

Bacterial Leaf Scorch

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In recent years, bacterial leaf scorch (BLS) has devastated many landscape and shade trees in West Virginia's urban forests. It was first found in 1992 in Middleway, Jefferson County, on red oak. In 2008, a multi-county BLS survey was conducted, starting in Jefferson County, and the samples collected were sent to Rutgers University for processing. The survey resulted in the discovery of BLS in five new counties (Berkeley, Cabell, Kanawha, Morgan and Wood) and on five new hosts (elm, sweetgum, red maple, black oak and pin oak).

BLS was first diagnosed in the U.S. in the early 1980s and this epidemic shows no signs of abating. At first the causal organism was considered a virus that affected the vines, leaves and fruit of its host. However, later experiments conducted in the early 1990s found that the disease symptoms of grapevines could be suppressed using antibiotics. This indicated that a bacterium and not a virus was most likely involved.

We now know that BLS is an infectious chronic disease caused by the bacterium *Xylella fastidiosa* and that this bacterium is transmitted by several species of leafhopper. These insect vectors, however, vary in their ability to acquire and transmit the different strains of *X. fastidiosa*. Vector efficiency may be related to some extent to host affinities (disease resistance, environmental factors, etc.) or the feeding habits of the insect vector. The bacterium colonizes and physically "clogs" the tree's water conducting tissues (xylem). Water transport becomes disrupted in the roots, branches and leaves due to large amounts of multiplying bacteria and their by-products. The presence of the bacterium also triggers a reaction in the tree that plugs the xylem, further impeding water transport and eventually killing the tree.

BLS causes a slow death of trees, usually in three to eight years. During this time dead and dying branches pose hazards for people and structures in urban areas. Dying trees also require costly maintenance due to the need to prune dead limbs or remove entire trees. Many communities in New Jersey have had to absorb these maintenance costs which have run upward to \$1.5 million. In addition, aesthetics and shade decline as the disease progresses throughout a community.

Symptoms of BLS appear in late summer to early fall and vary from host to host. In most cases the disease is identified by a characteristic scorching of leaves, where trees infected with *Xylella fastidiosa* exhibit marginal leaf necrosis, or browning, bordered by a pale halo band separating the dead or scorched tissue from the green tissue (Fig.1). Leaf discoloration begins at the leaf margin and moves toward the midrib and affected leaves may curl and drop prematurely. Epicormic sprouts (multiple side shoots growing from the tree trunk) may be prominent on severely diseased trees, and scale insects, borers, Armillaria root rot, and other biotic diseases may also be present as secondary pests.

Symptoms of BLS recur each year and spread over the tree's crown, thus, dieback and a reduction in growth are common in

affected trees. In trees with determinate growth, such as oak, the scorching appears on leaves of all ages at about the same time. In trees with indeterminate growth, such as sycamore and elm, symptoms progress from older to younger leaves. Elms may be killed outright by the disease; other affected species eventually decline to the point where the dead branches pose a risk and the tree must be removed. The process of tree decline may occur quickly or slowly, perhaps depending on the tree and the environment.

There is no effective preventative treatment or cure for bacterial leaf scorch, so one should expect diseased trees to eventually die. In the meantime, BLS-infected trees can be made to look somewhat presentable for a few more years if the dead wood is pruned out. Careful examination of your trees combined with judicious pruning can help rid the tree of symptomatic branches especially since there are no chemicals registered for treatment.



Fig. 1. Marginal leaf necrosis, or browning, bordered by a pale halo band separating the dead or scorched tissue from the green tissue.

In 2009, BLS was found in five new counties: Jackson, Mason, Putnam, Summers and Webster. BLS was detected in two new hosts as well: scarlet oak and boxelder. At this time, BLS is known to occur in 11 counties in West Virginia (Fig. 2) and on eight different hosts. Samples collected during the 2009 BLS survey were processed by the West Virginia Department of Agriculture's (WVDA) Plant Pathology Laboratory. The WVDA will conduct another BLS survey starting this month (August 2010) and will begin focusing on trees in forest environments as well as landscape/urban areas, due to the fact that BLS has been found in forests and woodlands in New Jersey and Delaware and the occurrence of BLS in these forested environments is increasing.

For additional information about bacterial leaf scorch, contact the WVDA's Plant Industries Division at (304) 558-2212.

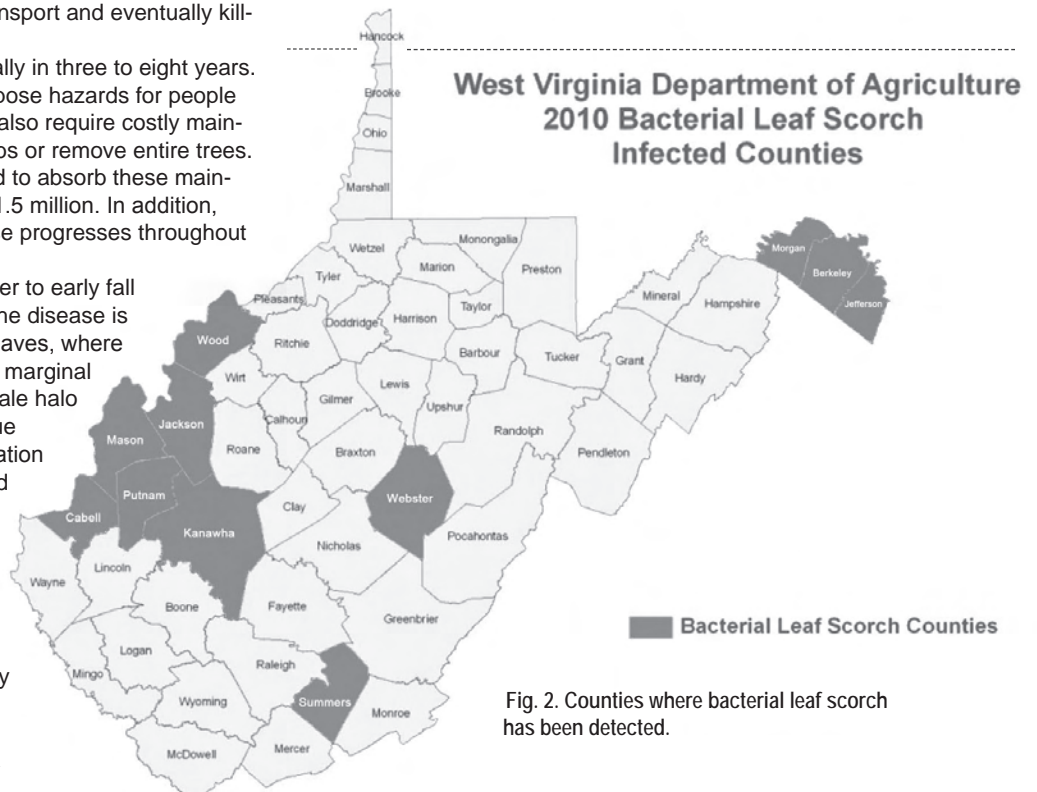


Fig. 2. Counties where bacterial leaf scorch has been detected.