

# THE PURDUE LANDSCAPE REPORT

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## Bacterial Leaf Scorch of Oak: Lab Confirmation Necessary

(Gail E. Ruhl, [ruhlg@purdue.edu](mailto:ruhlg@purdue.edu))



Fig. 1. Bacterial leaf scorch symptoms on oak

Bacterial leaf scorch (BLS) on oak is a systemic disease caused by the bacterium *Xylella fastidiosa* (*Xf*) (Fig 1). The bacteria live in the xylem vessels (water conducting elements) and restrict water flow. *Xf* is transmitted from tree to tree by xylem-feeding insects such as leafhoppers and treehoppers. Numerous woody hosts are susceptible to various strains of *Xf*.

Symptoms of bacterial leaf scorch may vary somewhat between oak species. On pin oaks, scorching appears along the leaf margins and progresses inward toward the mid-vein (Fig 2). There is often a yellowish margin between the scorched leaf tissue and green tissue. On other red oaks, the scorch typically appears at the leaf tip and progresses up the leaf towards the petiole (Fig 3).

Branches with leaves that appear to be healthy may be interspersed on the same tree amidst branches with scorched, diseased leaves (Fig 4).



Fig. 2. Pin oak leaves that tested positive for *Xf*



Fig. 3. Bacterial leaf scorch symptom on red oak



Fig. 4. Healthy appearing branches on same tree with scorched branches



Fig. 5. Late season bacterial leaf scorch symptoms on oak

Leaf scorch and premature leaf drop caused by *Xf* are similar to symptoms that can be caused by Oak wilt ([BP-28-W](#)) and Tubakia ([PLR article](#)). Root-related stress factors can also cause marginal

scorch similar in appearance to symptoms caused by bacterial leaf scorch.

The timing of bacterial leaf scorch symptoms can also present a diagnostic challenge. Infected trees often appear healthy until mid-summer. Initial symptoms usually begin as a few scorched leaves sometime in mid-to-late August, but the scorching expands rapidly to involve other leaves in September and October (Fig 5). The challenge is that the symptoms can be easily mistaken for physiological leaf scorch or early fall color.

The only way to confirm a diagnosis of bacterial leaf scorch is through laboratory analysis.

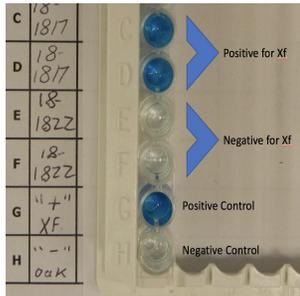


Fig. 6. ELISA serological assay for Xf

The PPDL uses a specialized serological ELISA assay to detect the presence of the bacteria in infected petioles and midribs from symptomatic leaves. (Fig 6)

Antibiotic injections can be used for high value specimen trees to suppress symptoms but there is no cure for bacterial leaf scorch which is why they are not recommended. One should expect diseased trees to gradually decline over time. It may take from 5 to 10 years until trees infected with *Xf* exhibit dieback and branches that need to be removed. It is suggested that tree owners provide optimal growing conditions for infected trees to prolong their survival and begin to plant replacement trees that will attain a reasonable size before the diseased ones need to be removed. A publication from University of Kentucky has a list of susceptible trees and a list of trees in which bacterial scorch has not yet been found.

Insecticides are currently not recommended to control the insects that vector this disease.

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## Start Preparing Trees for Winter and Next Year

(Lindsey Purcell, [lapurcel@purdue.edu](mailto:lapurcel@purdue.edu))



Figure 1. Applying fertilizer to newly established tree 3rd year after transplanting.

It all starts with providing some supplemental nutrition for small to medium-aged trees in the late fall when trees go into a state of dormancy. This is when trees stop active growth and begin to form terminal buds, drop leaves and develop cold resistance. Adding fertilizer to trees too early in the season can push new growth which will be prone to winter damage.

