Cooperative Extension University of California Ventura County

# Landscape Notes

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## CATASTROPHIC TREE DAMAGE FROM WIND

Wind is perhaps the most devastating damaging force to large shade trees that we encounter in landscapes. Not only are trees harmed by wind and storm damage but there can also be severe power outages and property damage. This year the gulf coast states have been pounded by hurricanes. The imagery of fallen palm and shade trees from Hurricane Ivan is intense. Here in the west, we usually do not worry about wind storms. However, Wind storms and hurricanes can pop up in the most unusual places such as the hurricane that devastated England in 1987 (Graham, 1990). In Southern California our east winds or Santa Ana winds can be particularly devastating because of their intensity and because they flow counter to the onshore direction that trees build reaction wood to resist. Fall is the typical season for east winds and so this article gleans what we have learned from others about dealing with wind damage.

Ideally, pre-storm planning for the disastrous effects of hurricanes and wind storms will prevent a majority of problems (Page, 1990). This requires having contractors approved for emergency work and having an implementation plan to deal with disasters. For Californians this may seem extreme, but we have much to lose and catastrophic storm events do occur here causing millions of dollars damage.

One way to limit damage to trees is to plant trees that resist damage or are less prone to failure than others while also removing weak wooded or easily damaged individuals from the landscape. In the late 1980's, a tree failure report program was established in California to better understand the failure patterns of trees (Costello and Berry, 1991). Although we now have data on frequent failing species such as Monterey Pine, (Edberg et al., 1994) Most of the documented failures of Monterey pine were due to branch defects not storm damage. This implies that the defects could have been prevented or corrected with pruning prior to failure or that trees deemed hazardous due to poor branch attachments could have been removed.

In the Hurricane of 1987, England lost over fifteen million trees to storm damage. A similar weather event had not been recorded since 1703 (Graham, 1990). Several lessons were learned in England. Felling of large trees was due to severe water logging of the soils prior to the onset of winds; mature full canopied trees were at risk due to their extreme size and lack of upper canopy pruning. Large, over-mature trees harboring extensive decay, were easily felled in the wind. When tree root systems held, their branches were sheared leaving disfigured trunks.

How can we prepare for storm losses of shade trees? Tree selection is one important way. Duryea et al., (1996), showed that in Florida landscapes stricken by Hurricane Andrew, more native trees survived than exotics.

Another way to manage storm damage in broad leaved trees is with pruning. Broadleaf trees pruned prior to Hurricane Andrew survived better than unpruned ones. The same observation was made for Hurricane Hugo—Trees thinned before Hugo hit South Carolina in 1989 sustained less damage than unpruned trees (Ehinger, 1991). However, pruning does not seem to effect failure in hurricane damaged palms. Palms were however cited as good choices for planting in hurricane wind areas. Duryea and others agree with Graham that mature trees of the same species are more likely to fail than smaller trees.

Unpredictability is the nature of storms both in the gulf coast states and here in California. We can't immediately prepare for the sudden onset of Santa Ana winds, rather it is recommended that we keep our trees on a regular program of planned maintenance which includes crown cleaning or thinning. Of course this has

to be reconciled with species needs, tree location and the size or potential of the tree to cause damage should it fail. Some species such as our native Coast Live Oak require little pruning to survive winds. All too often the limbs that fail on oaks are the result of prior pruning mistakes and architectural defects with the branches. High quality pruning, crown restoration pruning (for prior pruning mistakes) and more frequent pruning of smaller branches will assure that a tree matures into a stately specimen instead of a monster hazard tree that is susceptible to wind damage.

