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Please refer only to the current [Virginia Tech Pest Management Guide](#) for pesticide recommendations. All pesticides recommended are at the risk of the user. Read and follow all label instructions for use, storage, and disposal. **Remember, the pesticide label is the law.**

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Aster Yellows (AYP)

This particularly interesting bacteria-like disease (caused by a phytoplasma organism), is considered fairly common as it infects over 300 plant species; Everything from asters, coneflower, and snapdragon to grains like wheat and barley, to vegetables like carrots, tomato, and lettuce.

This systemic disease can cause an array of odd looking signs and symptoms depending on the species. Carrots, for example, can be stunted, taste bitter and have an overdevelopment of hair-like roots. On coneflowers, distorted, stunted leaves will grow in place of flowers and there may be some stunting overall. Some general symptoms may include chlorosis, slowed and stunted growth, curling of foliage, development of leaves in place of flowers, and sterility. The disease can spread through grafting of infected plants or the insect vector, the aster leafhopper. The leafhopper can feed on the sap of infected plants and carry the disease systemically for 1 to 3 weeks. If it feeds on the sap of another plant, it may infect it. The newly infected plant can take 10 to 40 days to show symptoms of the disease.

During warm weather, symptoms tend to appear faster and more severely. In times of colder temperatures, plants can still be inoculated but may not show symptoms of the disease. Unfortunately, there's no cure for the disease. Once a plant is infected it remains infected. The disease isn't usually lethal; a plant can survive years with it. It will, however, lose a lot of aesthetic appeal or practical use. Removing plants that have aster yellows as soon as possible can help prevent the spread of the disease. Also, controlling for the vector by placing mesh fabric over the crops in question can help prevent spread. Choosing plants that have a higher resistance to aster yellows from the get go, such as salvia, geranium, or impatiens, can help prevent dealing with the problem as well.

References:

<http://www.missouribotanicalgarden.org/garden-s-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/diseases/viruses/aster-yellows.aspx>

<http://hort.uwex.edu/articles/aster-yellows/>

<http://www.extension.umn.edu/garden/yard-garden/flowers/aster-yellows/>



Later stage distortion of flowers on Purple coneflower
Source: Missouri Botanical Gardens



Earlier stage distortion of Purple Coneflower from Aster Yellows
Source: Missouri Botanical Garden

Spider Mites (*Tetranychus spp.*)

Spider mites are one of the most common plant pests around. With over 130 species, and some like the twospotted spider mite (*Tetranychus urticae*) that can infect over 180 host plants, it's easy to see why this is such a typical problem. In the lab we've had a fair number of these come through on samples.

This genus of mites are not insects, but more closely related to spiders and ticks with their 8 legs and singular body structure. The adult females are the largest forms measuring in at a whopping 1/20 inch in length. Though difficult to see without the aid of a hand lens, the colonies can number into the hundreds and cause serious damage. They're frequently noted in the garden and landscape on ornamental plants, vines, berries, fruit trees/shrubs, and vegetables. The presence of webbing on the underside of leaves can be an indicator that the small pests are in fact spider mites as opposed to aphids or thrips which may also infest the undersides of leaves.

The life cycle of the typical spider mite involves 4 stages after hatching from their tiny, spherical eggs. The larva stage is born with 6 legs, before finishing with 8 legs in the second nymph stage heading into adulthood. Depending on species and the environment, a generation can go from egg to adulthood in 5- 21 days with many generations per year. They can overwinter in the soil, bark, or as eggs in bark or on leaves depending on the species. The mites can do well in hot or cool conditions, depending on the species, host plant, and other factors. Twospotted spider mites for example, thrive whenever conditions are most conducive for plant growth.

Heavy damage can result in the leaves turning a bronze, yellow, or grey color before falling off. If colonies are large enough webbing can be seen covering the leaves. The damage is a result of the mites tearing at the plant tissue with their stylets and sucking in cell sap. Minor damage will appear as stippling or fine flecking on the leaf surface. When coupled with water stress the damage can be significant. If left untreated the plant can go through foliage loss, reduced vigor, and possibly death.

For control, some success can be seen with natural predators such as lady beetles and predacious mites. Many insecticides aren't effective on spider mites, and some may increase levels of damage should they kill off the natural predators. The Virginia Tech Pest Management Guide has a list of recommendations available including insecticidal soap, horticultural oil, and neem oil. For more information please check the links below.

