option available is to remove the symptomatic plants and destroy them; they should not be composted.

If you grow peony and/or freesia and see symptoms that match Tobacco rattle virus or Freesia sneak virus, please contact Claudia Nischwitz (claudia.nischwitz@usu.edu) or Melanie Stock (melanie.stock@usu.edu) for identification. Testing is free for Utah commercial cut flower producers and $30 for homeowners. Note that the test for TRV will be available by the end of July or mid-August.

— Claudia Nischwitz, Extension Plant Pathologist and Melanie Stock, Extension Small Farms Specialist

New Vegetable IPM Farm is an Outdoor Classroom

The mission of USU Extension's Integrated Pest Management program is to increase the use of sustainable pest management practices within urban and rural landscapes to provide economic, human, and environmental health in Utah. To help promote this goal, our program established a vegetable farm to demonstrate IPM techniques in an agricultural setting, funded by Western Sustainable Agriculture Research and Education. This one-acre farm is located at the Utah Agricultural Experiment Station Greenville Farm adjacent to USU main campus in Logan, UT. It includes demonstrations of cultural, mechanical, biological, and chemical control methods, providing a "real-life classroom" for farmers and home gardeners. Listed below are some of the projects happening on the farm.

Chemical Control: Organic Fungicides for Powdery Mildew

In mid-July 2022, we will begin a trial to evaluate organic fungicides for their control of cucurbit powdery mildew (*Podosphaera xanthii* and *Golovinomyces cichoracearum*) on watermelon, yellow squash, pumpkin, and cucumber. The fungicides include Serenade (*Bacillus subtilis*), Eco-1 Fruit & Vegetable Spray (plant-based oils), Kaligreen plus oil (potassium bicarbonate), and sulfur. We will evaluate products by counting the number of mildew colonies and visually determining percent leaf coverage for each crop type and treatment throughout the season.

Mechanical Control: Weed and Insect Exclusion

On the farm, we use mechanical control methods to manage weeds. One method is the use of black plastic mulch laid in the rows to suppress germination and allow the cash crop space to grow and not compete with weeds for water. Other methods of mechanical weed control include mowing the field borders and rototilling and wheel-hoeing in between the mulch rows.

To exclude insects, we are using insect mesh netting to prevent damage from diamondback moth (*Plutella xylostella*), imported cabbageworm (*Pieris rapae*), cabbage looper (*Trichoplusia ni*), cabbage aphid (*Brevicoryne brassicae*), and crucifer flea beetles (*Phyllotreta cruciferae*). on cabbage. We will demonstrate the netting effectiveness by measuring insect populations and damage severity in uncovered and covered cabbage.

continued on next page





Plantings at the IPM Vegetable Farm, from top left: new annuals and perennials sprout in the insectary strip; sunflowers and sorghum in the edge trap crop planting; cabbage in the insect exclusion planting; mulching trial for tomato viruses.

Additionally, we are demonstrating the effectiveness of Agribon-15 spunbond fabric covering spinach and chard to exclude leafminers and we are collecting the same insect and damage data of covered and uncovered plants.

Cultural Control: Trap Crops and Mulching

Trap cropping involves growing plants alongside a target crop that are more appealing to certain pests, thereby protecting the crop. Building on our previous studies as well as others (Majumdar et al, 2012 and Soergel et al, 2015), we are growing a row of sunflowers and dwarf sorghum as trap crops to attract various true bug pests (stink bugs, lygus bugs, and other plant bugs) away from susceptible cash crop vegetables. The sorghum and sunflowers are planted as a "wall" on the eastern edge of the farm. Throughout the season we will document pest presence on the trap crops.

Reflective silver mulch is a method used to deter thrips and the spread of Tomato spotted wilt virus in commercial tomato production. On the farm, we are testing this method by comparing it with replications of tomatoes grown on black plastic mulch and bare soil. Reflective silver mulch is also being tested in dahlia production in its effectiveness to exclude earwigs, thrips, and the spread of viral disease.

Biological Control: Insectary Plantings

Within the vegetable rows, the IPM farm includes two 200-foot plantings of a "wildflower mix" to attract beneficial arthropods. The plants grown in this mix include *Alyssum saxatile, Ammi majus, Anethum graveolens, Arabis alpine, Cheiranthus allionii, Chrysanthemum maximum, Coreopsis lanceolate, Coriandrum sativum, Cosmos bipinnatus, Dalea purpurea, Eschscholzia californica, Gaillardia pulchella, Gilia capitate, Iberis umbellate, Liatris spicata, Lobularia maritima, Monarda fistulosa, Nemophila menziessi,* and *Rudbeckia hirta.* Throughout the season, we will inspect the flowers for winged beneficial insects and monitor overall pests on the vegetable crops for any signs of parasitism and predation.

