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THE PURDUE LANDSCAPE REPORT

In This Issue

August is National Tree Check Month: Are YOUR trees safe and secure?

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When was the last time you *really* looked at your trees? It's all too easy to just enjoy their cool shade and the sound of their leaves, but if you don't know what to look for you could miss deadly diseases or dastardly demons lurking in their leaves and branches. A quick check can help you stop a problem before it kills your tree or your local forest!

National Tree Check Month is the perfect time to make sure your tree is in tip-top shape! Our checklist will help you spot early warning signs of native pests and pathogens and invasive pests like Asian longhorned beetle, spotted lanternfly, and sudden oak death. You can stop invasive pests in their tracks by reporting them if you see them.

Is your tree healthy and normal?

Start by making sure you know the type of tree you have. Is it a deciduous tree like an oak or maple? Or is it an evergreen that like a spruce or a pine? Don't worry about exactly what species it is. It's enough for you to have a general sense of what the tree should look like when it's healthy.

Check the leaves

- Are the leaves yellow, red or brown?
- Are they spotted or discolored?
- Do the leaves look distorted or disfigured?
- Is there a sticky liquid on the leaves?
- Do the leaves appear wet, or give off a foul odor?
- Are leaves missing?
- Are parts of the leaves chewed?

Check the trunk and branches

- Are there holes or splits in the trunk or branches?
- Is the bark peeling from a tree that shouldn't shed its bark?
- Are there tunnels or unusual patterns under the bark?
- Is there sawdust on or under the tree?
- Is there sap oozing down the tree?
- Does the sap have a bad odor?
- Do sticky drops fall on you when you stand under the tree? You might have spotted lanternfly. Please report it right away!

Now what?

If you answered **YES** to any of the questions above, there's a good chance something is wrong. To decide if and how you should treat or report the problem, you'll need to have a tentative diagnosis. Luckily, there are many ways to get one!

Know the tree species? Use the Purdue Tree Doctor to get a diagnosis and a recommendation on whether treating or reporting is needed. This app allows you to flip through photos of problem plagued leaves, branches and trunks to help you rapidly identify the problem. If you have an invasive pest, it will guide you how to report it.

Don't know the tree species and still need help? Reach out to local experts. We're happy to help!

- Purdue Cooperative Extension Service (https://extension.purdue.edu/) can answer your questions or direct you to a local tree care professional with the right expertise.
- Contact an arborist who can give you an assessment of your tree and specific treatment recommendations (https://www.treesaregood.org/findanarborist).

Confused but think something is TERRIBLY WRONG? Contact Purdue's Exotic Forest Pest Educator, report online, or call 1-866-NOEXOTIC.

Perennials for Shady Gardens

(Rosie Lerner, rosie@purdue.edu)

Plants differ in their adaptability to different growing conditions. Sunshine is one of the most significant factors. We often think of light as being either sunny or shady, but, in fact, there are many "shades" of light in between. Your garden may experience light shade, such as that filtered through an overhanging tree; dense

shade, such as that found in woodlands; or intermittent shade from an object, such as a building that blocks the sun for only a portion of the day.

Some sites vary in their light exposure, depending on the season. Wooded areas usually have much more sunlight in winter and early spring when the trees are bare than in spring and summer when foliage blocks the light.

Most horticultural plants perform best in full sun but may be able to tolerate semi-shady conditions. Trimming nearby trees and shrubs may help increase the light. Some plants may produce lots of lush foliage in the shade but produce few or no flowers unless adequate sunlight is available. Thankfully, a number of plants thrive in the shade.

Variegated Solomon's seal is a well-behaved, shade-loving plant.

Pasque flower performs well with morning sun and afternoon shade.

Bloodroot blooms in early spring and its low-growing foliage dies down in midsummer.

You don't have to live in the tropics to have a stunning foliage display in your shade garden. Midwest gardeners have a wonderful foliage palette that can fill in areas among other perennials, or even star as the focal point. Some perennials have both attractive flowers and foliage, so they provide season-long interest.

Another important factor to consider is soil moisture and drainage. Plants vary in their requirement/tolerance of drought, wet feet and soil quality. Soils can be wet with good drainage or be wet because of poor drainage; the latter is a more difficult situation. It's wise to address the drainage issue before planting.

