Issue: 18-14
August 28, 2018

THE PURDUE LANDSCAPE REPORT

In This Issue

Boxwood Blight – Be on the Look-Out

(Gail E. Ruhl, ruhlg@purdue.edu)

Boxwoods losing leaves should not be ignored!! Check them carefully for tell-tale symptoms of boxwood blight, a serious fungal disease that causes rapid defoliation and dieback (Fig. 1). The fungus that causes boxwood blight can infect all above ground portions of the shrub. The first symptoms of the disease are dark leaf spots (Fig. 2) that progress to twig blight and rapid defoliation (Fig. 3) and eventual death of the plant if it goes undetected (Fig 4). The narrow black streaks (cankers) that develop on green stems (Fig. 5), are a unique symptom that differentiates boxwood blight from other boxwood diseases. During periods of high humidity, white, fuzzy masses that consist of numerous clumps of spores will emerge from these black stem cankers (Fig. 6) as well as on the underside of leaf spots. The spores can be observed on infected stems and leaves with a hand lens. These spores can be splash-dispersed through irrigation or rainfall, spreading the disease within a plant or to other nearby boxwood shrubs. Pachysandra is also susceptible to this disease and may become infected from rain/wind splashed spores.

Fig 1 Boxwood blight defoliation and dieback (D. Clement; MD)

Fig 2 Boxwood Blight Leaf Spots (N.Gregory; DE)

Fig 3 Twig Blight/Defoliation (PPDL)

Fig 4 Boxwood blight can kill plants (D. Clement; MD)

Fig 5 Diagnostic black stem cankers (PPDL)

Fig 6 Fungal spores develop on stem lesions when humid (PPDL)

Fig 7 Infected boxwood in mixed evergreen wreath (PPDL)

This fungus is easily transported in the nursery industry and can be moved on symptomless infected plants, as well as on shoots of infected boxwood greenery tucked into evergreen Christmas wreaths (Fig. 7).

Since the first U.S. detection in 2011, boxwood blight has been reported in more than 20 states and three Canadian provinces. **Boxwood blight has not yet been detected in Indiana landscapes or nurseries** but in all reality –it is just a matter of time. It is imperative to be aware of the tell-tale symptoms of boxwood blight and to send suspect samples to the PPDL https://ag.purdue.edu/btny/ppdl when you see symptoms of this serious fungal disease in boxwoods in the landscape or nursery.

For more background and in-depth information on this disease please refer to our Purdue publication BP-203-W at https://www.extension.purdue.edu/extmedia/BP/BP-203-W.pdf

Additional information:

Virginia Boxwood Blight Task Force

ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html

Why Tree Inspections?

(Lindsey Purcell, lapurcel@purdue.edu)

Review trees on a regular basis for health and safety.

Trees provide many benefits for our homes with shade, beauty and improved air quality as just a few, however, if a tree has defects which could lead to a failure, your shade tree could become a liability. It is important to understand that tree owners have a legal duty to inspect and maintain their trees. All property owners should take reasonable steps to protect themselves and others by taking a look at trees around the property on a regular basis. Here are some suggestions to consider in making your trees safer for everyone.

Reduce Tree Liabilities: In general, the law obligates tree owners to periodically inspect their property and take reasonable care to maintain it and this includes trees. Routine inspections also exhibit that the tree owner is actively managing their property and trees and thereby reduces their liability if a failure does occur.

Understanding tree health and risk is challenging for tree owners. It is best to find an ISA Certified Arborist to help with identifying tree issues.

When it comes to trees, it's best to have a professional conduct risk and tree health assessments if there is any uncertainty. However, Homeowners can look for tree defects, including dead branches, broken limbs, decay pockets or other conditions that reduce a tree's strength. Review the tree from the top, down. Look at the tree's crown, main branches, trunk and root area to see if there is anything abnormal. If you find easily recognizable defects like dead and falling branches, cavities, fungal fruiting bodies or newly-formed leans on a tree, consider having the tree examined by a certified arborist. This is especially important after a severe storm. Trees can easily survive normal weather conditions for many years, however, excessive winds can have a real impact. Make certain trees aren't removed prematurely out of fear without making an informed decision along with the arborist.

Schedule Tree Work: If risk or health issues are found during the inspection, schedule the tree work with a qualified arborist. Be sure to find a tree care company in the area that is reputable and can provide references. Also, being fully insured is another important item to be aware when choosing an arborist. To find an arborist in your area, go to the website, www.treesaregood.org.

Inspection on a regular basis: Trees should be inspected regularly. These inspections should occur during the growing season and dormancy. Further inspections should be conducted after major weather occurrences. At a minimum, trees should be inspected every five years by an arborist, especially if there is decline and dieback present in your trees.

Look for unusual fungal growths on you trees. This indicates decay which can lead to a higher risk of failure.

Recent leans developing on trees may be corrected, however, they do pose a risk and should be inspected by an arborist.