Follow the "USU Extension – Utah Pests" on Facebook and Instagram for updates on happenings at the IPM Farm including "walk and talk" tours this summer.

— Nick Volesky, Vegetable IPM Associate

References

Majumdar, A. Z., Akridge, R., Becker, C., Caylor, A., Pitts, J., Price, M., & Reeves, M. (2012). Trap Crops for Leaffooted Bug Management in Tomatoes. Journal of the NACAA, Vol 5, Issue2

Soergel, D.C., Ostiguy, N., Fleischer, S. J., Troyer, R. R., Rajotte, E. G., & Krawczyk, G. (2015). Sunflower as a Potential Trap Crop of *Halyomorpha halys* (Hemiptera: Pentatomidae) in Pepper Fields. Environmental Entomology, Vol 44:Issue 6.

Oystershell Scale: No Beach Required

Oystershell scale (*Lepidosaphes ulmi)*, native to Europe, is one of the more common armored scale insect pests of hardwood trees in North America, affecting many urban tree and shrub species. Although it is established in Utah, it is now being detected in naturally-occurring high-elevation stands of quaking aspen (*Populus tremuloides*). The UPPDL received samples from aspen in the past that may have been collected from forested land near Cedar City and other south-central parts of the state (elevation unknown). And in 2019, oystershell scale was found on aspen growing in Provo Canyon at around 7,300 feet in elevation. The U.S. Forest Service has initiated surveys to determine the extent of infestations around the state. Spread of the scale into these high-elevation areas can occur by moving infested plant material, such as firewood, and by movement of the mobile stage of the insect in high winds.

Oystershell scale has a broad host range of about 150 primarily hardwood species, and common Utah hosts include poplars (*Populus* spp.), willow (*Salix* spp.), ash (*Fraxinus* spp.), maple (*Acer* spp.), lilac (*Syringa* spp.), and elderberry (*Sambucus* spp.). Scales accumulate in clusters on the bark of trunks and branches, and a high infestation can lead to loss of plant vigor and branch dieback. Heavy infestations typically give bark a gray, mottled appearance, and susceptible host plants can succumb from prolonged attacks.

The thin bark of aspen makes this tree particularly susceptible to this pest, and since aspen are critical components of Utah's mountain regions that are vulnerable to changing climactic conditions, the potential impact to forests is disconcerting (Forest Health Protection, 2022). Aspen provide significant ecosystem services that include soil carbon sequestration, bank stabilization, shade for sensitive riparian areas and understory vegetation, and forage, shelter, and nesting sites for native species, among other benefits.

Adult scales are gray or brown with a waxy shell that covers the body. They are small (about 2 to 3 mm long) with one end narrow and the other end wider and rounded, resembling a tiny oyster. Eggs are whitish, and nymphs are tiny, pale yellow, and nondescript.

The scale overwinters as eggs under the female's scale cover. Eggs hatch in May or June, and the emerging nymphs ("crawlers") search for suitable feeding sites on the parent tree. Nymphs are mobile for a few days to about two weeks before settling down to feed on sap. The protective waxy shell develops as the insect molts,

continued on next page

Oystershell scale overwinters as eggs under the female armor (*top right*). Under high populations, they can kill trees or shrubs, including willow (*lower right*). One management option is to scrub off the scale bodies, which is easiest to do in late spring before bud-break (*left*).

and dead scale bodies can remain on the tree for several years. In late summer, mating occurs either sexually by winged males or asexually, and each mated female lays and shelters from 10 to more than 100 eggs before dying. The gray form of oystershell scale has one generation per year, while the brown form has up to two generations (Forest Health Protection, 2011).

For managing oystershell scale, prune localized infestations, physically remove the scales with a plastic dish scrubber, or use an insecticide in high populations. Application timings include a dormant spray of horticultural oil or an insecticide later in the season on the short-lived crawlers (Davis et al., 2019). Insecticides can negatively affect beneficial species and encourage secondary pest species, so always follow label instructions and choose reduced risk products first. The scale population can also be regulated by naturally-occurring beneficial insects such as parasitic wasps and various species of beetles, bugs, lacewings, and mites.

