RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

LANDSCAPE, NURSERY & TURF EDITION $1.50 AUGUST 5, 2004

INSIDE

First Report of Bacterial Leaf Scorch of Oak in New Jersey, 2004

Ann B. Gould, Ph.D., Specialist in Plant Pathology

Bacterial leaf scorch (BLS) of oak is one of several shade tree diseases caused by *Xylella fastidiosa*, a bacterium that lives and multiplies in the xylem of affected trees. Other shade trees affected by the pathogen include American elm, sycamore, London plane, red mulberry, red maple, and sweet gum. The bacterium also resides in a wide variety of other plants (called alternative hosts), many of them weeds, without causing visible symptoms of disease.

BLS occurs throughout the eastern, southeastern, and mid-western United States and in Texas. In New Jersey, BLS affects populations of oaks (mostly red and pin oaks in the red oak group, Section *Lobatae*) in most counties, but is most troublesome in certain sections of Burlington, Camden, Gloucester, Salem, Mercer, and Middlesex Counties. In some cases, up to 30% of street tree and landscape oaks are symptomatic for this disease. Incidence of BLS in other oaks and other shade tree species in New Jersey is rare. Although BLS usually appears in mid- to late-August, we spotted this disease a bit on the early side this year on several red oaks in Middlesex County.

Symptoms

The primary symptom associated with BLS is a marginal scorch of affected leaves on one or more branches in the canopy. The scorch pattern is not clearly defined and is easily confused with scorching due to environmental stress. On oak, scorch symptoms are often irregular in shape, and frequently a dull red or yellow band is apparent between healthy and scorched (necrotic) tissues. Affected leaves may curl and drop prematurely. As the infection progresses over several years, branches die and the tree declines. Affected trees eventually decline to the point where they must be removed. The process of tree decline may occur quickly or slowly depending on the tree or the environment.

Disease Spread

Xylella fastidiosa is spread (or vectored) from tree to tree by xylem-feeding insects such as **sharpshooter leafhoppers** and **treehoppers**. These insects subsist on the fluid within xylem vessels and pick up bacteria when feeding on infected trees. When an insect carrying the bacterium subsequently feeds on a healthy tree, the new tree becomes infected. Both nymphs and adults can spread the disease; adults remain

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infective for the remainder of their life, nymphs are infective only until their next molt. The particular species of insects that spread *Xylella* to oaks and other shade trees is currently unknown.

Diagnosis

Xylella fastidiosa was not recognized as a pathogen of landscape trees until the early 1980s, and its symptoms are very similar to those caused by other agents. It is not surprising, therefore, that the disease is frequently misdiagnosed. When trees are suspected of being infected with the leaf scorch bacterium, it is best to submit a small branch specimen (pencil-width in diameter), with scorched leaves attached, to the Rutgers Plant Diagnostic Laboratory for analysis. Diagnosticians will identify this disease by looking for the bacterium in xylem fluid or through the use of selective antibody (ELISA) techniques. Proper sampling is necessary for an accurate diagnosis; the best samples have leaves that are symptomatic for the disease.

Management

Residents, landscapers, arborists, and golf course superintendents in New Jersey should look for BLS of oak from now through mid-October. Since there is no cure for this disease, proper management strategy includes the maintenance of tree vigor for as long as possible. If possible, water affected trees during times of water stress to reduce the debilitating affects of this disease. In addition, other diseases, insects, and environmental stresses (including drought) enhance the development of bacterial leaf scorch. This disease may also predispose infected trees to other disease and insect problems. Branches and infected trees in a severe state of decline should be routinely removed as they are potential hazards. Expensive tree injections reduce symptom development, but do not cure the disease and must be repeated. In areas known to be affected by this disease, plant trees that are not known hosts of the bacterium. ❑

Birch from page 3

inch of water per week is provided throughout the growing season. When available water was reduced to less than ½ inch per week the resistance of both birch species to the BBB was reduced significantly.

