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THE PURDUE LANDSCAPE REPORT

In This Issue

Reduce Defoliation From Rose Black Spot

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Roses are a popular landscape and garden plant in Indiana. Black spot, caused by the fungus *Diplocarpon rosae*, is the major foliar disease of roses in Indiana. Infected leaves develop black spots, turn yellow and drop prematurely from the plant. Premature defoliation decreases plant energy reserves and results in reduced flowering of roses as well as weakening of plants to make them more susceptible to other site/cultural stresses, including winter damage.

The black spot fungus overwinters in diseased canes and infected fallen leaves beneath plants. Fungal spores germinate in the spring and are disseminated by splashing water up onto leaf surfaces and stems. Extensive periods of moisture during spring/summer months are required for infection to occur. Once infection is established, the fungus will multiply in black lesions, and new spores will be produced and splash to new tissue, spreading the disease.

To reduce the spread of this fungal disease from infected to healthy leaves remove and dispose of diseased leaves as soon as symptoms are apparent. Dead, infected leaves on the ground beneath plants should also be collected and destroyed. Since the fungal spores need a wet surface to germinate and cause infection **it is of utmost importance to keep the foliage as dry as possible.** Do not use overhead irrigation if practical; or if you do, water early in the day so as to allow foliage to dry prior to nightfall. Prune plants to allow for adequate air circulation and facilitate the drying of foliage.

As black spot lesions grow together the leaf turns yellow and will eventually drop.

Black spot usually begins on lower leaves and later spreads to upper leaves.

Black spot lesions on lower leaves.

Some popular roses are so susceptible that in order to produce acceptable flowers they may require weekly fungicide application to protect healthy plant tissue. Fungicides will not cure infected leaves, but if applied regularly, will prevent infection of new leaves. There are many home garden fungicides registered for rose disease management. Some of the more effective formulations and active ingredients include captan, chlorothalonil (Daconil*), myclobutanil (Immunox Multipurpose Fungicide Spray), tebuconazole (Bayer 2-in-1 Disease Control, Rose Shield), and triforine (Funginex). Many other products listed as rose dusts are also effective. Check the labels for control of black spot. For optimal control, follow the spray schedule directions on the fungicide label. Most fungicides need to be applied every 7–14 days, however, label directions may differ between fungicide types. Complete coverage of both the tops and bottoms of leaves is important for optimal protection as well as reapplication following rain or overhead watering in excess of 1/4 inch.

Note that roses bred to be genetically resistant to black spot may still show some disease, depending on regional disease pressure related to conducive environmental conditions. In addition, if the black spot fungus adapts to the plant's resistance, disease resistance may break down and be lost.

The publications below provide additional information on management of rose black spot and other rose diseases.

https://extension.tennessee.edu/publications/Documents/W833.pdf

https://www.extension.purdue.edu/extmedia/bp/bp-139-w.pdf

Trees in Peril

(Lindsey Purcell, lapurcel@purdue.edu)

It's tough out there for trees, especially when they are trying to survive in the "un-natural" urban forest where we live. Trees grow very well on more natural, undisturbed sites like our forested areas. However, trees planted in suburban and urban areas require more care and maintenance to keep them thriving. Some tree species can live over 300 years, but in the urban environment 25-50 years is the average, according to recent research. If trees don't receive adequate care, especially during times of stress, they will decline and die much too soon.

Trees with limited soil volume and supplemental irrigation will decline.

Successive years of decline will lead to dieback and eventually death of the tree.

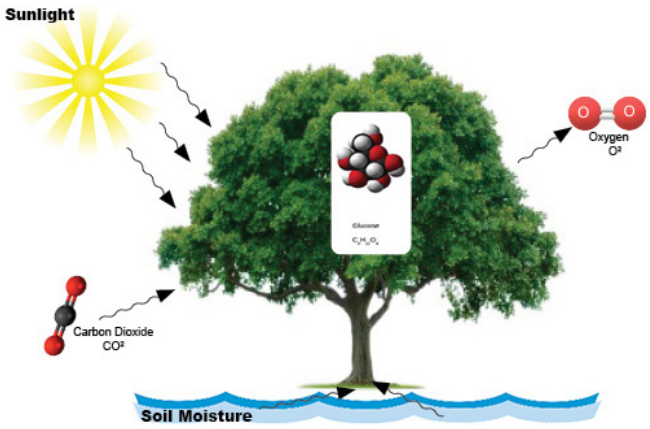
There is much speculation on why trees finally just go past the point of no return and die. There are many causes of tree death, but the most common is environmentally induced death often aggravated by some opportunistic pest. However, how the tree dies, well, that's a scientific and physiological process.