The following lists suggest a selection of plants for part to full shade, but be sure to do the rest of your homework in matching species to site conditions. Note that some entries appear under both flowers and foliage lists. Entries denoted with (N) are considered native.

Perennial Flowers

Aquilegia sp. (columbine)
(N) some species

Astilbe x arendsii (astilbe)

Bergenia cordifolia (heartleaf bergenia, pigsqueak)

Brunnera macrophylla (Siberian bugloss)

Darmera peltata (umbrella plant)
(N) California and Oregon

Hosta sp. (hosta, plantain lily)

Lobelia cardinalis (cardinal flower) (N)

Lobelia siphilitica (blue cardinal flower) (N)

Mertensia virginica (Virginia bluebells) (N)

Polemonium caeruleum (Jacob's ladder)

Polemonium reptans (creeping Jacob's ladder) (N)

Polygonatum odoratum 'Variegatum' (variegated Solomon's seal)

Primula sp. (primrose)
(N) some species

Pulmonaria saccharata (lungwort, Bethlehem sage)

Pulsatilla vulgaris (pasqueflower)

Rodgersia aesculifolia (Rodgersia)

Sanguinaria canadensis (bloodroot) (N)

Thalictrum aquilegiifolium (meadow rue)

Viola sp. (violets)
(N) several species

Perennials Grown Primarily for Foliage

Asarum canadense (wild ginger) (N)

Athyrium filix-femina (common lady fern) (N)

Athyrium niponicum var. Pictum (Japanese painted fern)

Brunnera macrophylla (Siberian bugloss)

Darmera peltata (umbrella plant)
(N) California and Oregon

Hakonechloa macra 'Aureola' (Japanese forest grass)

Hosta sp. (hosta, plantain lily)

Matteuccia struthiopteris (ostrich fern) (N)

Osmundastrum cinnamomeum (cinnamon fern) (N)

Polygonatum odoratum 'Variegatum' (variegated Solomon's seal)

Polystichum sp. (Christmas and Holly ferns)
(N) some species

Pulmonaria saccharata (lungwort, Bethlehem sage)

Rodgersia aesculifolia (Rodgersia)

Septoria Leaf Spot on Dogwood

(Megan Haas, mheller@purdue.edu)

Ornamental dogwoods are prone to several leaf spot diseases, but the fungus, *Septoria*, is commonly found in Indiana. It causes angular, brown lesions bordered by a purplish color on the leaf. The leaf spot symptoms are similar to dogwood anthracnose, however, *Septoria* does not infect the twigs or branches so it is a much less damaging disease. Throughout summer, spots may become numerous enough to cause early leaf drop. While the disease does not cause serious harm to the plant in any given year, multiple years of heavy infection may weaken the plant, making it more susceptible to other diseases or winter injury.

Septoria leaf spot on ornamental dogwood.

Septoria overwinters in dead leaf material left around the plant. Spores can spread through wind and rain. Symptoms tend to first appear after periods of warm and humid weather and will progress through the summer. In severe cases, leaves will yellow and fall from the plant.

Pycnidia are visible in an infected area of a dogwood leaf.

To reduce inoculum for the following year, dead leaves should be raked from under the plant and disposed of. Dogwoods may be treated preventatively with a fungicide, beginning at bud break. Refer to the table below for recommended fungicides. Reapplication may occur two to three more times at 14-day intervals if conditions are favorable for disease development. Please follow all instructions listed on the fungicide label.

Active Ingredient	Brand Names
Chlorothalonil	Daconil, Fung-onil Multi-purpose, Ferti-lome Broad Spectrum
Chlorothalonil + Propiconazole	Concert II
Myclobutanil	Eagle 20EW, Rally 40WSP
Propiconazole	Banner Maxx II
Thiophanate-methyl	Cleary's 3336-WP

Fragrant Sumac Succumbs to Fusarium Wilt

(Tom Creswell, creswell@purdue.edu)

Figure 1: Highway median planting of fragrant sumac

Fragrant sumac (*Rhus aromatica*) is a low growing native shrub that is valued for its adaptability to many soil types, wet or dry conditions, easy care as a ground cover, and for preventing erosion on slopes. It is often found in highway medians (Fig. 1), in parks or as a foundation planting around commercial buildings. The common name arises from the fact that crushing the leaves produces a lemon-like scent. The most commonly planted form is the variety 'Gro-low' which has nice fall color and usually stays about 2 to 3 feet tall instead of the 3-5-foot height of the native type.