A fertilization program is used to maintain trees in a vigorous condition and to improve their immune system against pests. Fertilizing trees refers to the practice of adding supplemental nutrients (chemical elements) required for normal growth and development. However, you really can't "feed" a tree, since trees are autotrophs. They use nutrients to feed themselves by making sugar in the leaves through photosynthesis.



Figure 2. Deep root feeding landscape trees by a certified arborist.

Nitrogen (N), phosphorus (P), and potassium (K) are plant nutrients needed in the largest quantity and these are most commonly applied as a complete fertilizer. However, the addition of any soil nutrient is recommended only if soil or plant foliage tests indicate a deficiency. For trees and shrubs in most of Indiana, the two most common causes of nutrient problems are high pH (alkaline) soils, which can lead to chronic deficiencies of nutrients in some tree species, such as red maple and pin oak, and nitrogen-deficient soils. Typical symptoms include yellowing chlorotic leaves and reduced growth and smaller leaf size.

Trees in natural settings get nutrients from the air, organic matter, nutrient cycling, and microbial activity. In many cases, supplemental nutrition is not necessary in fertile soils which have enough nutrients in the proper amounts to support healthy growth, especially on established trees, but in the urban and suburban environment, often a little assistance is needed. The more challenging urban environment provides less opportunity for healthy growth due to poor, fragmented soils, reduced microbial activity and compaction. Trees needing fertilization to stimulate growth include those exhibiting the symptoms of pale green, undersized leaves, chlorosis, reduced growth rates and those in decline resulting from insect attacks or disease problems. Also, turf can be a serious contender for nutrients and trees surround by turf benefit from additional nitrogen applications every couple of years.



Figure 3. Older, mature trees may need supplemental feeding in urban environments.

Trees which should not be fertilized include newly planted trees in the current year and those with root damage from recent trenching, construction or other disturbance. The root systems of these plants will need to re-establish before fertilizers are applied with cultural practices such as supplemental moisture and mulch. Older, established trees do not need to be fertilized every year and may never need supplemental feeding. In fact, serious pest problems can result on over-fertilized trees. Research indicates that young deciduous trees benefit from additional nitrogen in low-analysis, slow release forms. Conifers require less fertilization and are genetically adapted to low-nutrient soils.

For more information on how and when to fertilize trees, refer to HO-140-W, Fertilizing Woody Plants from the Purdue Extension Education Store.



Figure 4. Proper application of fertilizer and in the right amounts are important.

## Alternatives to Burning Bush for Fall Color

(Rosie Lerner, [rosie@purdue.edu](mailto:rosie@purdue.edu))

Burning bush is so named for its brilliant red foliage display in autumn. But we sometimes get questions asking why their shrub fails to color up, with leaves that remain green until they drop from the plant.

Fall color or lack thereof is affected by a number of factors, including genetics of the plant and environmental conditions such as temperature, soil moisture, nutrition, and sunlight. If a particular specimen fails to perform over multiple years it is likely that the plant lacks the genetic disposition for good fall color. This is not likely to improve over time.

Burning bush, also known as firebush, is considered an invasive plant in Indiana, so this could be an opportunity to consider replacing with one or more of the following alternative shrubs with attractive fall color. Note that some cultivars are selected for

fall color.

You can take a "tour" of these plants and more at the Purdue Arboretum Explorer website, <http://mlp.arboretum.purdue.edu/>.



Chokeberry – *Aronia arbutifolia* 'Brilliant' fall color and fruit.



Fothergilla gardenii 'Jane Platt' fall color.



Oakleaf hydrangea – *Hydrangea quercifolia* fall color

Photos courtesy Purdue University Arboretum

### Common Name

### Botanical Name

Bottlebrush Buckeye

*Aesculus parviflora*

Chokeberry

*Aronia spp.*

Red- or yellow-twig dogwood

*Cornus spp.*

Leatherwood

*Dirca palustris*

Fothergilla

*Fothergilla spp.*

Witchhazel

*Hamamelis spp.*

Oakleaf Hydrangea

*Hydrangea quercifolia*

Sweetspire

*Itea virginica*

Sumac  
*Rhus spp.*

Viburnum  
*Viburnum spp*

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