References:

<http://pubs.ext.vt.edu/456/456-018/Section02-Home-Vegetables.pdf>

http://pubs.ext.vt.edu/444/444-221/444-221_pdf.pdf

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7405.html>

<http://www.ext.colostate.edu/pubs/insect/05507.html>



Eggs attached to the underside of a leaf
Photo Credit: Jack Kelly Clark, University of California



Twospotted Spider Mite with the signature black spots on its back
Photo Credit: Washington State University

Brown Rot (*Monilinia spp.*)

Brown rot is known as one of the most destructive diseases in Virginia to stone fruits, especially peaches, nectarines and ornamental cherries. Though several species can cause it, *Monilinia fructicola* is by far the most common. When the conditions are favorable, heavy and quick crop loss can occur. When the rain was coming in often a couple weeks ago we saw several cases of this come into the lab.

Though most characteristically thought of as attacking fruit, the fungus can also attack blossoms and shoots. The initial symptoms of the disease start on blossoms in the spring. A tan/grey gummy matrix forms on the blighted, brown blossoms where fungal spores are produced. The blossoms can completely collapse leading to dieback and further plant infection. These tan/grey fungal spores can work its way down twigs (usually just on new growth) and cause elliptical, brown, sunken cankers. If these cankers girdle a shoot it'll die, though the leaves may remain attached for up to several weeks. In the appropriate environmental conditions, ripe fruits can rot completely in as little as two days. Even fruits derived from healthy blossoms can quickly succumb to the disease. On fruit like nectarines and peaches, the fungus starts as small circular spots that eventually enlarge and merge. The same tan/grey spore masses can be found on them before the fruits shrivel up into brown/black masses. These "mummies" act as an overwintering source for the following year.

Here the disease typically overwinters on the mummies, but may also survive on twig cankers and crop debris on the ground. The spores can then be transported by wind, splashing water, and insects such as bees.

Moderate temperatures (55° - 77° F) and wet, humid conditions (like were provided to us earlier this summer) help proliferate the spread of this disease. The closer fruits come to ripening the more susceptible the trees become to brown rot. Injury from insects or hail may also increase susceptibility to the pathogen.

Both cultural and chemical control is usually required in Virginia due to our humid climate. Immediate pruning of infected branches with sanitized pruners is necessary. Remember to cut at least six inches below the infection and clean the pruners with Clorox wipes after each cut. The Virginia Tech Pest Management Guide has a few tables listing the effectiveness of various fungicides with regards to different stone fruits and brown rot. Please check the links below for more information.

References:

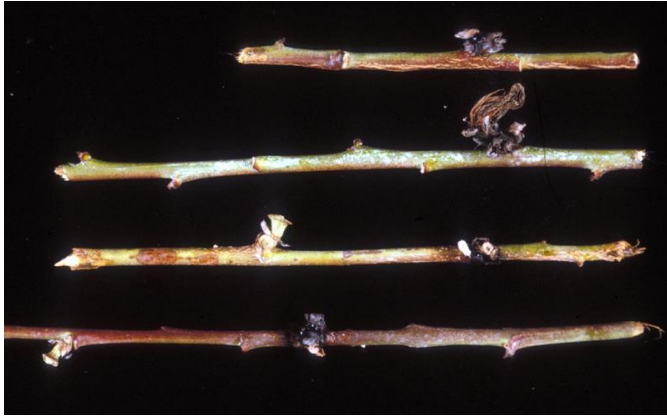
<http://pubs.ext.vt.edu/456/456-018/Section03-Home-Fruit-Disease-and-Insects.pdf>

http://www.pubs.ext.vt.edu/450/450-721/450-721_pdf.pdf

<http://hort.uwex.edu/articles/brown-rot/>



The characteristic mass of tan/grey spores on peach
Photo Credit: Clemson University



Peach twigs and blossoms with symptoms of Brown Rot
Photo Credit: Plantvillage.com

Cercospora Leaf Spot (*Cercospora spp.*)

This genus of fungus can infect a variety of plant hosts. A notable one from the lab includes cercospora leaf spot of hydrangea (*Cercospora hydrangea*) which is a rather common disease for the plant starting this time of year. The genus in general is unlike many other fungal leaf spot diseases in that it becomes more prominent later in the growing season.

Once the leaves have fully expanded, purple circular-to-angular leaf spots on the surface of older, lower leaves can be one of the first symptoms. This can begin as early as late June running into July. The spots may later develop tan-to-grey centers with a variety of colors surrounding them. A reddish-purple halo can be seen around the sunken lesions with the rest of the blade turning a bright orange, yellow, or red. The infected foliage can fall off leaving only the most juvenile of growth. Though it may not kill the tree or shrub, repeated defoliation year after year can severely reduce vigor and aesthetic appeal.