Starting in 2010, the PPDL began receiving samples of dying fragrant sumac from several locations around the state, including Hancock, Marion, Porter and Tippecanoe counties (Fig. 2, 3). In each sample the main symptom was a striking internal discoloration of vascular tissue in the stems and crowns (Fig. 4, 5, 6). The fungus *Fusarium oxysporum* was consistently isolated from stem and crown tissue with internal discoloration, confirming Fusarium wilt as the main cause for decline.

Figure 2 Fragrant sumac being killed by Fusarium wilt

Figure 3 Fragrant sumac being killed by Fusarium wilt

The fungus responsible for the damage lives in the soil and infects through roots when a susceptible plant is present. Fragrant sumac (*Rhus aromatica*) and skunkbrush sumac (*R. trilobata*) are highly susceptible to this strain of the fungus. Smooth sumac (*R. glabra*) is not likely to be susceptible, however Fusarium wilt has also been reported on staghorn sumac (*R. typhina*).

Figure 4: Fragrant sumac stem showing discoloration of water conducting vessels just below the bark.

Figure 5: The same stem shown in Fig. 4 with bark removed to reveal dark brown to black sapwood discoloration typical of Fusarium wilt.

Figure 6: Crown tissue showing dark brown to black sapwood discoloration typical of Fusarium wilt.

Fungicides are not effective in this situation since the fungus resides in the soil and cannot be effectively eliminated. With this type of soil-borne disease we often get asked whether one may get rid of the problem by removing and replacing soil. Practical experience suggests it is nearly impossible to remove all traces of infested soil and the planting bed can easily become infested again from neighboring areas. The main recommendations in this situation are to plant a different type of shrub in the affected area and to avoid moving soil from this area to other areas with sumac. Clean shovels, other tools and boots by removing all soil with a wire brush before leaving the contaminated site then scrub tools with soap and water before using them elsewhere.

The Fusarium strain present is unlikely to attack other types of plants so replanting with other shrubs/ground covers should be okay. Shrubs such as deutzia, landscape roses, juniper, nine-bark (modern powdery mildew resistant types) or spirea are just some of the potential replacements.

Zombie Tree Needs Close Friends to Survive

(Kyle Daniel, daniel38@purdue.edu)

Let’s get this out of the way….Plants and their ecosystems are amazing. To survive in so many environments with abundant or minimal resources without capabilities to migrate, plants are one of the most amazing organisms on the planet. Though research is abundant in above ground plant systems, below ground ecology is starting to show the vital importance that mycorrhizae, root grafts, and microbial action play in the health of individual plant and the surrounding ecosystems.