The U.S. Forest Service-Forest Health Protection is requesting public input to help track infestations and keep this pest from extending its range. If you suspect oystershell scale in Utah, please consult Justin Williams (justin.williams3@usda.gov) or Ryan Davis (ryan.davis@usda.gov) to learn how you can help guide future research and monitoring efforts in our region.

——— Ann Mull, Research Technician, and Lori Spears, USU Invasive Species Specialist

References

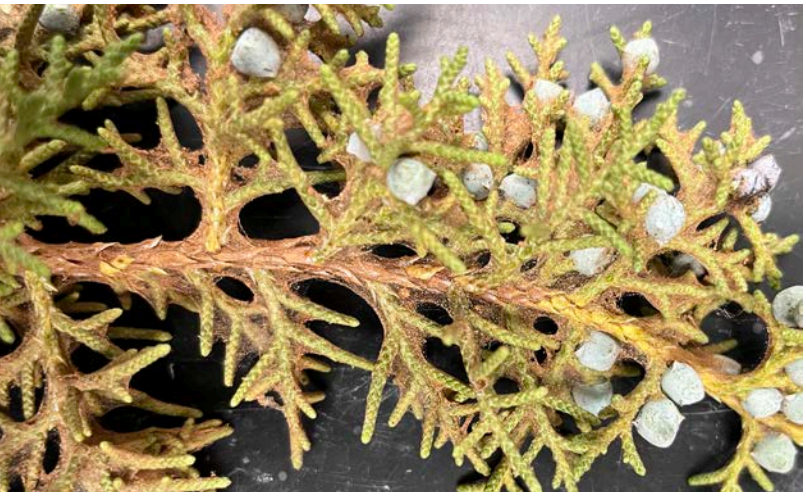
Davis, R., J. B. Karren, and A. H. Rose. (2019). Oystershell (mussel) scale, (*Lepidosaphes ulmi*) [Pub ENT-210-19]. Utah Plant Pest and Diagnostic Laboratory, Utah State University Extension.

Forest Health Protection. (2011). Oystershell scale: Tiny, armored scale on many hardwoods. USDA Forest Service, Rocky Mountain Region.

Forest Health Protection. (2022). Pest alert: Oystershell scale. USDA Forest Service, Intermountain Region, Ogden Field Office.

University of California Integrated Pest Management Program (UC IPM). (2016). Oystershell scale—*Lepidosaphes ulmi*. California Department of Food and Agriculture.

Spider Mites Abound on Junipers in 2022



Utah juniper sample sent to UPPDL, showing sand and debris-covered spider mite webbing. No living mites were found on this seemingly heavily infested branch (*left*). Magnified view of debris-covered spider mite webbing (*right*).

There have been more early-season inquiries regarding spider mites on juniper trees sent to the UPPDL in 2022 than in most past years. Spider mites are arthropods that feed by piercing plant cells with their mouthparts and sucking up the contents. This can result in yellowing and stippling of foliage, dieback, and reduced plant vigor. In addition to feeding symptoms, spider mites are known for fine webbing, which can result in plants that look dirty and unhealthy.

Identification of spider mites to the species level can be challenging and often requires microscopes or other testing. To date, none of the spider mites in junipers from 2022 have been identified to the species level, but it is likely that they are spruce spider mite, a cool-weather species that feeds on all conifers in Utah and is most common on blue and Alberta spruce.

Spruce spider mites overwinter as eggs on the host and after hatching in spring, they start to reproduce quickly, followed by a dormant period in the heat of the summer. Utah has experienced a series of mild winters, and in spring 2022, we experienced hot early spring temperatures that were followed by prolonged cooler temperatures. These conditions, combined with Utah's continued drought likely contributed to the outbreak. The best management practice is to keep junipers and other hosts as healthy as possible to reduce drought stress. Areas of the plant that are infested can be pruned off if pruning is safe for the plant, and a jet stream from a garden hose can dislodge and kill mites from heavily infested areas of plants.

In severe cases, chemical control options are available. Homeowners can use dormant oil (targeting the overwintering eggs), neem oil, insecticidal soap, or bifenthrin. Professional applicators can use miticides that target only the mite and preserve beneficial predators.

It is important to note that infestations on some plants may look worse than they actually are due to the webbing and trapped debris that the mites leave behind. In samples of spider mites from junipers sent to the UPPDL in 2022, the foliage was dark brown due to sand and debris getting stuck in the spider mite webbing. There were no mites found in the samples even though to the eye the infestation looked incredibly heavy.

