**Tick Vectored Diseases: New Research**

**More complex than we thought!**

*by Donald C. Booth, Entomologist*

When the Lyme disease bacteria was discovered in 1981 on Shelter Island, NY., the disease was thought to be caused by a single species of bacteria, *Borrelia burgdorferi*. Recent research indicates that there are many closely-related species (referred to as “genospecies” in recent literature) of bacteria causing Lyme disease. Currently, *Borrelia burgdorferi* is considered to be at least eleven genospecies.

The strain of Lyme that a tick transmits depends on the animals it has fed on and where it lives. A study in the oak/maple forests of New York reported that the important host animals were white-footed mouse, eastern chipmunk, and the short-tailed shrew. The study found that each animal carried different strains of Lyme. In NY, the strains most commonly causing Lyme in humans were from the mice. Gray squirrels are now not considered an important reservoir for the disease.

Ticks can readily be controlled in most landscapes. Consult with a Bartlett Arborist to develop a management plan for your property.

---

**Winter Injuries on Landscape Plants**

*by Bruce R. Fraedrich Ph.D., E. Thomas Smiley Ph.D. and Kelby Fite Ph.D.*

The full effects of the past winter are just now becoming apparent. Low temperatures, heavy snows and ice storms have resulted in a variety of plant damage. Winter injury is also increased in landscape plants weakened by last year’s drought.

**Low Temperature Injuries:** Root systems of plants are very sensitive to low temperature injury. When there is no snow cover, root damage may occur on plants during prolonged cold periods. When low temperatures occur following heavy snowfall, only the branches above the snow line may be affected due to the insulating properties of snow.

**Desiccation of plant tissue, “Winter Drying”:** Broadleaf evergreens are generally affected by transpirational water loss during warm days in winter when the soil is frozen. Water lost through foliage is not replaced from the frozen soil, which results in desiccation of the foliage.

**Stem Splitting, “Frost Cracks”:** Winter frost cracks generally occur on young thin-barked trees. Injury generally results from sudden drops in temperature, from sunny daytime highs to very low nighttime temperatures. This may cause sudden shrinkage of stem tissues or can freeze sap within the cells, resulting in a frost crack. In severe instances, cracks can extend well into the heartwood but usually it is restricted to the outer few inches of wood.

**Breakage from Snow and Ice Accumulation:** Trees and shrubs with poor growth structure are prone to breakage due to the weight of ice and snow. Wood decay can also predispose branches to failure from ice loads. Evergreens that have a large surface area to “hold” snow are especially prone to breakage.

**Deicing Salt Injuries:** The salt (sodium chloride), often used on roads and walkways can cause serious injury to plants. High levels of salt in the soil from pavement runoff can desiccate and kill plant roots. Sodium can be toxic to plants and can destroy soil structure, leading to compaction and elevated soil pH. Salt spray can desiccate plants adjacent to roadways.

**Miscellaneous Injuries:** An early autumn frost may kill late growth as was common last fall because many plants resumed growth when rain followed the summer drought. Late spring frosts also may damage new growth following budbreak. Plants generally recover quickly from these injuries, especially if recently fertilized.

**Animal Injuries:** Deer browse can cause severe injury to foliage and twigs, especially in snowy winters. The lower stem and root collar of plants can be damaged by rabbits and rodents in winter. If the stem is girdled, the plant will often wilt and die suddenly in late spring or early summer.
Mulch to Improve Tree Health
by Tom Smiley Ph.D.

Mulching the soil surface around your trees and shrubs is one of the best treatments you can provide to increase root development and improve tree health. Numerous studies over decades have shown that maintaining a 2 to 4 inch layer of mulch will conserve soil moisture, reduce compaction, increase nutrient levels and moderate soil temperatures. Mulch beds can look good and reduce lawn mowing time.

One of the best materials to use as a mulch is fresh wood chips. Wood chips contain bark, leaves and wood. Because of this mixture, more nutrient are available to the tree. In many areas, a 4 inch layer of wood chips applied in late winter or early spring will decompose to one inch or less by fall. The decomposing chips will work their way into the soil, which will help reduce soil compaction.