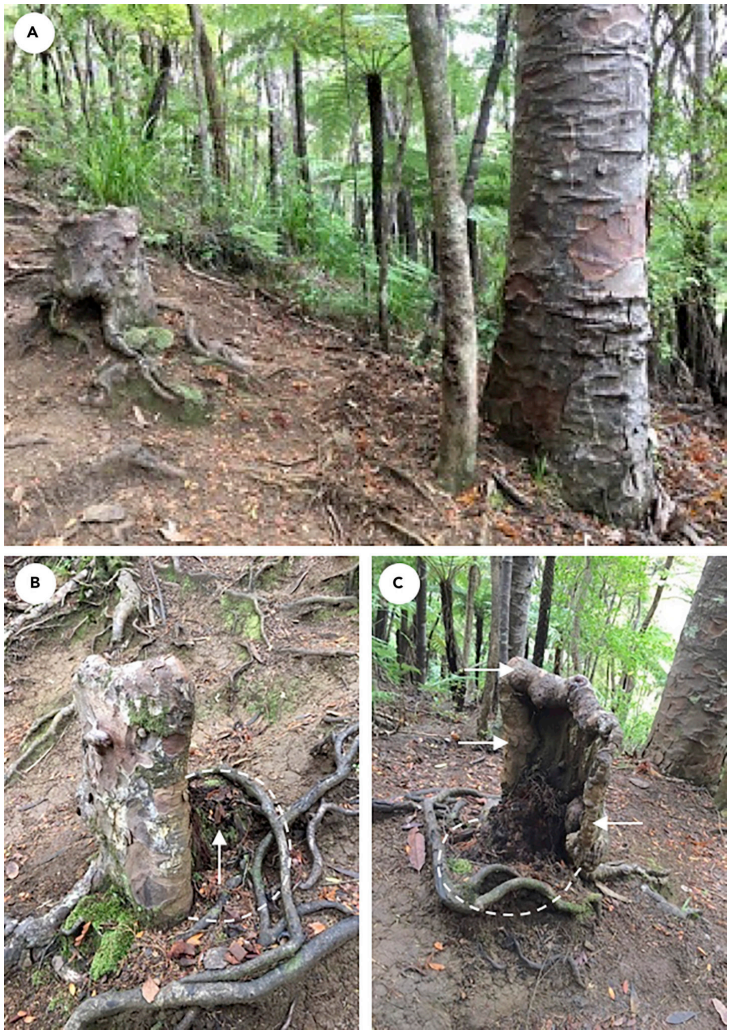

Figure 1. Living, Leafless Stump of the Southern Conifer Agathis autralis (Kauri). Frontal view of the tree trunk remnant from the forest track (A). Oblique lateral view showing the typical gray-brown kauri bark with distinctive hammer mark pattern and decaying wood behind it (arrow) indicating the original trunk perimeter (dashed line) (B). Rear view showing a thick callus lining along the edge (arrows). The dashed line indicates the approximate original trunk perimeter (C). Source: Bader and Leuzinger, Hydraulic Coupling of a Leafless Kauri Tree Remnant to Conspecific Hosts, iScience(2019), https://doi.org/10.1016/j.isci.2019.05.009

A new research study found that a 'dead' stump, with no way for photosynthesis (i.e. leaves), was actually found to have a live and functioning vascular system (xylem and phloem). Yes, you read that correctly, but how in the world is this possible? The study found that sap flow is directly related to the surrounding tree, which indicates that mycorrhizae and/or natural root grafting via the underground ecosystem flows through the stump into the tree. The most probable benefit of this strange relationship is the root grafts/mycorrhizae is connected throughout the forests. This can help during drought to allow the surrounding trees to better survive drought conditions. Figure 2 shows the benefits for the tree and the stump.