For more information, see FNR-FAQ12-W Trees and Storms and FNR-475-W Tree Risk Management.

Common Abiotic Problems of Ornamentals: Soil pH Effects on Fertility

(Kyle Daniel, daniel38@purdue.edu)

An abiotic stress in plants is a stress due to a non-living factor, such as temperature, moisture, herbicides, etc. Biotic stress includes a living organism, such as a fungi, insect, etc. This series will explore some of the most common types of abiotic stress you may find in landscapes and nurseries.

What is wrong with this maple?

Figure 1. Yellowing between the veins (interveinal chlorosis) on maple is typically due to manganese (Mn) deficiency in high pH soils.

How would you correct the problem?

If you guessed manganese deficiency, you would be correct. In areas with high pH, such as many locations in the Midwest, manganese (Mn) deficiency in maple is very common. When the pH of the soil is above 7, manganese is not readily available to the plant, even if there are sufficient amounts of manganese in the soil. As the pH of the soil increases, manganese is less and less available. We tend to begin seeing manganese deficiency when the pH is above 6.3 (Fig. 1). The pH of soil is just as important to plant health as the amount of nutrients that are in the soil (Fig. 2).

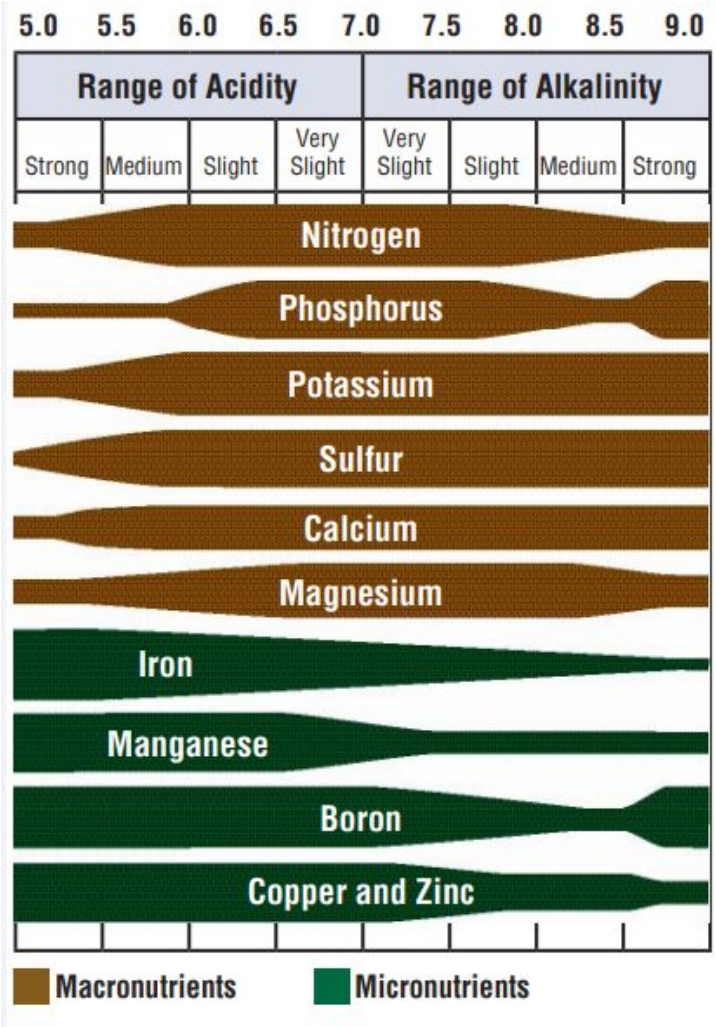

Figure 2. Nutrient availability is determined by the pH of soil. Adapted from the Corn & Soybean Field Guide (Purdue Extension publication ID-179).

On a similar note, plants in the Ericaceae (heath or heather) family (i.e. azalea, rhododendron, blueberries) are found in naturally acidic soils. These plants exhibit iron (Fe) deficiencies and not typically manganese deficiencies. If you take a look at Figure 2, you will notice that both manganese and iron are not readily available at higher soil pH. The symptoms of manganese and iron are similar in appearance, with both exhibiting interveinal (yellowing between the veins of the leaf) chlorosis (Fig. 1).

Where did the plant come from?

If a neutral pH is 7, anything below is acidic and anything above is basic, or alkaline (Fig. 2). Though plants vary in their requirements, based on where they are found in the native range, most ornamental plants prefer slightly acidic soil conditions. Knowing where a plant is found growing wild will give you an idea of the requirements of that plant. For example, silver maple and sycamore are found in bottomlands with slightly acidic soils and

poor drainage. Knowing where these plants are found in nature will tell you that they have a shallower root system (due to water-logged soils), thus are more tolerant of compacted soils.

So what determines a soils pH? Why does the majority of the Midwest have slightly alkaline soils?