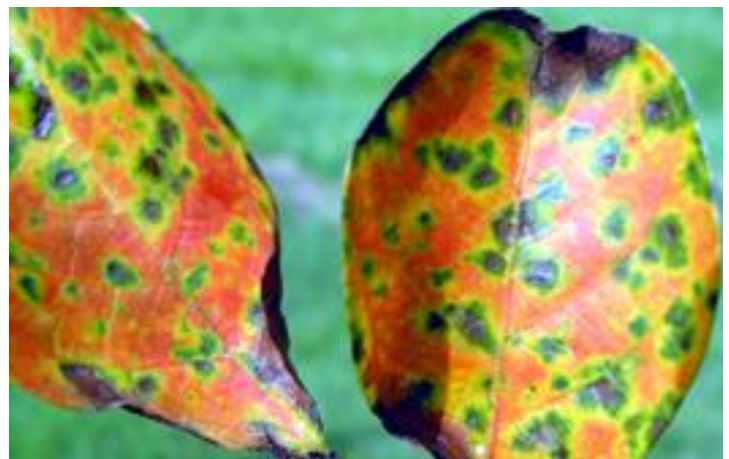
Cultural control methods for any fungal disease should always be your first line of defense. Making sure there's adequate spacing and pruning of your plants to allow for proper air flow is one way. Avoiding foliar watering and making sure to dispose of any infected leaves in the trash are also effective approaches. The Virginia Tech Pest Management Guide has both a general list for fungicidal treatment and species specific solutions for dealing with cercospora. Please consult the link below for more information.

References:

<https://pubs.ext.vt.edu/456/456-018/Section04-Home-Ornamentals.pdf>

http://www.clemson.edu/extension/horticulture/landscape_ornamentals/crapemyrtle/culture/disease_problems_cercospora_leaf_spot.html

<http://www.uaex.edu/publications/pdf/FSA-7570.pdf>



A particularly colorful example of cercospora on crape myrtle
Photo Credit: Clemson University

Bacterial Wilt of Cucurbits (*Erwinia tracheiphila*)

This bacterial disease carried by the cucumber beetle, had its first appearance in the lab last week. Despite being a bigger problem earlier in the season when plant growth is most vigorous, the wilt's symptoms can still appear during all stages of development. The pathogen can be severely damaging to both cucumber and melon, moderately damaging to squash and pumpkin, and rarely if ever a problem on watermelons.

The disease may begin after runners form, with a few leaves showing signs of severe wilt. They may seem to nearly recover by the next morning, but soon enough the wilt will spread down the petiole to the stem. Eventually, entire vines and the plant will be taken over by the severe wilting. This is especially noticeable in the middle of a sunny day when water stress is at its highest point.

Both the striped and spotted cucumber beetle can harbor this disease systemically in their digestive track. The first signs of infection seem to come around areas of insect damage. The bacteria may spread through excrement entering the plant via the feeding wounds. A simple at home diagnostic test (though not 100% reliable) is to cut an infected leaf and petiole at the base of the petiole. From here, cut the petiole in half. Take the two halves and push them together again, before slowly pulling them apart. If white, stringy, bacterial ooze is seen between the two parts it may be a sign of the disease.

Unfortunately there's no cures for the

disease. Once a plant has contracted it it's best to destroy it in order to prevent infection of healthy plants. The best integrated pest management solutions involve trying to limit the success of its vector, the cucumber beetle. Some possible solutions involve covering your crop with netting, quickly removing diseased plants, using varieties more resistant to bacterial wilt, and growing susceptible crops on rotation every 3 years. The Virginia Tech Pest Management Guide has a small list of chemical control solutions for the cucumber beetle if need be in section 2-14, table 2.5 in the link below.

References:

<http://pubs.ext.vt.edu/456/456-018/Section02-Home-Vegetables.pdf>

<http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/diseases/bacterial-spots/bacterial-wilt-of-cucumber.aspx>

<http://ohioline.osu.edu/hyg-fact/3000/3121.html>

<https://pubs.ext.vt.edu/2808/2808-1009/2808-1009.html>



Melon and cucumber plant severely affected by bacterial wilt
Photo Credit: University of Massachusetts Amherst

Summer Scorch

With the beating heat of summer weather along comes the summer scorch. We've seen a few samples in the lab on poorly placed Japanese maples and dogwoods in particular.

