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THE PURDUE LANDSCAPE REPORT

In This Issue

Is it time for drought-proof plants in the Midwest?

(Kyle Daniel, daniel38@purdue.edu)

Depending on where you are located in the Midwest, rainfall in 2021 has either been too much or too little. This trend was forecasted several years ago by climatologists, in that more droughts and more floods are projected as the ramifications of climate change take shape in the future. Though this statement doesn't make logical sense on the surface, the fact that longer periods of drought are occurring and more rainfall per event have been occurring on a regular basis in many locations around the Midwest, makes this statement very accurate. We wrote about this phenomenon previously:
https://www.purduelandscapereport.org/article/feast-or-famine-landscape-plants-are-struggling-due-to-precipitation-extremes/

Figure 1. Drought conditions caused this Taxus to die.

Precipitation extremes can cause significant stress-related issues to landscape plants, including leaf drop, reduced uptake of nutrients, salinity toxicity, anaerobic soil conditions, and reduction in cold hardiness, among others. In addition, when a plant is under stress via abiotic issues, insects and disease will proliferate. The ramifications of too much or too little water has the potential to extend into multiple growing seasons, which increases the chances of suffering from a biotic problem and general decline.

In years that a drought of any magnitude occurs, there is talk of planting more drought-tolerant plants for a drying climate. This would be a mistake because those plants will not perform in years that produce more rainfall.

The varying amount of rain is significant around Indiana, as Table 1 demonstrates. It's important to keep in mind that even though things may be dry in your area in 2021, 2022 may present significant rainfall. By installing plants that are more tolerant of extreme events, there will be less plant stress and plant loss.

	Fort Wayne	Lafayette	Evansville	Indianapolis
September	3.78		2.75	4.82
	5.36			
August	2.55			2.75
	6.75		1.89	
July	4.61			4.61
	4.11		6.93	

Figure 2. Drought can cause leaf drop as a response to a lack of water.

If you are in an area with a lack of rainfall, make sure to irrigate this fall until leaf drop. This will allow the plant to recover a bit before dormancy occurs. Continue to water in the spring, if needed, to reduce stress into the growing season.

In areas with too much rainfall, consider installing drain tile or grading the area to remove water away from the landscape.

Related links:

Why fall color is sometimes a dud
https://www.purduelandscapereport.org/article/why-fall-color-is-sometimes-a-dud/

Water now to minimize winter injury.
https://www.purduelandscapereport.org/article/water-now-minimize-winter-injury/

Drought? Don't forget the trees!
https://www.extension.purdue.edu/extmedia/FNR/FNR-483-W.pdf

How do trees use water?
https://www.purduelandscapereport.org/article/how-do-trees-use-water/

Stress related conifer dieback
https://www.extension.purdue.edu/extmedia/ID/ID-477-W.pdf

Conifer cone production

(Lindsey Purcell, lapurcel@purdue.edu)

Conifer cones are a perennial favorite for fall and winter decorations and crafts and it's that time of year where we start looking for these coniferous fruits. Or it may be that you have noticed lots of the green, unripe cones on the ground as squirrels work to dislodge them to a better spot for feasting. Regardless, of the interest, there are some interesting facts and lesser-known biology behind our cone-producing trees.

Pinecones (and all true cones) are produced by a group of plants called *gymnosperms*. Pronounced just as it is spelled (gym-no-sperm) and originating from the Greek language, it translates to mean "naked seed". Since gymnosperms do not flower, they do not form a true fruit as an ovary for their seed like acorns, peaches and apples. Their cone is a rigid container for the developing seed which rests on the top of a scale. When the cone is mature and dries out the scales will open, dropping tiny seeds. Also, just to put a finer point on the subject, pinecones are produced on pines, spruce cones on spruces, fir cones on firs, etc. However, nobody typically collects fir cones for decorations, because the disintegrate when they are mature, so they do not fall out of the tree intact.