The field experiments with the paper birch species at OARDC indicated that when these native trees received 4 or 12 inches of irrigation per year, then the percent mortality by the BBB was 100% and 75%, respectively. On the other hand, when irrigation levels approximated normal annual rainfall (i.e., 36 inches per year), then after 20 years only 25% mortality of paper birch from the BBB occurred (the gray birch mortality was even less).

Reference: Adapted from a presentation by Dr. Dan Herms at the OARDC PHC Workshop, Wooster, OH - 8/99. ❑

Plant Diagnostic Laboratory Highlights

Richard J. Buckley, Laboratory Coordinator

Turf

The **brown patch** pressure is high, which makes brown patch our disease of the week. Brown patch was diagnosed on several samples of turfgrass from New Jersey, New York, and Connecticut. Most of the injured turfgrass was perennial ryegrass from fairways and tees. Mixed species – bluegrass, ryegrass, and fescue – turf from residential clients in Monmouth and Middlesex Counties also were diagnosed with brown patch. With the cooler weather and steady supply of moisture, we are also seeing lots of **dollar spot** activity in residential lawns. All the rain in July has stimulated heavy growth in most lawn areas, so it is likely the nitrogen supply has been used up. Dollar spot, which is most prevalent on low nitrogen input grasses, may simply be a signal that the tank is low and a shot of nitrogen is needed on your site.

The **anthracnose** and **summer patch** watch continues! Golf turf samples diagnosed with anthracnose were submitted from Cape May, Gloucester, Mercer, Morris, and Somerset Counties in New Jersey as well as on golf turf from Connecticut and New York. **Summer patch** was diagnosed on plugs of annual bluegrass sent from Burlington and Monmouth Counties in New Jersey, and from several other golf courses in Ohio, New York, North Carolina, and Pennsylvania.

Last, but not least, we have seen one or two samples of several other diseases in the last week from either landscape turf or golf turf including: **red thread**, **stripe smut**, **pythium blight**, **fairy ring**, **gray leaf spot**, and **copper spot**. Gotta love the rain and humidity!

Ornamentals

Bacterial leaf scorch is the big news for the Plant Diagnostic Laboratory this week. Samples of pin oak are beginning to trickle into the laboratory with the classic leaf scorch symptom. Antibody-based test kits used on the samples reveal infection by the bacterium *Xylella fastidiosa*. The recent sample submissions got me out checking on some trees that I know are positive and I was not surprised to see that symptoms are beginning to develop on most of them. **Cytospora canker** was identified on willow samples from Mercer and Bergen County landscapes. **Cytospora canker** is best know as a problem of spruce, but also makes nice cankers on willow and maple. A couple more samples of **quince rust** were submitted to the laboratory from Cape May County residential clients. **White pine weevils**, **euonymus scale**, **cottony azalea scale** and **elongate hemlock scale** rounded out the fun! ❑

The Native White Birch Species and their Resistance to the Bronze Birch Borer

Steven K. Rettke, Ornamental IPM Program Associate

Wood boring insects can have devastating effects on landscape plants. Although many plants are relatively tolerant to leaf feeding herbivores, they cannot tolerate extensive feeding within their vascular systems. For example, **bronze birch borer** (BBB) larvae feed within the phloem of birch and typically girdle branches or trunks. The resultant interference of the translocation of photosynthates (e.g., carbohydrates/ starches) from the phloem to the roots results in tree starvation. Declining roots subsequently cause a reduction in the absorption of water and nutrients that results in the death of the top of the tree. The tree declines from the top-down because of hydraulic resistance. It is a myth that the bronze birch borer attacks the top of a birch tree first. This wood boring species attacks anywhere on the tree where branches exceed one inch in diameter, but are especially attracted to bark wounds.

Should White Bark Birches Be Planted?

