TREE TIPS
TREE & SHRUB CARE FROM BARTLETT TREE EXPERTS

Molecular diagnostics — "CSI" for plants

by Christine Bechtel, Bartlett Laboratories Diagnostician

Some plant pathogens (organisms that cause disease) are brilliant evaders of detection, making them more dangerous than everyday pests such as aphids and spider mites. They may move incognito on to additional victims unless sophisticated testing is used to unmask them.

Molecular detection is a helpful tool in characterizing pathogens and pests that weaken or kill ornamental trees and shrubs. Also, these techniques have greater sensitivity and reliability than other testing methods. Moreover, molecular testing can enhance a diagnostician's ability to detect invaders in cases in which more traditional techniques cannot.

Bartlett Arborists send samples to our Research Laboratories for diagnosis.

Certain troublemakers are too small to see even with a microscope. Others will not grow in a petri dish, leave very little physical evidence of their presence, or cause rapid damage before their populations rise to a detectable level. In these instances,

> Extracting genetic material from samples can help identify elusive pathogens and pests.

extraction of genetic material (DNA or RNA) from the host sample, followed by making millions of copies of the targeted gene through a process called the polymerase chain reaction (PCR) may be useful for identification. This technology is based on the discovery that certain lengths of DNA found in marker genes are exclusive enough to screen out non-target DNA (such as from the host tree and ever-present bacteria), yet particular enough when

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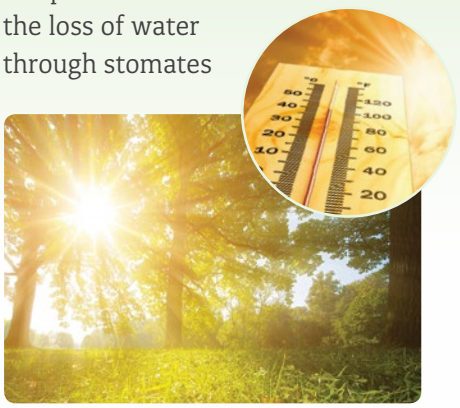
Be aware of heat stress

Most of us are familiar with the results of drought stress, but did you know that high temperatures alone can cause significant damage to the health of your plants? With many areas recording rising temperatures, we should know how warmer temperatures affect the physiology of plants. High temperatures reduce photosynthetic rates faster than they reduce respiration rates. The result is an imbalance because the carbohydrates produced by photosynthesis are used faster than they can be replaced! Higher temperatures increase the loss of water through stomates



in the leaves, and thereby increase demands on the root system to take up water to cool the tree via transpiration. (High temperatures are usually accompanied by low rainfall—adding insult to injury.) Cellular membranes also become unstable and result in ion leakage within the leaf cellular structure.

So how do plants cope with high temperatures? One way is through the formation of heat-shock proteins (HSPs). Found in humans and other animals as well, HSPs perform the same function in both animals and plants: maintain the integrity and

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TREE & SHRUB MAINTENANCE CALENDAR

JUNE

- Prune ornamentals, and remove faded flowers and seed pods, as needed
- Adjust irrigation needs—deep water (wet 6"–8" deep) every 7–10 days when rain is lacking
- Mulch trees and shrubs to conserve moisture
- Thin fruit to 6"–8" apart; prop up heavily loaded branches
- Apply foliar disease and insect control treatments to roses
- Have your Arborist check plants for insect infestations
- Prune terminal growth of rhododendron to increase next year's flowering
- Maintenance-prune evergreens (like boxwood) to retain formal shape
- Scout and treat for fruit insect pests
- Treat bagworms if found
- Apply a second application of tick treatment to landscape perimeters

JULY

- Prune ornamentals as needed
- Deep water (wet 6"–8" deep) every 7–10 days when rain is lacking
- Continue treatments for diseases and insects on fruit trees and on roses
- Remove suckers from fruit trees and continue to prop up heavily fruited branches
- Mulch as needed
- Monitor and treat for Japanese beetles and leaf miners on holly
- Watch for oak wilt, rose rosette and apple scab
- Monitor and treat plants for spider mites

AUGUST

- Treat for fall webworm and tent caterpillars
- Deep water (wet 6"–8" deep) every 7–10 days when rain is lacking
- Monitor new plantings for insects, disease and girdling issues
- Conduct final pruning to shape shrubs
- Treat ripening fruit to prevent brown rot
- Treat stone fruit trees for borer protection
- Protect black locust from locust borer with insecticide treatment

Molecular diagnostics

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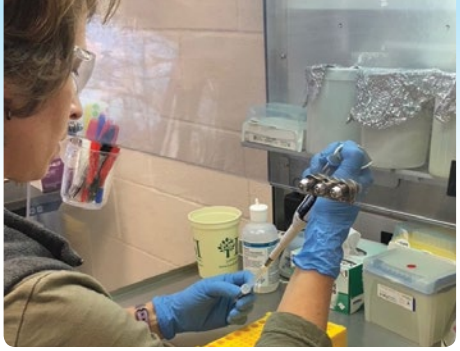

sequenced, or decoded, to match to a pathogen or pest of interest.