There are male and female cones on each evergreen. Seed bearing cones are female, while the pollen filled cones are male. Both sexes of cones grow on the same tree, but the male cones typically grow on lower branches relying on the wind to blow pollen up to the female cones. In some conifers, male cones sit higher in the tree than female cones, allowing the pollen when released to take advantage of this added height in floating farther when the wind or breeze carries it off. Spruce seed cones typically occur on the upper third of the tree, while pollen cones, which are fairly inconspicuous, occur on the lower third to reduce self-pollination. Likely all the cones you will collect for decorating are lady cones, since male cones are significantly smaller, softer, and less conspicuous, and typically after the male cones shed their pollen, they dry out and fall from the trees by mid-summer.

Male pollen cones and female cones on Norway Spruce

Male and female cones on Scots Pine

Early female cone development up high on a Norway Spruce

Conifers produce cone crops erratically; there will be years of complete cone failure, years of poor to moderate cone production, and, periodically, years in which a staggering number of cones burden the trees. In such a year, a spruce may produce 10,000 or more cones. Many conifers, including spruces, firs, and Douglas-fir, produce cones in a two-year cycle. Cone buds are produced in the first year and then cones develop and mature in the second year. Other factors which affect cone production include tree stress due to high temperatures and drought. It has been a very dry summer and early fall which will have an impact on many trees this year and next spring as well.

If you notice a difference in pinecone production, it may be an internal mechanism, an environmental impact, or a combination of both. Regardless, trees are often unpredictable with their flower and fruit production but are certainly fascinating!

Thanks to Curtis Young, Ohio State University Extension for providing the images.

Tip blights of Juniper

(John Bonkowski, jbonkows@purdue.edu)

Junipers have to be my favorite group of evergreens, behind a select few pine species. They have a fantastic fragrance, are evergreen, many can tolerate drought, are an ingredient in gin (definitely a bonus), and work well in a variety of landscape uses, including as a barrier plant. They look great year round, except when they have tip blight.

Tip blight is a common disease in nurseries and landscapes that cause branch tips to die back fairly quickly starting in the spring. Infected branches become chlorotic, progressing from light green to yellow, before turning brown as the season continues. Black fungal structures will develop in the transition zone between affected foliage and green, healthy tissue. Some of the infected scales may turn gray in color, surrounding these structures.

Two fungi cause tip blight, *Kabatina* and *Phomopsis*, and knowing which one you have is important to determine your management strategies. Both fungi produce similar symptoms and similar fungal structures, so the presence of tiny black dots cannot help separate these diseases. Both fungi also infect a range of hosts, including arborvitae, cypress, Douglas fir, true firs, yew, *Cyptomeria*, and *Chamaecyparis*, but these are not as susceptible as juniper species.

Phomopsis tip blight affecting multiple juniper branches.

Juniper with tip blight symptoms in the landscape.

Branch tips turning pale yellow due to infection by Kabatina.

Kabatina infects young, new growth during the growing season, but infected twigs remain green until winter and the following spring. *Phomopsis* will infect new growth during the growing season, but the tissue dies during the same season. Typically, *Kabatina* infects wounded tissue, while *Phomopsis* does not need an injury to enter the plant; so *Kabatina* is typically less common and less severe than *Phomopsis*.

Affected branches turn from light yellow to tan as the season progress.

Infected branch tips with visible black fungal structures.

After turning tan, infected tissue will eventually become a darker brown.

Close up image of fungal fruiting bodies. This is Kabatina, but it is difficult to tell these apart without increase magnification and further microscopy.

Both pathogens require moist and humid conditions to infect the host, so avoid overhead irrigation where possible. For highly susceptible cultivars fungicides are often needed, especially to protect young plants. Timing of fungicide applications can be difficult in the case of *Kabatina* since symptom development is delayed, but applications made after wounding can help reduce the chance of infection. Fungicides are often not necessary unless disease severity is high. Applications are more frequently required for *Phomopsis* infections because there can be repeat infections in the same season if conditions are conducive.

An accurate diagnosis is important in deciding the appropriate management strategy between these two diseases, so I recommend submitting a sample for confirmation before planning any fungicide applications.