It is commonly assumed that white bark birches should not be planted in New Jersey landscapes because of the lethal bronze birch borer. Native birch trees have evolved with the BBB and have developed powerful defenses against this woodborer. In 1979, a 20-year study was initiated at the Ohio Agricultural Research & Development Center (OARDC) in Wooster, Ohio that attempted to determine the susceptibility of several species of white barked birches to the BBB. In a highly replicated study, seven different birch species involved in the research were each represented by 200 trees (for a total of 1400 trees). The seven birch species included three native species (gray birch (*B. populifolia*), paper birch (*B. papyrifera*), and river birch (*B. nigra*)); two Asian species, (monarch birch (*B. maximowicziana*) and Asian white birch (*B. pendula* var. *'szechwanica'*)); two European species (European white birch (*B. platyphylla*) and mountain birch (*B. pubescens*)). All of the trees received fertilization during the early years, but thereafter, they received no supplemental irrigation or pesticide treatments.

The three native North American birch species showed strong resistance to the BBB. The river birch is immune and is not a host of the BBB. The native river species only exhibited 2% mortality during the 20 years. After 20 years, more than 75% of the initial 200 native paper birch species were alive and growing well in the research plots. At the conclusion of the 20-year study, the only birch trees left standing were the native North American species.

At the other end of the spectrum, the European white, mountain, and Asian white birch species were all dead in the experimental plots in less than 10 years (all 600 trees). Virtually 100% of the tree mortality was attributed to infestations by the BBB. The monarch species faired somewhat better, but by 1990 only 10% of these trees were alive, and by 1999 they too had totally succumbed to the BBB. Therefore, as the study continued over the years, eventually all the nonnative birch tree species showed a tremendous number of BBB emergence holes per square meter of bark surface.

There is some misleading published information that indicates the monarch birch species is resistant to BBB. The OARDC studies seem to strongly refute any significant resistance within this Asian birch species. Other misinformation still present in the literature states the 'Whitespire' birch is an Asian white birch variety (*B. platyphylla* var. *'japonica'*) that is resistant to BBB. In actuality, the 'Whitespire' is the native gray birch (*B. populifolia*) that was improperly identified.

Why have the Asian and European white birch species continued to be sold and planted in our region? The perceived problem with the native birch species is that their bark does not turn white fast enough as they mature. The bark of the Asian and European birches turns white at a young age and is considered more desirable. Also, from a business perspective, the possible reason nurserymen continue to sell non-native Asian and European birch species is because there is a need for a lot of replacements!

Native White Birches & Plant Defense Theory

Our native birches are able to defend themselves by several different mechanisms. The birch trees can protect themselves through the rapid accumulation of secondary metabolites (i.e., organic defensive chemicals) at the point of BBB attack. Also, protection can occur through rapid callus formation in areas of BBB larvae feeding. The feeding wounds made by the larvae therefore stimulate the callus formation and the phenolic compounds. Furthermore, the rapid compartmentalization of wounded trunk areas is theorized as another important defense in resistant birch trees.

Through millions of years of insect/plant interactions our native birch species have evolved to fight back against bronze birch borer invasions. The same defensive capabilities have not occurred with the non-native birch species since they were never pressured to make these evolutionary adaptations.

Avoid Drought Stress to Maintain Resistance

The susceptibility of drought stressed vs. well-irrigated birch trees to the bronze birch borer was also studied in the Ohio field experiments. The results of these studies indicated that the native gray and paper birch species would maintain their resistance to BBB when one

See Birch on page 2

Diseases of Turfgrass

Bruce B. Clarke, Ph.D., Specialist in Turfgrass Pathology

General

Pythium blight, **brown patch**, **dollar spot**, **anthracnose**, and **slime mold** are all active on golf and landscape turf at this time**.**