Diseases that can be confirmed at the Diagnostic Clinic within the Bartlett Tree Research Laboratory using molecular testing include bacterial leaf scorch, oak wilt, rose rosette virus, various wood decay fungi, elm yellows, Texas Phoenix Palm Decline, lethal yellowing of palm, and ash yellows. DNA from unknown fungi, bacteria, insects, and oomycetes (water molds) can also be isolated, sequenced, and identified.

As long as these disease pathogens evade detection, our not-so-"elementary" methods will be vital for sleuthing out tree and shrub problems.

Heat stress *(Continued from page 1)*

function of proteins in high heat. HSPs form in response to rising temperatures and help to stabilize proteins to ensure cell functioning; they help to moderate metabolic reactions that would otherwise speed up and cause an imbalance of metabolites and acidification in cellular tissue. Calcium also plays a critical role in temperature stress adaptation by modulating enzyme activity and stabilizing membranes. There are physical adaptations as well, such as increasing leaf hairs and waxes, changing leaf morphology to reduce light interception, and changing leaf orientation.

Preparing plants for heat stress consists of the horticultural basics: plant properly in high quality soil, manage soil fertility, and irrigate properly. Bartlett recommends soil sampling to assess soil nutrition (particularly calcium) and physical properties in order to create a custom fertilizer to optimize the soil environment and enhance plant health. Contact your Bartlett Arborist Representative to learn more.

Fun with trees

Imaginative and funny leaf creations

A piece of paper, a few leaves, a glue stick and a marker are all you need to have a little fun with your child! Lay a leaf on a blank sheet of paper and let imagination take over; draw additions around the leaf to create all kinds of images. Save favorite ones by using a glue stick to fasten the leaf in place.

TREE FOCUS:

Cornelian cherry dogwood *(Cornus mas)*

History

Although commonly known as cornelian cherry, this deciduous shrub or small tree is not a cherry, but a dogwood. It is native to central and southern Europe into western Asia, and is hardy in North America to zone 4. The cornelian cherry is typically multi-stemmed with a very short main trunk and branches often beginning just aboveground. Because of its small size and slow growth, it is often suitable for planting under utility lines.

From the seventh century BCE onward, Greek craftsmen used its hard wood to construct spears, javelins and bows, considering it far superior to any other wood. The wood is so dense that it does not float. Today cornelian cherry is better known for its dense, showy, rounded clusters of yellow flowers that bloom in early spring before the leaves emerge. Its medium-green foliage appears in summer, followed shortly by dark red fruits that ripen in July. These tart berries can be eaten raw or made into jams and syrups.

Culture

- Easily grown in average, medium, well-drained soil in full sun to part shade
- Fairly easy to transplant
- Prefers moist, organically rich soils
- Best as a hedge, screen or foundation plant or as a specimen, or grouped in a shrub border
- Relatively adaptable to urban conditions, so can be used in parking lots and medians

Concerns

- Trees stressed by heat and drought may become vulnerable to borers
- Potential disease problems include dogwood anthracnose, leaf spot, crown canker, root rot, powdery mildew and leaf and twig blight

Bartlett Management Practices

- Promptly remove root suckers to control spread, given that this plant can quickly become a thicket
- Can make specimen more tree-like and better reveal the exfoliating bark by pruning the lowest limbs from the base up

WONDERS OF NATURE

A rainbow-colored tree!

The large, tropical tree *Eucalyptus deglupta* gets its common name, rainbow eucalyptus, from its amazing multi-colored bark. Every year patches of the tree's outer bark are shed at different times, in vertical strips, revealing bright green new bark underneath. This bark changes color as it matures, so in addition to the fresh green bark, there are streaks of blue, purple, orange and maroon bark on the tree all at once!

This tree thrives in tropical forests that get lots of rain. The colors of the bark are not as intense when the rainbow eucalyptus grows outside its native range.

Compliments of

It's so easy being green when you have plant healthcare.

Salve Regina University – the campus is an arboretum!

The campus of Salve Regina University is set on seven contiguous Gilded Age estates in Newport, Rhode Island. A Bartlett client for decades, this campus is also an arboretum made up of a tapestry of the estate gardens. It features mostly mature and exotic trees, originally designed by notable landscape architects such as the Olmsted brothers.

The students, faculty, and administrators wanted to elevate the experiences of their community in the unique landscape of the campus. Our inventory program, Arborscope, was used to catalogue the tree population. Grounds managers, interns, students, and community coordinators used Arborscope to help them delve into the depths of their 19th century arboretum.

Visitors can experience the arboretum's vast array of specimens with the University's digital tree walking tour around Wakehurst. Find the tour and more at www.salve.edu/arboretum.

A fern leaf beech in front of McAuley Hall.

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