

Trees regularly face adverse environmental conditions over their lifetime, especially during the summers. Prolonged rainless spells and high temperatures place severe stress on trees. Add to that disturbances to the unseen root system through various construction and other human activities, and you have trees declining and/or dying.

When a tree starts having a problem, it is easy to suspect a disease. The oak wilt problem in Central Texas made news in the 90s' you tend to immediately wonder if their sick trees have a terrible disease. In most cases, when an oak or other type of tree looks unhealthy, it is more likely caused by stress or injury rather than a lethal disease.

A common early symptom of stress or injury is *marginal leaf burn* - leaves fringed by dead tissue. Diseases seldom cause marginal leaf burn. Leaf diseases usually show up as small or large dead spots or areas scattered about the leaf. Leaf burn occurs at the leaf tip or along the leaf margins because salts (plant nutrients) accumulate in this area. Anything that causes the plant to pump insufficient water can result in a toxic burn to this tissue because it contains the highest level of salt. This can especially be a problem with young, newly transplanted trees.

An important fact to understand while considering trees is that the root system of a tree is not a mirror image of the trunk and branches. Most roots are shallow, in the upper 12 to 18 inches of the soil, especially the finer roots doing the critical work of taking up water and nutrients. While there are also deeper roots, these mostly provide support and stability to the tree. The root system of a tree may extend outward 2 to 3 times the width of the branches.

Stress symptoms range from leaf burn, a thinning canopy, limbs dying, to death of the tree. Some of the most common causes of stress in trees are:

* **Drought or insufficient water:** This is the most obvious cause of stress in trees. It is aggravated by summer heat. Large established trees can tolerate

short periods of drought, but young or newly planted trees frequently show significant signs of stress. Recurring summer droughts can severely impact even old, long established trees.

Often folks will say, "My trees shouldn't look like this. I water them." Consider this example. A 7-year-old pecan tree in a well-drained soil needs (takes up) about 70 gallons of water a week in July and August to maintain its vigor and health. Just think of how much more a 70-year-old tree with a much greater root system might need! Water that is adequate for lawn grasses is not sufficient for actively growing trees. During periods of drought, occasionally supplement with deep watering at the drip line (the ends of the branches) of trees, not near the trunk.

* **Excess water:** Just as not enough water can injure tree roots, so can too much water. Tree roots require oxygen to function properly. This oxygen is forced out of the root zone when the soil is saturated with water. Tree roots in waterlogged soils stop growing, minerals are not absorbed, leaves then turn yellow and remain small, and finally roots begin to die. It can take a long time for a root system that has been seriously injured to regenerate.

* **Heat:** High temperatures cause trees to pump more water. As temperatures approach 100 degrees, water loss (transpiration) by some trees can equal or exceed the ability of the roots to supply water, even when soil is adequately moist.

* **Construction injury:** Quite frequently trees left on a lot during construction or remodeling of homes are injured or stressed from various construction activities. Direct loss of roots from trenching for utility and sprinkler lines, and excavating for building foundations, walks and drives have both immediate and extended impact on trees.

More subtle injuries occur when soil is removed from the root zone, and even worse when soil is added over the root zone. Roots may slowly suffocate from lack of oxygen due to added soil resulting in a gradual decline of trees over

several years.

Heavy construction equipment and vehicles moving over the root zone compacts the soil, especially when the soil is wet, reducing available oxygen to the roots. Also, alterations of water drainage patterns on the property or in the neighborhood may result in more or less water than usual moving across root zones.

Protection of only the trunks or a small zone surrounding the trunks of trees is not adequate, since the sensitive tree roots can easily exist over twice the distance of the spread of the branches.

* **Transplant shock:** Newly planted trees, especially species such as pecan trees that are planted with bare roots, or very large trees with large root balls, are vulnerable to transplanting shock. Symptoms can include poor growth, burn along the leaf margins, trunk bleeding, twig dieback and sometimes death.

Transplant shock can result from a variety of problems, such as damaged nursery stock, insufficient pruning at transplanting, inadequate or too much water, excessive grass and weed competition, or poor soil conditions. It is possible to reverse transplant shock, but it might require years of tender, loving care.

* **Chemical damage:** Many cases of tree injury or death result from the careless application of weed killers. Marginal leaf burn, defoliation, limb dieback and tree death are among the symptoms that some of these chemicals cause. Damage is often evident on the side of the tree where the herbicide was applied.

Remember that tree roots might extend well beyond the width of the tree canopy, and can easily absorb root-active chemicals. Read and follow label directions and keep soil-active herbicides away from the root zone of trees.

* **Un-adapted species:** Trees, like other plants, have specific climate and soil requirements. People might fail to consider this when selecting trees, and un-adapted species never perform to expectations. The most practical solution if you are having problems with an un-adapted tree is to remove it and replace it with a native or type known to thrive in our region. Leave Colorado blue spruces in Colorado!

* **Stress-related pests.** Trees under stress are more prone to pests such as borers and some root and canker diseases.