This environmental stress can cause leaf margins to brown, interveinal areas to turn yellow, and in severe cases the leaves become brittle enough to fall off entirely. The stress is caused when the tree isn't taking up enough water to keep up with the rate of transpiration. Trees and shrubs on the sunny western, southern, and windy sides (particularly with afternoon sun) are usually the most susceptible; although this also depends on the species in question. Despite the fact that overall we've got an above average amount of rain this summer, species susceptibility and high humidity coupled with lots of strong afternoon sun can cause problems. Also, in times of too much moisture and poorly draining soil, new root growth is inhibited. This can actually deter the plant as a whole from absorbing enough water. In mild cases the leaf margins may just turn brown or discolored, but remain attached. The severe cases won't kill off the tree. Year after year of stress can weaken the plant to other pathogens and insects however.

Making sure your plant is getting the appropriate amount of sun for the species and placing it in a well-drained soil can go a long way to preventing scorch. Avoiding other environmental stressors like over-fertilization, dog urine, deicing salt runoff, excessive car exhaust, and herbicides helps as well. Some mulch can also help retain moisture, and prevent growth of weeds that could otherwise rob your plant of much needed water. You may also want to consider performing a soil test in the early spring to decide if fertilizer is necessary.

References:

<http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/environmental/scorch.aspx>

<http://www.ext.colostate.edu/pubs/garden/02911.html>



A mild-to-severe case of scorch on Japanese Maple
Photo Credit: Missouri Botanical Garden

Eriophyid Mite Gall (Eriophyidae family)

This family is home to 200 different genera of microscopic mites that are responsible for a variety of galls on a variety of plant species. In the lab we've seen some example of erineum patches on beech and maple; both species happen to be quite susceptible to the tiny parasites.

The mites are unique from others in that instead of 4 pairs of legs, they possess only 2 pairs. Other than being so small, they're known to be slow moving and may have a distinct carrot or cigar shape about them. They can be white, yellow, or light orange. Overwintering occurs on the host plant in the cracks of twigs and buds. The females

lay eggs in the spring, and there can be multiple generations a year. Spread is primarily wind powered.

The little mites can cause an array of symptoms including blistering, witches-broom, chlorosis, stunting, distortion, and all sizes and shapes of galls. They tend to be quite species specific, and have the capacity to carry some viruses or phytoplasmas. The erineum galls we've seen cause red or green patches on both the lower and upper leaf surface. Some erineum-type galls, will cause a small round depression filled with white felty hairs on the lower portion of the leaf. Sometimes the damage caused by these mites can be confused with damage by scorch, air pollution, herbicides, or fungi. A close examination with a dissecting microscope may be necessary to confirm their presence.

The good thing is these pests are rarely capable of anything truly destructive or lethal. All the damage done is purely cosmetic. If it's attacking a fruit bearing plant, there may be a slight dip in yield. Cultural control methods such as pruning heavily infested branches, and providing adequate irrigation and fertilizer for vigorous growth can help prevent heavier infestations. The Virginia Tech Pest Management Guide has a few chemical recommendations for early spring (listed below). It also recommends encouraging natural predators such as lacewings and lady beetles to keep populations under control.

References:

<http://pubs.ext.vt.edu/456/456-018/Section04-Home-Ornamentals.pdf>

<http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/insects/mites/eriphyid-mites.aspx>

<http://www.ipm.ucdavis.edu/PMG/GARDEN/PLANTS/INVERT/gallblistermites.html>

<http://bygl.osu.edu/content/eriphyid-mite-erineum-patches>



Erineum patches on the upper side of a beech leaf
Photo Credit: Joe Boggs, Ohio State University



Close up of orangish mites on redbud
Photo Credit: Missouri Botanical Garden

Rose Rosette Disease

Also known as Rose Rosette Virus and witches-broom of rose, this disease was recently reclassified from a phytoplasma to a virus. This is one of the viruses spread by the eriophyid mite *Phyllocoptes fructiphilus*, the rose leaf curl mite (infected grafts may spread the disease as well). This can be a serious

disease of rose, depending on the species. The difficulty in diagnosing this disease is that the symptoms are so highly variable between different species or cultivars. It's also difficult to diagnose in the preliminary stages because the distortion and witches broom may appear to be chemical damage from glyphosate or 2,4-D.

Some of the more common symptoms include rapid elongation of new shoots, witches' broom, abnormal red discoloration, distorted or dwarfed leaves, spiral pattern of cane growth, increased susceptibility to other disease, loss of winter hardiness, and tight cluster of smaller branches among many others. The initial infection can progress until all new growth is affected. The plant may succumb to secondary infection or winter injury if the initial infection is rigorous enough. Some may die in as little as one season, while others may hold out for several years as the disease intensifies before dying out.