**References**

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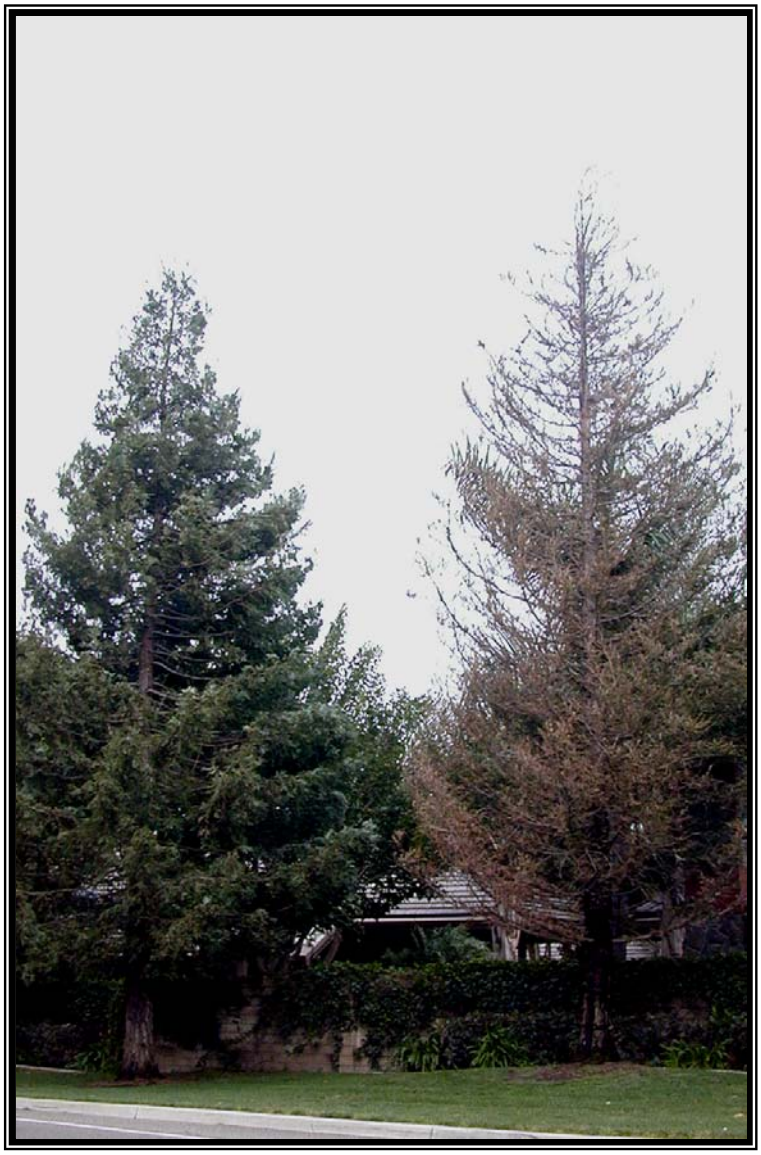
## WHAT'S UP WITH THE REDWOODS?



In the last two years redwoods (*Sequoia sempervirens*) or the coast redwood have declined in epidemic proportion in Ventura County. The effect has been so dramatic that many people suspect a new pathogen or disease outbreak. With the confounding fact that the sudden oak death pathogen (*Phytophthora ramorum*) has been found to cause disease in redwoods, people are more than ever alarmed about the apparent lack of health in their redwood trees. The "epidemic" is not limited to Ventura County; Farm Advisors all over California are seeing more and more problems on redwood. In many areas, trees have died back entirely to the main trunk or have died completely (see figure).

Although the problem with redwoods appears to be epidemic, I believe that the problems are not caused by a single pathogen, thus this is not an epidemic. There are several fungal pathogens that cause redwoods to develop brown foliage or may even kill the tree; however, these are not new to California landscapes. The other possibility is that there are abiotic causes of the decline that some redwoods are experiencing. Salinity, drought and specific ion toxicity are all problematic for redwoods.

The Coast Redwood is a forest tree that grows along the coasts of central and northern California. In this environment the trees are shaded by each other, experience significant cooling from fog and moisture from fog drip and reside in areas of high rainfall. In their native forests, redwoods grow with copious amounts of forest litter over their roots. Redwoods are adapted to a cool environment with relatively pure water supplied throughout the year.

Like most plants, redwoods are adaptable and can be grown in the hot inland valleys away from their coastal native range. Although redwood forests may experience a dry summer, coastal fog drip and onshore flows of cool air help to maintain moisture on the forest floor. Dense canopies also assure that root systems are shaded and cool.