Fresh wood chips make an excellent mulch.

Whether you have wood chips, other mulches or ground cover plants growing under your trees, be sure to keep them off of the trunk and buttress roots. When against the trunk, any of these can keep moisture levels high on the bark and promote some fungal pathogens. They can also hide the fruiting structures of root decay fungi. So keep ground cover plants at least a foot away from tree trunks.

Your Arborist Representative may be able to provide you with fresh wood chips. Contact him/her for more information.

Tree Focus-
Appalachian Redbud (Cercis canadensis)
by Greg Paige Ph.D.

One of my favorite spring flowering trees is Cercis canadensis, Eastern Redbud. It is one of the earliest to begin blooming in the spring and it seems to flower forever! It is a hardy small tree, found in plant hardiness zones 4 to 9. In the wild it can reach a height of 20 to 25 feet though usually stays smaller in the urban landscape. It does best in moist, well drained soils however, it is fairly adaptable to different soil types.

‘Appalachian Red’ is a favorite among the many cultivars of this native tree. Though not truly red, this cultivar exhibits standout, flashy bright pink flowers in the spring before the leaves emerge. After a long bloom cycle the characteristic heart-shaped leaves emerge soft green. Fall color is minimal, usually yellow followed by decent winter branch texture and nice bark. Its a wonderful, small, flowering tree worthy of a try in your garden!
There are many ways to help trees and shrubs recover from this harsh winter, and to help prevent that stress from leading to new problems.

**Inspection:** Plants should be inspected in late winter or early spring for symptoms of winter injuries. Large trees should be inspected carefully for broken and cracked branches, frost cracks in the stem and other potentially damaging or hazardous conditions.

**Watch out for signs of disease or insects:** Plants stressed by winter injuries are more susceptible to several insect and disease pests. Continued monitoring through the spring and summer months is also recommended to detect and treat pests.

**Don’t prune too soon:** Avoid heavy pruning on limbs exhibiting brown foliage in late winter. In some instances, these plants will push out new growth from limbs showing winter injuries. Prune out dead twigs and branches after the plant has resumed growth in spring.

**Feed and water:** Fertilization, mulching and irrigation will help promote new growth on winter damaged plants.

**Soil analysis:** This is helpful in assessing specific fertilization treatments.

**Remove salty snow:** To reduce injury from deicing salt, remove salt laden snow from around the trunk prior to the spring thaw. To determine actual salt levels, soil should be analyzed as soon as it thaws.

**Monitor frost cracks:** Cracks in stems and branches usually close without any intervention. Monitor frost cracks closely during the early spring to determine if the cracks close.

Plants should be monitored closely for pests that can cause leaf injury and defoliation. Foliage injuries reduce energy production and further stress plants.
Utilizing Molecular Tests to Aid in Diagnostics  by Andrew Loyd

Recently, the Bartlett Diagnostic Laboratory purchased new equipment that will allow us to conduct molecular analyses, which will enhance our diagnostic ability. Some microorganisms (especially ones that cannot grow in culture) require molecular-based tests for confirmation, such as the phytoplasmas that infect palms, ash, juniper, and elm. Using these molecular methods, we will be able to confidently confirm and validate diagnoses to the genus and species level.

We will use conventional PCR (polymerase chain reaction) and DNA sequencing to identify unknown fungi, bacteria, nematodes, insects, and some viruses. Conventional PCR makes millions of copies of a piece of a gene from an unknown organism. The PCR product is then sequenced, which tells us the exact composition for that segment of the targeted gene. The sequence will be a unique series of nucleotides (building blocks of DNA), which can act like a barcode. We can search extensive DNA libraries for series of nucleotides that match our unknown, revealing the organism’s identity. Several databases exist, some specific and some generic, but all are curated and contributed to by the scientific community.

From a diagnostic standpoint, molecular methods are yet another great tool for us to accurately identify the possible cause of a plant problem. As our world and work become more scientifically driven, it is important to keep up with the latest developments, and this upgrade of our lab’s capabilities will allow us to provide our clients with the most advanced diagnostic services in the industry.