If you choose to look at the glass half-full, the destruction of the highly invasive multiflora rose could be considered a good thing. However, the noxious weed from Japan is the viruses' main primary host. If there are any cultivated rose varieties within 100 yards, it's best to remove if possible. Once a plant is infected, it's only a matter of when it'll die. Making sure the nursery stock is healthy when purchasing new roses and trying to space out roses so they don't overlap are necessary preventative measures. If a rose does become infected make sure that the entire plant, roots and all, is removed, bagged, and if possible burned.

References:

http://www2.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-OR-W-16.pdf

https://pubs.ext.vt.edu/450/450-620/450-620_pdf.pdf

<http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/diseases/viruses/rose-rosette.aspx>



Cane on the left side with heavy over-abundance of thorns

Photo Credit: University of Illinois Extension



Rapid elongation of new shoots & red discoloration

Photo Credit: Malinowski, University of Maryland

Common Burdock (*Arctium minus*)

This biennial weed from the asteraceae family is a common occurrence across the country. Originating from Europe, it was originally brought over by early French and American colonists for its supposed medicinal properties. It's now commonly found all across

most of North American with the exception of Florida and the most northern territories of Canada. It's gone by many names over the years including cockleburs, wild rhubarb, lesser burdock, love leaves, and beggar's buttons among others.

In its first year a rosette of leaves is produced; a 3'-6' erect, bushy flowering stem is then produced in its second year. The true leaves produced in its first year are characteristically large with a heart shaped base, are bluntly pointed, alternate, and have hollow petioles. These large rosette leaves are dark green on top and a light green on its wooly under surface. They can reach a length of 20 inches with a width of 12 inches. In its second year, short flower side stems are produced with the flower heads comprised of a bur with hooked bristles beneath a closely packed cluster of tubular, purplish flowers. The burs are known to get stuck to fur and clothing, spreading the burdock's seed. Common burdock only reproduce through seed. Within each bur are the 1/4 inch long brown, oblong fruits.

References:

http://www.illinoiswildflowers.info/weeds/plants/cm_burdock.htm

<http://extension.psu.edu/pests/weeds/weed-id/common-burdock>

<http://www.oardc.ohio-state.edu/weedguide/singlerecord.asp?id=900>



The large, alternate, pointed leaves
Photo Credit: Penn State Extension



The short side stems with the flowers and burs
Photo Credit: Illinois Wildflowers

Pomelo (*Citrus maxima*)

One of the most interesting samples to come into the lab a few weeks ago ended up being a pomelo sample. Someone had been gifted a mysterious citrus tree of some kind (container bound, brought in every winter, & yet to produce fruit) years ago and was wondering if we could identify it. Turns out, it was one of the four original citrus species, the pomelo! Another common name for it in the past was shaddock, though pomelo (despite previously being used to refer to grapefruit) has become more popular. This one was particularly difficult

to identify as the winged petioles are slightly larger than on most pomelos. In fact the size of the petiole is closer to that of the kaffir lime. However, the size of the leaf blade and the fact that the petiole tuck behind the blade make it more distinguishable as a pomelo.

This citrus fruit isn't commonly seen in the US and originates from South East Asia. The fruit itself is among the biggest of the citrus species (up to over 4 pounds) and is typically a green-yellow color. The rind can be quite thick compared to the typical orange at the grocery store. It's believed that the common orange and grapefruit are actually naturally occurring hybrids resulting from the help of the pomelo. The flesh is considered to be a mild, sweet grapefruit and can range in color from white to light pink.

References:

<http://www.gardeningknowhow.com/edible/fruits/pomelos/pomelo-tree-care.htm>
<http://www.sfgate.com/homeandgarden/article/Pomelo-Growing-the-granddaddy-of-grapefruit-2627497.php>



The winged petiole tucking behind the leaf blade
Photo Credit: Chris Artigue



The upper leaf surface with petiole and thorns
Photo Credit: Chris Artigue

Upcoming Event for Master Gardeners

August 5: "Hoop Houses, Floating Row Covers, and Cold Frames for Season Extension" with VCE summer horticulture intern Chris Artigue
Green Spring Gardens (6:30 p.m. – 8:00 p.m.)

August 19: "Trees!" with Kurt Mohr, Certified Master Arborist with Bartlett Tree Green Spring Gardens (6:30 - 8:00 p.m.)

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