The coast redwood is one of the most planted landscape trees in Bakersfield California (Karlik, Personal Communication). They are planted extensively in the Sacramento Valley and all along Interstate highway 5. Redwoods are planted all over Southern California both along the coast and inland. Since specimens of this tree can be found in good health in all these areas, we must assume that the tree is fairly adaptable. Not curiously, many of the redwoods that appear diseased are occurring in hot inland valleys. Just because a plant can be grown outside the climate it is adapted to, does not mean that it will always grow well. In fact, the less adapted the tree, the more problems it will encounter as we try to cultivate it. Still some redwoods look good in Southern California and some don't. Why? I believe that the cultural practices we use to maintain the trees will make the difference in how they look and grow in our landscapes.

Cultural Practices that harm redwoods are: pruning, south facing planting aspect, low soil moisture levels, competing plant cover and lack of mulch. Often redwoods are inter-planted with adjacent shrub or ground cover plantings. These plantings compete with the trees for moisture and open up the trunk area to sunlight and higher temperatures. To maintain space for adjacent plants the tree are often pruned up, further exposing their trunks to full sunlight and increased temperatures. Another common planting problem is placing trees in turfgrass areas. Instead of leaving the canopy to the ground, limbs are removed pruned to allow for mowing etc. In my own survey of redwood problems I have always found unpruned trees to generally be in a better state of vigor and health than skirt pruned redwoods. The coast redwood prefers to have a full canopy right to the ground and its own thick mulch layer surrounding the trunk. When redwoods are planted on south facing slopes, they suffer. When planted behind walls (north side) or on the north sides of slopes they luxuriate. Redwoods that are planted with copious layers of mulch seem to do better than unmulched or trees planted up to their trunks with turfgrass. The best situation for redwoods is mulched, unpruned, with shade on the lower branches or trunk. When given these cultural advantages the trees can thrive even in hot inland valleys.
Redwoods are surface rooted. Most of their roots occur in the top 12 inches of soil. Thus another very harmful condition for redwoods is compaction. Foot traffic can be devastating to roots and result in a declining tree. Preservation of the mulch layer, reorientation of footpaths or walkways and allowing the presence of low branches will allow roots to grow in uncompacted soils. Coast redwood also has an extensive list of fungi that attack it. Perhaps the most common is *Botryosphaeria* canker which has an imperfect stage called *Dothiorella*. This causes a blight or twig dieback that is common all over Southern California. *Dothiorella* is also a pathogen of avocado and many other plants and has been particularly active in the last several drought years. *Dothiorella*, like many canker and twig fungi is exacerbated by stress (drought conditions). Therefore, it is not uncommon to find drought stressed trees also suffering from this disease. However, in the same vicinity it is usually possible to find well cared for trees that do not have the disease. As in many diseases, predisposition is necessary for full blown devastation. Drought has been a very important predisposing factor for redwoods in the last several years.

Another disease we sometimes see in well irrigated landscapes is root rot caused by *Phytophthora cinnamomi*. In this case, the entire tree turns brown and does not recover. Sometimes this is confused with a massive *Dothiorella* outbreak where every twig is blighted. The difference is that *Phytophthora* infected trees usually do not recover; by the time the tree turns brown it is usually dead. Also, while root rot is associated with soaking wet soils, twig blight is often found on trees growing under drought conditions.

Another pathogen that is occasionally seen in coast redwood is *Armillaria mellea* the pathogen causing oak root rot and root rot of many other ornamental trees. Although not as common on redwood, I have seen it several times on trees that were stressed, either from over-watering or drought. It is easily detected by the white mycelium found growing under the bark.

Redwoods are forest trees. We have cultivated them to be used in non-forest landscapes, as street and park trees and as specimens. These conditions are not always favorable to their growth or long term establishment. In cultivating redwoods it is important to consider their origin as a forest tree with shade, cool root systems, abundant mulch, and continual moisture that is relatively salinity free. If we can create some of these conditions in the landscape, redwood culture and disease management will be much less problematic.

**Reference:**

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