Despite decades of research on plant tolerance to environmental stressors, especially drought, the physiological mechanisms by which trees succumb are a continuous point of examination. However, it could be argued that two main reasons trees experience a physiological death is starvation and thirst, lack of food and water. Actually, it's more complicated than that from a tree's perspective.

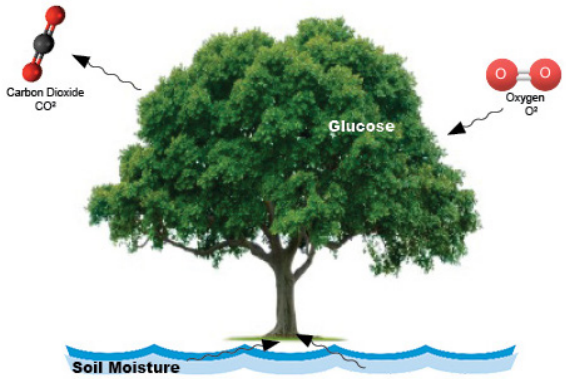
The important factors responsible for tree death are carbon starvation and hydraulic failure. When the energy resources in the form of complex carbon molecules become exhausted, the tree can no longer support respiration, which is the use of carbohydrates to create energy. This can happen when the tree is depleted due to the inability to photosynthesize which creates

simple sugars or carbohydrates. If storage or sink areas are depleted as well, there are no reserves which the tree can draw upon. This can occur from several stressful growing seasons leading to an “overdrawn food account”. Food sources are created through photosynthesis. Photosynthesis is a process by which phototrophs convert light energy into chemical energy, which is later used to fuel cellular activities. The chemical energy is stored in the form of sugars, which are created from water and carbon dioxide.

This chemical process is seasonal and light dependent. Sugar is broken down through the process of respiration, this is the key process. If the tree can’t break down the sugar into key products such as cellulose and starch for energy, the tree just runs out of fuel and begins the decline spiral. It’s a very specific chronological process in which photosynthesis creates the energy source and relies on respiration to oxidize the carbohydrates for food. The tree then relies on translocation, which requires water and nutrient movement through the plant vascular system, allocating these resources throughout the plant.



Carbon Dioxide + Water (in the presence of Light) = Glucose (sugar) and Oxygen



Respiration occurs when glucose (sugar produced during photosynthesis) combines with oxygen to produce useable cellular energy.

The process of respiration is constant, even in dormancy and production of carbohydrates must exceed its energy requirements especially during the growing season. Without a surplus of food, decline begins, and death eventually follows, unless conditions improve. Proper maintenance and care means providing adequate moisture and fertility to help maintain healthy growth and energy reserves.

Trees have a vascular system with an amazing transport capacity. The transport system can deliver water rapidly and preferentially to those parts of the canopy which are most actively transpiring or losing water. This is called translocation which is simply the movement of something from one place to another, in this case water and other soluble products. The transport system is subject to the impacts of environmental stress, especially temperature extremes and pests.

Hydraulic failure is the loss of conductivity or the inability to move water to the leaves and food in the form of carbohydrates around the tree. This means the tree cannot adequately translocate water and assimilates. Water is an important component of many plant processes and is the single most limiting ecological factor for survival. PSN and RESP are no exception to this factor. This translocation of critical resources must occur, or the tree suffers the consequences.

It is well-documented that trees can die of both hydraulic failure and carbon starvation, and that during drought, the loss of conductivity and carbohydrate reserves can also co-occur. Basically, it is about the trees inability to absorb and translocate water and running out of energy. There are many other factors that can accelerate tree mortality included insects and diseases. Often, physiological stress in trees are signals to pests. This lethal combination of stress and pests will cause rapid decline and death.