Anthracnose

This disease, caused by the fungus *Colletotrichum graminicola* is apparent on annual bluegrass, fine fescue, perennial ryegrass, and Kentucky bluegrass. The fungus typically attacks turf growing under low soil fertility and/or heat or drought stress. Low cutting height and traffic can also enhance symptom development. To identify **anthracnose** in the field, look for small black fruiting bodies with protruding black spines. For best results, increase turf vigor with frequent, light applications of nitrogen, maintain adequate irrigation, reduce thatch, and raise the cutting height (whenever possible). On a preventive basis, apply Banner, chlorothalonil, Compass, ConSyst, Eagle, Endorse, Heritage, Insignia, Rubigan, Spectro or thiophanate-methyl per manufacturer's recommendations. Resistance has been reported at some locations for the QoI (strobilurin) and benzimidazole fungicides. Also, Prostar may enhance the severity of this disease, therefore, restrict the use of this product to sites that do not have active infections.

Brown Patch

This disease, caused by the fungus *Rhizoctonia solani*, is very common on tees, greens, and home lawns due to the recent warm, humid weather. To reduce the incidence and severity of **brown patch,** avoid nitrogen applications during hot weather, irrigate between midnight and 8 a.m. to reduce the period of leaf wetness, and spray turf with Banner, Chipco 26GT, chlorothalonil, Compass, ConSyst, Curalan, Eagle, Endorse, Heritage, Insignia, mancozeb, Medallion, Prostar, Spectro, thiophanate-methyl, or Touche per manufacturer's recommendations.

Gray Leaf Spot

Gray leaf spot caused by the fungus *Pyricularia grisea*, has been reported in Central Jersey during the past few days. This disease has devastated perennial ryegrass and tall fescue plantings throughout the Mid-Atlantic States in the past, and environmental conditions appear to be perfect for a major outbreak this summer. Symptoms start as tiny, brown leaf and stem lesions within a 3 to 4 inch patch. In severe cases, the leaves curl and lesions may extend the entire width of the blade. As the disease progresses, patches coalesce into large (one to two feet diameter) areas of blighted turf. Extensive foliar blighting may occur during warm (75-85^{0}F days and 60-75^{o}F nights), wet weather. Newly established seedlings are more susceptible to infection than mature plantings. When conditions are conducive to disease development, the pathogen produces abundant one to two-celled, pear-shaped spores (conidia). For best results, avoid high rates of nitrogen during July and August and extended periods of leaf wetness (i.e. water in the early morning hours). Fungicide studies conducted in New Jersey, Georgia, Maryland, and Kentucky have shown that Compass, ConSyst, Heritage, Insignia, Spectro, thiophanate-methyl, and Zyban were most effective when applied on a preventive basis every 14 to 28 days beginning in late-July. Chlorothalonil (e.g., Daconil) and the DMI (sterol-inhibiting) fungicides, such as propiconazole (e.g., Banner), may provide effective control when disease pressure is moderate.

Pythium Blight

Pythium blight has been very active on golf and landscape turf during the past two weeks. Since pythium thrives in low or poorly drained areas, especially when the night temperatures are above 70^{0}F, we should see a lot more of this disease as the "hot muggy" weather continues this summer. For best results, improve drainage, water in the early morning hours, avoid over fertilization, and apply Alude, Banol, Chipco Signature, Heritage, Koban, Magellan, Prodigy, Quell, Subdue MAXX, or Terrazole, according to the manufacturer's recommendations. Apron may be used as a seed treatment to prevent damping-off. Mancozeb can be used to control this disease but it is generally less effective than the other products mentioned above. Use of Koban and Terrazole on fairways is prohibited and should be used with caution on other areas due to the potential for foliar burn during hot weather.