If you think you may have spruce spider mites on junipers on your property, consider contacting the UPPDL or submitting samples, as we have interest in confirming the species that has been extremely abundant on juniper trees this year.

—— Zach Schumm, Arthropod Diagnostician

Summer is Wasp Season

Far right: Western yellowjacket on top and European paper wasp, below.

Near right: Rescue trap for yellowjackets and DIY soda bottle trap with funnel for paper wasps.

Summer is the time for swimming, playing outdoors, and oh yes, shooing away certain wasps. Not only can stinging wasps hurt the unsuspecting foot that steps on one, but they are attracted to our sugary picnic foods and ripe fruits. However, away from human activity, these insects do not need to be feared. Their main objective in life is to forage for food, which often includes other pest insects or plant nectar.

In Utah, wasp species with "stingers" are in the family Vespidae, and include paper wasps (such as the European and western), hornets (such as the baldfaced), and yellowjackets (such as the western). The most *aggressive* of these in Utah—especially when defending its nest—is the western yellowjacket. They build underground nests that can have up to 1,000 individuals by the end of the season. The most *common* vespid in Utah is the European paper wasp (which builds above-ground paper nests). The paper wasps, plus the baldfaced hornet (a type of yellowjacket that builds an aerial nest) are a bit more docile and rarely sting unless provoked. Enjoy your summer and use these tips and tricks to get these "beneficials" to nest elsewhere.

- If there are areas on building that have had nests in the past, spray surfaces with a product containing essential oils (peppermint, clove, lemongrass) as a repellent, such as Safer Outdoor Insect Control or EcoSmart Wasp and Hornet.
- Reduce other nesting sites by capping open fence-pipe ends, and sealing gaps, holes and other openings into voids in walls, doorways, eaves, and roofs.
- Any aboveground nests should be destroyed now (early July) while they are still small. In hot temperatures, the size of the nest colony will increase rapidly. Destroy manually or use a wasp-specific spray (in the evening or in cool weather), using all safety precautions.
- Avoid the chance of being stung by not vigorously swinging at any of the wasps listed above.
- Remove food wastes and spills including overripe fruit immediately and keep garbage lids closed.
- If a hole to a western yellowjacket nest (below ground) is discovered, hire a pest management professional. They will treat it in early morning or evening, by safely applying an aerosol or dust into the entrance of the hole.
- For trapping wasps, it is all about the bait. Hang several traps at 15-25 ft spacing around the area to be protected, from July to October. Check them regularly and re-fill or replace:
    - **European paper wasp:** DIY traps by cutting the top from a plastic soda bottle and invert it (without the lid) into the bottom "cup." Alternatively, without having to cut the bottle, you can purchase inexpensive yellow funnels that attach to the side of the bottle. Add to the trap, 1 part fruit juice to 10 parts water plus 1 tsp. vinegar and 1 tsp. detergent. Punch a hole on each side of the cup or bottle and hang, using wire, twine, or zip-tie.
    - **Western yellowjacket**: Use yellow Rescue traps (widely available). These traps are sold with an attractant, heptyl butyrate, and only catch yellowjackets. They will not attract paper wasps or baldfaced hornets.

Davis, R. 2019. Western Yellowjacket – The Uninvited Picnic Guest. Utah Pests Quarterly Newsletter. Vol 13:summer. Utah State University Extension.

National Cooperative Extension (nd). Wasp, Hornet, and Yellow Jacket Control– An Integrated Pest Management Stinging Insect Action Plan. pestsinthehome.extension.org.

— Mair Murray, IPM Specialist

IPM In The News

Resistance to Insecticides found in German Cockroaches

Researchers at the University of California tested the efficacy of eleven insecticides and baits on German cockroach (*Blattella germanica*). They found a level of resistance to all insecticides tested except for abamectin. These results are valuable for entomologists, pest management professionals, and the public as all baits tested are widely available. Understanding resistance in these widespread cockroaches serves as an important advancement in both resistance research and pest management strategies, but more research is needed for other regions of the country.