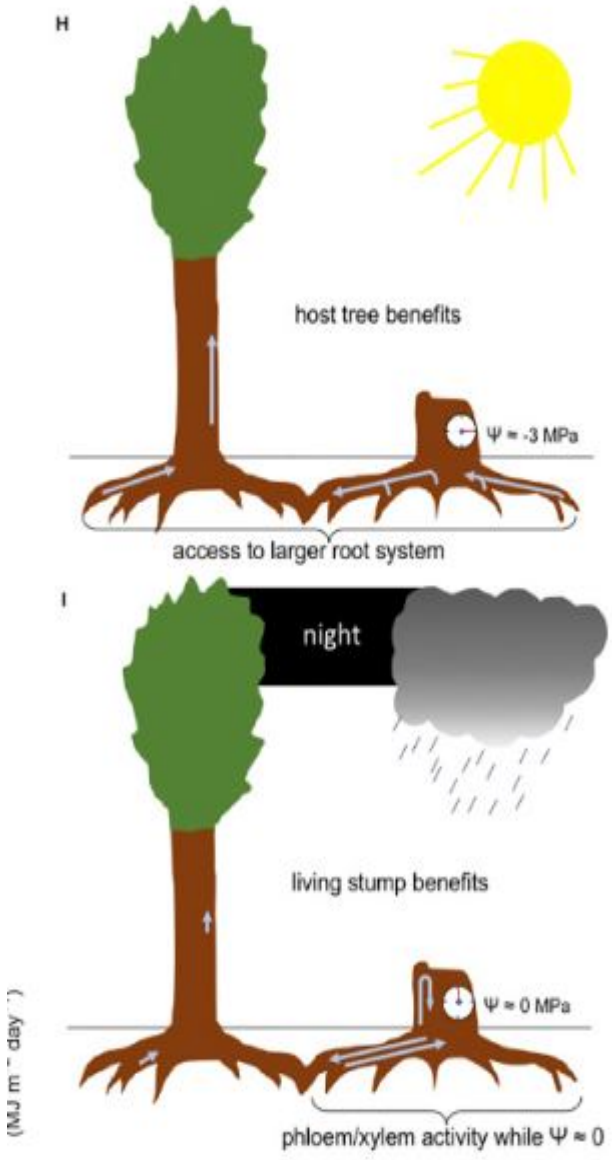

Figure 2. During daytime when host trees transpire vigorously, the host tree profits from a larger root system and the stem water potential (Ψ) is low (H). During nighttime and periods of low evaporative demand, the living stump circulates water through its living tissues at Ψ close to zero. In the absence of transpiration, this water movement is likely driven by root pressure or osmolyte accumulation (I). Source: Bader and Leuzinger, Hydraulic Coupling of a Leafless Kauri Tree Remnant to Conspecific Hosts, iScience(2019), https://doi.org/10.1016/j.isci.2019.05.009

The sensor data found that during the day, when the live tree is photosynthesizing (thus needing more water), the water pressure is low in the trunk while high in the tree. During the night, when little water is required by the tree, sap flows back into the trunk. The interconnected nature of underground systems is evident in this study (Fig. 3).

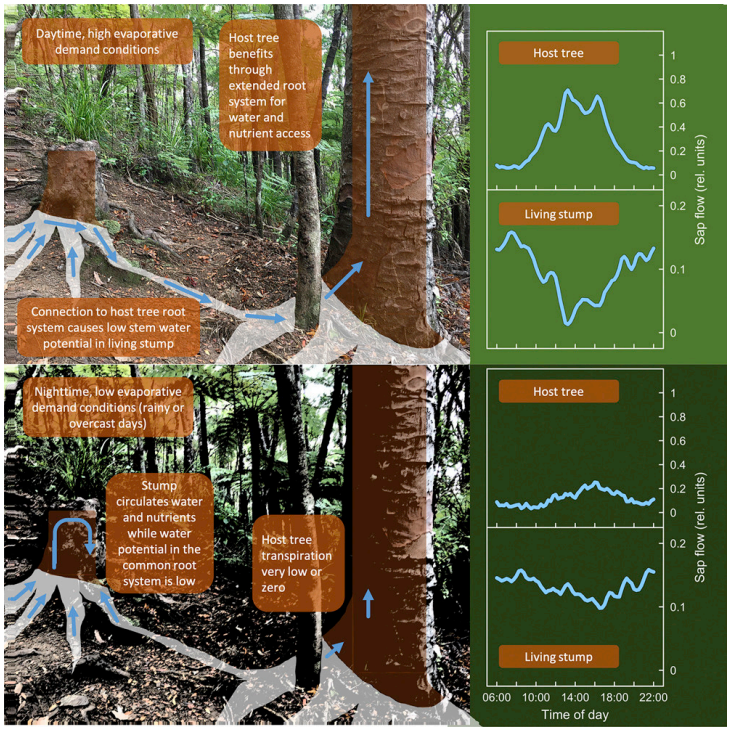

Figure 3. Sap flow between the host tree and the living trunk during various times within a 24 hour period. This symbiotic relationship is shown via arrows demonstrating the flow direction of the water.

Though there are limitations to this study as primarily there is only one stump and tree, so no replications can be developed, this information reinforces the need for more soil ecology understanding. With more replicated research, we can start to develop best management practices in improving soil ecology in ornamental plantings.

The Purdue Department of Horticulture and Landscape Architecture is fortunate to have one of the world's leading microbial ecology leaders in our department. Dr. Lori Hoagland is developing data that is demonstrating the importance of considering soil ecology that we haven't even considered in the past. You can find Dr. Lori Hoagland's Soil Microbial Ecology Lab at this site: https://www.purdue.edu/hla/sites/hoaglandlab/

This is just a brief synopsis to this study. To read more about this publication (which is highly suggested), click this link:

https://www.sciencedirect.com/science/article/pii/S2589004219301464?via%3Dihub

Source: *Source: Bader and Leuzinger, Hydraulic Coupling of a Leafless Kauri Tree Remnant to Conspecific Hosts, iScience(2019), https://doi.org/10.1016/j.isci.2019.05.009*

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