So why do trees die? Their death follows a reverse sequence of physiological processes. Trees die because respiration is terminated. Respiration ceases because carbohydrate production ceases and stored carbohydrates are exhausted. Carbohydrate production ceases because photosynthesis has stopped because of lack of functioning green, leafy tissue. Typically, these factors for photosynthesis have been interrupted because of anthropogenic impacts locally or negative environmental changes.

The primary management focus for sustainable long-lived trees is to promote healthy growth which support robust plant processes with adequate oxygen, water, and nutrition in a suitable soil volume. Often a very tall task to accomplish! Also, the timing of maintenance activities such as pruning has an impact on energy production. Pruning in early summer, prior to the possibility of water deficits can reduce the impacts of loss of green tissue. This is especially important if the tree is already suffering from environmentally induced decline. Timing is everything for arboricultural practices and abiding by the physiological demands of the tree is important for sustainable health and growth. The basic needs are critical for all life to be fulfilled to be healthy, trees are no different.

It is important that we all work to protect and enhance our urban forests and community trees by recognizing the resources available to us. Trees in our cities are critical to our quality of life and as stewards of our environment, we must be vigilant for the many issues that imperil our community trees. For more

information visit:

Trees Are Good!

Indiana Arborist Association

Society of Municipal Arborists

The Purdue Education Store

Getting a Grip on Japanese Maple Scale

(Cliff Sadof, csadof@purdue.edu)

Japanese maple scales (JMS) attack a wide variety of trees and shrubs. They are common on dogwood, elms, flowering fruit trees, maples, magnolias, lilac and roses. Heavy infestations can kill tree branches. Unlike the closely related soft scales, these insects will be dry and not coated with sticky liquid excrement. All stages of this scale can be separated from the plant tissue by flipping them over with a fingernail without ripping the plant surface. If you remove a bump on a plant and the tissue rips, this means the plant has produced a gall or swelling in response to an insect or disease and the bumps are not scale insects.

Figure 1. Heavy infestations of Japanese maple scales can encrust twigs and kill stems of a wide variety of trees (Photo by T. Creswell).

Figure 2. Mature JMS are covered with white wax. When the wax is rubbed off by wind or nearby twigs, the brown cover remains.

Wintering as mated and immature females, eggs hatch into flat wingless insects called crawlers. Crawlers walk on stems until they settle to attach themselves to the stems and start to feed. Scales use a fine, wire-like tube to pierce plant tissue and suck its liquid co

ntents. Soon after scales begin feeding they become translucent. Female scales remain where they have settled for the remainder of their lives. Males fly away from their feeding sites only after they have developed wings.

What to do if you think you have Japanese maple scale?

Verify that you have JMS and not oystershell scale, which is much easier to control. At this time of year, oystershell scales will have eggs beneath their waxy covers and not the brown or purple bodies filled with fluid. Oystershell scales are easy to control because they have shorter and more distinct crawler periods

Figure 3. When the covers of live oystershell scales are flipped over, they reveal the translucent white eggs.

Figure 4. When the covers of live JMS are flipped over, they can reveal the brown fleshy body of the armored scales.

Earlier this year, you could have applied horticultural oil during dormant season to kill overwintered scales. This scale is very difficult to control during the growing season because the susceptible stage of crawlers is present throughout most of the summer. There are two generations a year in Indiana with crawlers being found from early May through June an again from mid August through September. The prolonged crawler period makes this insect particularly difficult to control with insecticides.

Figure 5. Parasitic wasps that attacked and killed many of the Japanese maple scales in this photo, chewed holes through their waxy covers.

Figure 6. Dark tape, wrapped around a twig sticky side up can be a good way to monitor for the crawling stage scale of insects. Crawlers get stuck in the glue and are easy to see with a magnifying lens.

Homeowners can apply horticultural oil in early or late June. Professionals can apply pyriproxifen, buprofizen, or azadirachtin at this time and may get better results. Each of these produces will kill crawlers but not natural enemies. Repeat in August if scales are still alive.

To protect bees, do not apply insecticide when plants are flowering. Oil will only kill bees during the 4 hours it takes to dry after spraying.

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