

## It's the Things You Don't See

Eric H. Hoyer

When most people think of problems affecting trees, insects and diseases come to mind. We are used to seeing visible critters on the leaves or elsewhere such as caterpillars, beetles, aphids, or signs of disease such as fungal conks or oozing from the trunk. In addition, many of us have heard or read about the “killer insects and diseases” such as citrus greening, red bay decline, or emerald ash borer. These problems have garnered widespread publicity (as they should!) and have been responsible for the death of millions of trees in Florida and elsewhere. (Note: the emerald ash borer is not yet in Florida but most agree it is just a matter of time).

However, in my 40 years of experience, I have come to suspect that, more often than not, it is non-living or abiotic factors that often result in tree decline or death. These factors are often manifested by declining or yellowing foliage, dieback of the branches, or a very rapid decline and death. I will discuss several of these abiotic factors that I have encountered over the years.

Lightning – Although it may seem obvious, lightning damage is not always easy to determine. Approximately 25 percent of the time, a lightning strike leaves no outward signs on the tree. When this occurs, I often “diagnose” a lightning strike through the process of elimination. Death by lightning is often rapid and may occur within several weeks of the actual strike. Very few other problems cause such a rapid decline. Asking questions of the homeowner often

verifies that there was a bad storm with lightning “a few weeks ago”. And, most of the time, the leaves turn yellow all at once and then quickly brown. I suspect this is what killed a large redcedar in my yard last year. Although it was during the winter, we had had several lightning storms. The tree was yellow and quickly browned and died within weeks. No other cedar trees in the yard had any problems and no insects were visible on this or the other redcedars. There was no lightning scar on the tree but, since none of the other nearby cedars (one within 15-20 feet) were affected, I suspect lightning was the killer.

***“Approximately 25 percent of the time, a lightning strike leaves no outward signs on the tree.”***

pH Imbalance – In a previous article, I had mentioned that nutrients are available to a tree only in solution; therefore, the tree receives its nutrients through the roots as it absorbs water from the soil. If certain nutrients are deficient, the tree will show outward signs such as yellowing, twisted leaves, stunted growth, etc. Most nutrients are available within a fairly modest pH range – approximately 5.5 to 7.5. If the pH falls above or below this range, many nutrients become unavailable. Many things can contribute to raising or lowering soil pH. Frequent use of fertilizers with ammonium (NH<sub>4</sub>) can cause acidification (lowering of the pH) of the soil. Also, fertilizers with high sulfur content can cause acidification. Golf courses often realize the opposite

problem – a raising of the pH from repeated irrigating with ground water. I have often witnessed yellowing needles on pine trees on golf courses due to long-term application of ground water for irrigation.

Root Damage – One of the most common problems I encounter is damage to the roots. This can be a result of soil compaction from driving or parking over roots over an extended period of time, damage due to construction activities such as soil trenching or tearing the roots, placement of fill material over roots, lowering of the grade during construction, and other similar activities. Soil compaction reduces or eliminates the pore spaces within the soil where water and oxygen are stored. Thus, the roots become desiccated from lack of water or starve due to lack of oxygen and minerals. Fill material over the natural grade creates a similar situation of reducing oxygen and water availability to the roots. Tearing roots due to construction or grade changes reduces the ability of the roots to take up water and nutrients.



Usually root damage manifests itself through a decline in the canopy of the tree. If the damage is limited to one side of the tree, the canopy will decline on that side. This is often a way to diagnose root damage. If root damage is severe enough, the tree can lose its ability to anchor itself and can fail during a wind or rain event.

Root Damage from Septic Tank Cleanout – A specific type of root damage can sometimes be traced to septic tank cleanout when pressurized air is used. Such was a situation several years ago when I noticed trees declining on one side of the canopy. Trees in one part of the yard were declining on the left side and other trees elsewhere in the yard were declining on the right side. I inquired if a septic tank was located between these trees and learned that the homeowner had recently paid a company to clean out his septic tank using pressurized air. Roots which had encroached into the septic tank were killed resulting in some dieback in the canopy on the septic tank side of the tree.

Salt Damage – Salt accumulation in the soil can cause root damage due to direct damage and/or desiccation of the roots. Salt buildup can also alter the soil pH. Salt accumulation can result from excessive use of fertilizers with high salt content. Most fertilizer labels will indicate the salt index which can range from single digits to over 100. While there is no “magic number” which is right or wrong, it is a good idea to use fertilizers with a lower salt index to prevent salt accumulation in the soil.

Another source of salt damage can occur from runoff from water treatment systems which use salt. I witnessed some declining redcedar trees which were directly in the path of a nearby water treatment system overflow hose. Over time, the accumulation of salts within the soil near these trees caused root damage and a subsequent yellowing of the branches on the side of the trees nearer the water treatment system.

Many other abiotic factors can also cause tree damage or death. These include too much or too little water, herbicide damage, lack of sunlight or too much sunlight, excessive heat or cold, and even fire. Any non-living agent is considered to be abiotic. These are often difficult to diagnose and there can sometimes be more than one factor making diagnosis of tree decline challenging.



Eric is a Certified Arborist, a Certified Forester, a Registered Consulting Arborist, and a Qualified Tree Risk Assessor with Natural Resource Planning Services, Inc. He can be contacted at [erich@nrpsforesters.com](mailto:erich@nrpsforesters.com).