Climate Change Plus Intensive Agriculture Negatively Effects Insect Populations

A first-of-its-kind study, published in *Nature* by University College London researchers, reports the effects of climate and intensive agriculture interaction on insect populations. The researchers analyzed a large dataset of insect abundance and species richness from areas across the globe, including three-quarters of a million records for nearly 20,000 insect species. They found that areas with high-intensity agriculture and increased climate warming exhibited less biodiversity and insect numbers 49% lower than natural habitats with no recorded climate warming. They also found that, depending on natural habitat cover, areas with low-intensity agriculture and increased climate warming showed only a 7% decline in areas with high natural habitat and only 25% decline in areas with less natural habitat cover. This research provides important evidence of human impact on insect biodiversity.

Review of Bt Corn Studies Disputes Prior Claims

A new study by USDA-ARS and Swiss entomologists has found that genetically modified Bt corn has less of an impact on non-target organisms than critics thought. By analyzing over 100 different studies, the team published in *Environmental Evidence* that previous individual studies assessing Bt corn's effect on non-target organisms were limited in scope, environment, or size. However, when pulling all the data together, they found that Bt corn did not have any negative effects on most insect groups and that Bt corn still acts as a highly selective pest control method with few negative consequences, especially when compared to the use of broad-spectrum insecticides.

Introduced Parasitoids no Match for Spotted-wing Drosophila

Spotted-wing drosophila (*Drosophila suzukii*), has cost more than $700 million in crop damage annually since its arrival to the U.S. in 2008. A team of scientists from USDA and counterparts in Canada found that in southwestern British Columbia, two introduced biocontrol wasp species (*Leptopilina japonica* and *Ganaspis brasiliensis*) parasitize the spotted-wing drosophila at the same level that occurs in the fly's native Asian range. The study, published in *Environmental Entomology* finds that in some areas, these wasps are potentially an effective biological control option. However, scientists are still unsure of the overall efficacy for fruit growers since the parasitism observed occurred after fruit became infested. This discovery is promising, but more research is needed to assess the full potential impact of these wasps.

Drones for Bird Pests in Orchards

A team at Washington State University scientists published a study in *Computer and Electronics in Agriculture* that shows the potential for automated drones to scare away pest birds in fruit crops. They developed a camera system that can detect birds in a field and tested small drones carrying the camera to make a whirring noise to scare birds away. The researchers discovered that in fields where they drove birds off with drones, there was around a 50% reduction in damaged fruits. This early research is promising, but there are still many details to determine—including cost—which means it will be several years before the technology would be available for commercial growers.

CRISPR Now Possible in Cockroaches

Researchers at Kyoto University have developed an approach called "direct parental" CRISPR for gene-editing in cockroaches. Current approaches of gene-editing require microinjection of materials into embryos which places limitations on species with unique reproductive systems. This new approach injects ribonucleoproteins into the main body cavity of female cockroaches which introduces heritable mutations into developing egg cells. Although this approach needs more research for widespread application on more insect species, it shows a promising future of accessible and practical gene-editing solutions.

Featured Picture of the Quarter

Tobacco rattle virus was identified on dahlia by the USU plant pathology lab a few years ago. Since then, this virus is found in about 20-30% of dahlia samples that we test for viruses. The host range includes 400 species including other cut flowers, vegetables, and many weeds, most of which do not even show any symptoms.

In Utah, the virus can be found anywhere dahlias are grown, and primarily causes vein-clearing (yellowing of veins) on the foliage. It is carried over in the tubers and may possibly spread via pollen of some host species. Our lab is currently investigating whether thrips can spread the virus to healthy dahlias.

— Image by Claudia Nischwitz, Extension Plant Pathologist

Invasive Pest news & notes

Invasive pests can harm agricultural and natural resources, and their prevention and management require significant involvement by federal and state agencies, educators, landowners, agricultural producers, and individual citizens. Utah Pests and the Utah Cooperative Agricultural Pest Survey (CAPS) programs are therefore pleased to announce the "Invasive Pest News & Notes," a new outreach publication that will highlight local and national news related to invasive pest issues and promote public participation in the fight against these species and their impacts. It will be released on at least a triannual basis, and the first edition will be posted in mid-July 2022 on the Utah CAPS website, and distributed via email to subscribers. Subscribe to this and other Utah Pests subscriptions (Fruit, Vegetable, Turf, and Landscape IPM Advisories, and *Utah Pests News*); pestadvisories.usu.edu.

Clipart courtesy of FCIT

UTAH PESTS people and programs are supported by:

Extension UtahStateUniversity

NPDN National Plant Diagnostic Network

WPDN Western Plant Diagnostic Network

USDA United States Department of Agriculture

National Institute of Food and Agriculture

APHIS

Western SARE Sustainable Agriculture Research & Education