RESEARCH LABORATORY TECHNICAL REPORT

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Bacterial Leaf Scorch

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Bacterial Leaf Scorch (BLS) is a chronic disease caused by the bacterium, *Xylella fastidiosa*, which infects the vascular system of many woody landscape plants. This disease restricts water transport within the plant causing a slow but progressive decline in plant health eventually resulting in death. *X. fastidiosa* was first discovered in grapes and causes a disease known as Pierce's Disease.

Range

BLS is prevalent in the eastern United States from New Jersey south through Florida and west to Texas and California. Isolated occurrences have been reported in several midwestern states including Indiana, Illinois, Ohio, and Nebraska. Numerous species are infrequently infected with this disease. Some plant species are symptomless hosts; *Xylella* can colonize the plant without causing scorch. These plants can go unnoticed in a landscape but serve as sources of new infections. Frequently and infrequently reported host species of this disease are listed in Table 1.

Table 1: Bacterial leaf scorch hosts

Common Hosts
Red, pin, black, scarlet, and southern red oaks
Sycamore and London plane
American elm
Oleander
Mulberry
Occasional Hosts
Red and sugar maples
Sweetgum
Dogwood
Olive
Pecan
White, swamp white, bur, and willow oaks

Figure 1: Bacterial leaf scorch symptoms on red oak

Symptoms

The key diagnostic symptom is browning (scorching) of leaf margins. Scorch symptoms are very irregular on the leaf blade with browning extending deeply toward the mid-vein (Figure 1). Often, a yellow, orange, or red halo is visible at the margin of the scorch. Scorch develops rapidly in August and early September and is soon followed by defoliation. Symptoms usually exhibit first on a few branches and then spread in subsequent years until the entire crown is affected (Figure 2). Portions of the crown impacted by *Xylella* may leaf out later in spring than the rest of the canopy and have lighter green leaves. In later stages of the disease, branches die and death occurs. Decline usually occurs slowly over a period of ten years or more from the initial onset of symptoms, but in

young trees and in species sensitive to moisture stress, such as sycamore, death can occur sooner.

Symptoms of BLS can be confused with environmental leaf scorch caused by water deficits due to drought, poor soils (compacted, sandy, shallow or limited volume) or root loss. Table 2 highlights key diagnostic differences between environmental and bacterial leaf scorch.

Figure 2: Declining pin oaks from bacterial leaf scorch

Disease Biology

Xylella is an obligate pathogen that grows in the vascular system of living plants. As weather warms in late spring, the bacterium multiplies rapidly and by late summer, it is occluding (blocking) the xylem vessels in the stem and branches and in the leaf petiole of the infected host. Gums/gels produced by *Xylella* are likely contributing to the vascular occlusion and the development of water stress and scorch symptoms. The bacterium is spread by xylem-feeding insects, including leafhoppers (Cicadellidae), spittlebugs (Cercopidae) and treehoppers (Membracidae). These insects acquire the pathogen when feeding on infested plants and then move on to healthy ones.

Diagnosis

The presence or absence of *Xylella* is determined by analysis of symptomatic leaves and associated twigs through Polymerase Chain Reaction (PCR). Sample quality and quantity is critical to achieve accurate results. The sample should be composed of twigs with scorched leaves attached. Samples should be placed in sealed plastic bags and shipped to a plant diagnostic laboratory that is capable of performing the analysis.

Table 2: Key diagnostic differences

Bacterial leaf scorch	Environmental leaf scorch
Marginal leaf scorch that progresses randomly throughout the canopy	Marginal leaf scorch that is evenly distributed throughout the canopy
Yellow to red halo often present at margin of scorch	Halo usually absent
Symptoms reoccur and worsen each year, even during periods of normal rainfall or irrigation	Symptoms occur during periods of drought and can be prevented with irrigation

Management

There is no reliable preventative treatment for BLS. Remove diseased trees with advanced decline to reduce the likelihood of the pathogen spreading to healthy plants.

For diseased trees, antibiotics injected directly into the root flare will suppress development of the bacterium in the current year's xylem thereby suppressing symptoms in the year of treatment. Treatments must be applied annually or symptoms will return.

Antibiotic injections should be combined with cultural practices to maintain the health of the tree. Appropriately mulching the critical root zone and providing supplemental irrigation during periods of drought are critical to the health of the tree. Fertilization should be based on soil analysis results. Monitor for outbreaks of secondary pests, including canker diseases, borers and bark beetles, and provide treatments as needed. Pruning diseased limbs as a means of eradicating the infection is not effective. Please contact your Bartlett Arborist Representative to learn about management strategies.