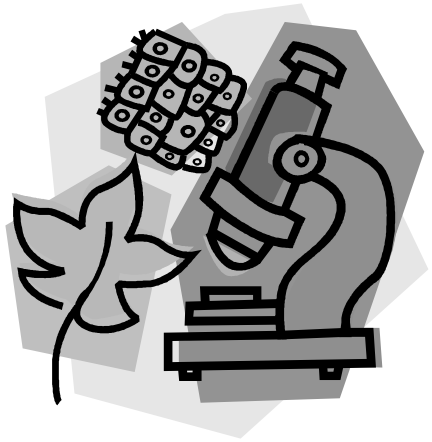
Yellow Tuft

This disease, caused by the fungus, *Sclerophthora macrospora*, is present on greens and irrigated landscape turf at this time. **Yellow tuft** (=Downy Mildew) occurs on almost all cool-season turfgrasses; however, it is usually only a serious problem on turf maintained at a low cutting height. Poorly drained or heavily irrigated sites are often associated with disease development. Infected turf appears stunted, off color (yellow to light green), and may exhibit slightly broadened leaf blades and dense clusters of shoots. Patches ranges in size from 0.25 to 1 inch in diameter for bentgrass and red fescue turfs, and 0.5 to 3 inches for bluegrass and perennial ryegrass areas. Tufts are easily removed from the soil due to the absence of adventitious roots. To control, improve drainage, avoid over watering, mow only when the grass is dry, apply iron sulfate to mask symptom expression, and spray turf with Chipco Signature, Prodigy, or Subdue MAXX on a preventive basis (next spring) and repeat at 21 day intervals from late March to early June. ❑

Rutgers Plant Diagnostic Lab

The Plant Diagnostic Lab provides the following services:

- ❖ Disease and Insect Pest Diagnosis
- ❖ Plant and Weed Identification
- ❖ Insect Identification
- ❖ Fungus and Mold Identification
- ❖ Nematode Assays
- ❖ Screening for Acremonium Endophytes
- ❖ Fungicide Resistance Screening
- ❖ Other Services Available by Contract



Most samples (except fine turf)
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In-state:
$65 per sample
$100 disease and nematode assay
Out-of-state:
$95 per sample
$150 disease and nematode assay

For further information, visit us on the web at: http://www.rce.rutgers.edu/plantdiagnosticlab

Weather Summary for the Week Ending 8 am Monday 8/02/04

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	3.60	20.72	.84	88	61	73.	0	1844	243	100
CANOE BROOK	2.68	24.84	3.87	89	61	75.	1	2003	408	91
CHARLOTTEBURG	1.13	23.51	2.38	87	59	73.	1	1719	485	80
FLEMINGTON	2.60	29.73	9.42	89	60	74.	0	1893	252	98
LONG VALLEY	2.32	22.12	.36	86	60	71.	-1	1634	222	90
NEWTON	2.07	20.82	1.42	86	60	73.	0	1738	289	96
FREEHOLD	.71	21.64	1.95	91	62	75.	0	2043	284	71
LONG BRANCH	2.67	20.86	1.27	84	63	74.	-1	1853	172	100
NEW BRUNSWICK	2.15	24.14	4.46	89	63	75.	0	2008	161	93
TOMS RIVER	2.51	23.59	3.37	88	65	75.	1	2099	413	100
TRENTON	2.11	21.05	2.22	89	61	75.	-1	2076	153	86
CAPE MAY COURT HOUSE	.12	16.70	-.71	86	65	74.	-2	2002	206	19
DOWNSTOWN	.55	19.38	.98	89	61	76.	0	2160	225	47
GLASSBORO	4.22	32.23	12.85	88	67	78.	2	2290	381	100
HAMMONTON	.72	20.75	1.31	90	62	77.	1	2234	326	44
POMONA	2.05	18.70	1.16	87	61	76.	1	2137	357	94
SEABROOK	.46	23.64	5.85	88	66	78.	2	2391	449	41
SOUTH HARRISON	2.95	25.66	6.08	88	63	76.	NA	2268	NA	NA

WES KLINE — GDD BASE 40 PINEY HOLLOW Last Week 211 (Ending 7/26/04) This Week 206 (Ending 8/02/04)

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