



Understand and Manage

# Bacterial Leaf Scorch

**Bacterial Leaf Scorch (BLS)** is a devastating disease of shade trees that is caused by the xylem-inhabiting bacteria *Xylella fastidiosa*. Leaf desiccation is the most prominent visible symptom, although infected trees may eventually display dieback, branch death, and prematurely die. Commonly infected trees include oaks, elms, sycamores, and sweetgum, making this an important disease for arborists to manage.

## Symptoms

Many factors can cause leaf disorders in trees including, root damage, road salt, fungal pathogens, drought, and more. Proper identification of bacterial leaf scorch requires an arborist to be able to recognize how leaf symptoms of this disease are distinct from those caused by other problems.

Xylem fluid contains a variety of compounds, such as amino acids, that are utilized by *X. fastidiosa* and the insect vectors of the disease. When bacteria colonize the xylem, the availability of water to the leaves is restricted and scorch develops. Symptom severity tends to increase when drought stress is also present.

## Transmission

*Xylella fastidiosa* is spread via xylem feeding insect vectors including sharpshooters, treehoppers, leafhoppers, and spittlebugs. The pathogen does not circulate within vector bodies and probably does not multiply within them. *Xylella fastidiosa* may also spread from one tree to another by root grafts.



**While symptoms may vary slightly from species to species, there are some common characteristics of bacterial leaf scorch regardless of the tree:**

- ▶ Leaves develop normally early in the season and symptom expression begins in June and July.
- ▶ Necrosis begins along the leaf margin and spreads toward the veins and petiole in an irregular pattern.
- ▶ Green tissue is separated from necrotic tissue by a band or halo of yellow or reddish brown bands.
- ▶ Scorch symptoms will reappear in the same limbs from one year to another and eventually spread to other limbs.
- ▶ Infected trees display an overall decline in vigor, branch dieback, and premature death.

## Infected areas

Bacterial leaf scorch in shade tree: has been reported as far north on the eastern seaboard as New York. It is prevalent in the southeast and extends into Texas and northward to Illinois. In California Pierce's disease of grape is the most economically important bacterial pathogen.



shaded area indicates known BLS infections

## Suceptible Species

Oaks: Red oak, Pin oak, Bur oak, White oak, Willow oak, (Approximately 12 other species of oak), Sycamore, American elm, Maples: Red maple, Sugar maple, Mulberry, Sweetgum, Almond

# Managing Bacterial Leaf Scorch

Bacterial leaf scorch is a frustrating problem because there is no known cure. Infected trees die prematurely and their appearance deteriorates over their lifespan. A variety of management practices are aimed at extending the longevity of infected trees. These include treatment with antibiotics and water stress reduction through mulching, irrigation, and growth regulation. Trees killed by bacterial leaf scorch should be replaced with species that are not susceptible to the disease.



Pin oak with 90% leaf scorch on October 19, 2006 (left). The same tree with 20% leaf scorch on October 20, 2007 (right). Bacastat treatment was applied during the week of June 8, 2007



Pin oak with 70% leaf scorch on October 18, 2006 (left). The same tree with 35% leaf scorch on October 16, 2007 (right). Cambistat was applied in 2006, and Bacastat was applied in mid-May 2007.

## Antibiotic treatments

Application of Bacastat™ by root flare micro-injection reduces symptom expression of bacterial leaf scorch by directly suppressing the pathogen. If bacterial colonization of the xylem can be limited, then less disruption to water flow occurs and leaf scorch is minimized. Current technology provides relief from symptoms for one year, and results are best on trees with less symptom development.

## Reduce water stress

Cambistat™ is a growth regulator that reduces shoot growth which allows the tree to redirect some of its energy to defense chemicals, fibrous root production, thicker leaf production, and other uses.

These responses aid in minimizing water stress.

Mulching trees and irrigating during dry conditions will also help serve this purpose.

## Manage vector transmission

Xytect™ is a systemic insecticide that protects the vascular system of trees. It is highly effective against a broad range of ornamental pests, including the vectors of bacterial leaf scorch. The prevalent nature of these insects, combined with their season long activity, makes widespread control of these pests impossible. The purpose of an insecticide treatment is to reduce the movement of insects from a tree infected with bacterial leaf scorch to other nearby trees.