

## What's up with the redwoods?

James Downer

In the last two years coast redwoods (*Sequoia sempervirens*) 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.

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 for 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, rainfall is ample and the trees experience significant cooling from summer fog. Moreover, they receive additional moisture from fog drip. In their native forests, redwoods are shaded by each other and 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 commonly 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 can harm redwoods include: 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 planting redwoods in turf areas. Instead of leaving the canopy to the ground, lower limbs are pruned to allow access 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. 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 hot, south facing slopes, they also suffer. When planted behind walls (north side) or on the north sides of slopes they usually thrive. Redwoods that are

planted with copious layers of mulch seem to do better than unmulched trees or those growing with turf planted up to their trunks. Redwoods in the landscape appear to do best when their lower laterals are left intact, the lower branches and trunk are shaded and their root zones are mulched. 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 with 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 for use 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 supply relatively free of salinity. If we can create some of these conditions in the landscape, redwood culture and disease management will be much less problematic.

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Reference:

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