

Abiotic Tree Problems

by Russ Thompson, Certified Arborist

Every year, I receive numerous phone calls from clients stating that a pine tree is turning brown or branches of a shade tree are dying. Of course, they frequently think that some exotic pest is devouring their landscape and my attempts to calm them down are usually futile. So, I tell them not to worry and make an appointment to meet with them as soon as possible. More often than not, my inspection of the tree reveals that the problem isn't insect or disease related, but a cultural and/or environmental issue.



I can't stress to you enough that when investigating landscape plant problems there is no "slam dunk" and you must always determine whether the cause is **Biotic** (living) or **Abiotic** (non-living).

Biotic factors include pathogens such as insects, mites, fungi, bacteria, and viruses. If left untreated, these pathogens will likely spread from one plant to the next. Abiotic problems include temperature extremes, water, poor soil conditions, construction, drought, chemical damage, transplant shock, and mechanical injuries. These non-living maladies are not transmitted from one plant to another.

Now, determining whether the problem is living or non-living sounds easy enough. However, this is not always the case, as many biotic problems are secondary. In other words, insects and/or diseases have a tendency to attack an already stressed plant. Therefore, an insect may be present but not necessarily the cause of decline. Additionally, many biotic and abiotic problems are similar in appearance. Mechanical damage, due to a wire tie being left on too long, can be easily confused with water stress. Poor leaf color and/or stunted growth, from an over application of herbicide, could be diagnosed as a need for fertilizer and so on.

Here are some of the more common abiotic disorders I've encountered when hunting for that exotic pest:

Leaf Scorch: High temperatures and drying winds lead to a rapid loss of water, especially in broad leaf deciduous trees such as Sycamore, causing the leaf margins to turn yellow or brown and fall prematurely. This problem can be avoided by planting susceptible trees in locations protected from long exposure to sun and/or wind.

Drought: Symptoms of drought appear when loss of moisture through the leaves exceeds uptake of water by the roots. This is caused by inadequate soil moisture during the warmer times of the year. The symptoms usually include wilting, off-color foliage, twig and branch dieback, and the death of fine feeder roots. The loss of these roots can lead to complete failure as uptake of water is prevented even if moisture is restored to the soil. Keep in mind that a lack of water will usually cause the tree to dieback from the top down and from the outside in.

Over watering: The roots of plants in waterlogged soils are usually killed by a lack of oxygen; and roots require almost as much oxygen as they do water. As excessive water is applied, the oxygen is displaced which leads to suffocation of the plant. This is a common problem in heavy clay soils that have poor drainage. Symptoms of oxygen deficiency closely resemble those of drought injury. When the roots suffocate and die off, the upper portion of the plant will appear as though there is a lack of water. Most people, especially in the desert southwest, will add more water to the wilted plant which only compounds the problem.

Nutrient Deficiency: Certain nutrients nitrogen, phosphorous and potassium being the most important, are needed for proper plant development. Other “micro nutrients” like iron, zinc, and manganese are also needed to maintain good overall health and green color. The symptoms of nutrient deficiencies vary from chlorotic leaves, to stunted growth, to plant death. These symptoms can easily be misdiagnosed as a disease problem. It is always best to submit a soil sample to the lab for a true analysis and recommendations.

Herbicide Injury: Herbicides, when improperly applied, can easily damage a tree. Leaves and stems will be distorted, stunted, cupped, and/or discolored. Most established trees will survive a minor contamination, but development will be slowed. Always apply chemicals according to manufacturers’ recommendations. A great deal of research goes into their development and in most cases, “more is not better.”

Mechanical Damage: Usually caused by lawn mowers and string trimmers banging or ripping the bark off a plant and damaging the cambium layer. As a result, the sap flow between the roots and the leaves, twigs, and branches is disrupted leading to a scattered dieback throughout the tree.



As you can see, there are numerous non-living problems that can lead to plant failure in the landscape. To properly diagnose these problems, one should have a strong educational background, field experience, problem solving abilities, and follow a step-by-step diagnostic strategy.

- 1- Identify the Plant - from proper identification, you can get an understanding of its growth characteristics, cultural requirements, and common problems.
- 2- Identify the Symptoms - the symptom is how the plant responds to the problem ie. discolored leaves, abnormal growth, etc.
- 3- Inspect the Whole Plant - inspect the leaves, branches, trunk and roots, and not just the injured area.
- 4- Inspect the Site - examine the plant’s environment and look for conditions that may have contributed to the injury.
- 5- Look for Patterns - are symptoms uniform throughout the plant, scattered, on one side only? Are all the plants affected or only one?
- 6- Investigate the Maintenance History - collect as much information as possible. When was it planted? Has it been fertilized? How is it irrigated? etc.
- 7- Compile the Information - once all information has been gathered, identify all possible causes of the problem.
- 8- Test Likely Causes - If necessary, submit tissue and/or soil samples to the lab.

Finally, take before and after photographs. This will help you determine whether or not treatments are working.

Oh, by the way, please let me know if you ever encounter that exotic pest!