The primary factor that determines a soil's pH is the parent material, or bedrock. In most locations that have limestone ($CaCO_3$) as the parent material, you will typically have a higher pH soil. Soil particles have charges that attract ions. When there are more hydrogen (H) ions in the soil, the pH is acidic. When there are more hydroxide (HO) ions in the soil, the pH is basic. The calcium in the limestone is attracted to the soil particles, which, in turn, leaves more hydroxide ions in the soil, thus making the pH more basic.

The soil pH scale is logarithmic, which means that each change in pH is ten times the next number. For example, a pH of six is ten times more acidic than a pH of seven, a pH of five is 100 times more acidic than seven, and a pH of four is 1,000 times more acidic than a pH of seven. To go the other direction, a pH of eight is ten times more basic than a pH of seven, and a pH of nine is 100 times more basic than a pH of seven. Though a change in pH from seven to six doesn't sound like much, this logarithmic scale is the primary reason is takes a significant amount of product over a period of time to change soil pH.

Taking Steps to Correct the Problem

To determine the pH of your soil, it's always recommended to send off to a laboratory (Fig. 3). Without a soil analysis, you will not know how much the pH needs to be raised or lowered, or what nutrients are in the soil. You need a starting point to determine what, if anything, needs to be changed in the soil. Though the Purdue Plant and Pest Diagnostic Laboratory does not conduct soil analysis, they have a list of soil testing labs that can be found at https://ag.purdue.edu/btny/ppdl/Pages/servicesandfees.aspx.

Figure 3. Soil analysis needs to be completed prior to raising or lowering the pH of your soil

There are products than can be applied to the soil to increase or decrease pH. Tables one and two indicate the amounts of limestone needed to raise the pH and the common products that can be beneficial to raise the pH. Tables three and four list the amounts of sulfur needed to lower the pH and common products to help lower the pH.

Lime requirements (tons per acre)		
Soil Texture	From pH 4.5 to 5.5	From pH to 5.5-6.5
Sand	0.5	0.6
Loam	1.2	1.7
Much	3.8	4.3

Table 1. Amount of limestone needed to raise pH of 7 inch layer of soil. Adapted from Possen, UCCE.

Name	Chemical Formula	Equivalent % of $CaCO_3$	Source
Limestone	$CaCO_3$	100	Pure form, finely ground
Hydrated Lime	$Ca(OH)_2$	120-135	Steam burned
Burned Lime	CaO	150-175	Kiln burned
Dolomite	$CaCO_3 – MgCO_3$	110	Natural Deposit

Table 2. Common liming materials. Adapted from Possen, UCCE.

Original pH	Sandy Soil	Clay Soil
8.5	0.7-1.0	1.0-1.3
8.0	0.5-0.7	0.7-1.1
7.5	0.2-0.3	0.4-0.5

Table 3. Tons of sulfur needed per acre to lower pH to 6.5. Adapted from Possen, UCCE.

		Tons of amendment equivalent to	
Material (100% basis)*	Chemical Formula	1 ton of pure gypsum	1 ton of soil sulfur
gypsum	$CaSO_4 * 2H_2O$	1.00	5.38
Soil sulfur	S	0.19	1.00
Sulfuric acid	H_2SO_4	0.61	3.2
Ferric sulfate	$Fe_2(SO_4)_3 * 9H_2O$	1.09	5.85
Lime sulfur	CaS	0.68	3.65

Table 4. Commonly used materials to lower pH and their equivalent amendment values. Adapted from Possen, UCCE.

Conclusion

Remember to always confirm the pH of the soil prior to any action. If the pH of your soil is either too high or too low, no matter if there are plenty of nutrients in the soil, they may not be available to the plant. Steps to correct pH of your soil will take time, so don't expect a magical bullet that will cure the problem

overnight. When thinking about changing the soil pH, patience is a virtue.

Purdue University resources:

Fertilizing Woody Plants:
https://www.extension.purdue.edu/extmedia/HO/HO-140-W.pdf

Alkalinity Management in Soilless Substrates:
https://www.extension.purdue.edu/extmedia/HO/HO-242-W.pdf

Lowering Soil pH for Horticultural Crops:
https://www.extension.purdue.edu/extmedia/HO/HO-241-W.pdf

Soil pH:
https://www.extension.purdue.edu/extmedia/HO/HO-240-W.pdf

pH and Electrical Conductivity in Soilless Substrates:
https://www.extension.purdue.edu/extmedia/HO/HO-237-W.pdf

Medicion de pH y Conductividad Electrica en Sustratos:
https://www.extension.purdue.edu/extmedia/HO/HO-237-SW.pdf

Fundamentals of Soil Cation Exchange Capacity (CEC):
https://www.extension.purdue.edu/extmedia/AY/AY-238.html

Sources:

Possen, V. Changing pH of soil. University of California Cooperative Extension. https://vric.ucdavis.edu/pdf/soil/ChangingpHinSoil.pdf Last accessed 8/18/2018.

Purdue Landscape Report © Purdue University - www.purduelandscapereport.org
Editor: Kyle Daniel | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West Lafayette, IN 47907