

## REDWOOD CANKER

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Causal agents: *Botryosphaeria dothedia*, *Seridium* species and *Cytospora* canker

Hosts: Coast Redwood, Giant Sequoia, incense cedar, Japanese cryptomeria, Chamercyparis (Port Orford cedar), dawn redwood, other conifers and hardwoods.

**Symptoms:** Scattered dieback of twigs and branches, occasional top dieback (up to 1/3 of crown), infected branches often exude pitch droplets. Look for reddish-brown 'flags' (dead branches) as an indicator. Cankers range from well-defined flattened or depressed dead areas in the bark surrounded by raised 'healthy' callus tissue (woundwood), or spreading lesions without raised margins. Wood beneath cankers is discolored. Smaller branches are often quickly girdled and killed by the pathogen. Trunk cankers are slower to develop, and less likely to girdle the trunk. Branch cankers can spread to the trunk.

**Biology:** These pathogens have been implicated in the recent increase in dieback seen in Northern California redwoods, particularly those planted outside their normal range and those subject to unfavorable growing conditions, e.g., dry soil, compacted soil, wet soils overcrowding, etc. By and large, these canker-causing fungi are fairly specific to trees that are exposed to environmental stress or weakened by site disturbance. Fungal fruiting bodies are produced in the killed tissue. Although spores can be produced throughout the year, most are released from the fruiting bodies during wet weather. Seasonal rain splash is responsible for dispersing spores within trees and to neighboring trees. Other spores may be dispersed by wind during the growing season. Infection commonly occurs through wounds, lenticels, growth cracks in the bark, sunburned or injured tissue. Healthy trees and tissue seem to resist infection.

- *Botryosphaeria dothidia* is an opportunistic pathogen, commonly attacking trees that are predisposed by environmental stress. The host range is quite broad and its distribution is worldwide. This organism is often associated with perennial cankers that can reinfect other parts of the tree. Rainwater and wind disperse spores.
- *Seridium* spp. is another opportunistic pathogen favoring stressed trees. It is typically associated with branch and top dieback, elliptical cankers, bleeding, and discolored wood. Spore production and Disease spread occur predominantly during wet weather. Smaller branches with cankers serve as an inoculum source for disease buildup.
- *Cytospora* canker: is similar to the above in that it is also an opportunistic pathogen favoring stressed trees. This organism can colonize dead and dying branches, which can serve as source of spores for future disease spread. Fruiting bodies extrude orange, thread-like spore masses when wet. These spores are then dispersed by rainwater. Other spores can be dispersed by wind. Moist conditions are needed for germination.

### Management:

- In natural stands and planted groves, thin – reduce crowding and competition through selective removal. Ideal spacing for redwoods is about one foot of spacing for each inch of trunk diameter.
- For ornamental trees, maintain health and vigor by providing summer irrigation. Mulch the soil beneath trees to conserve soil moisture.

- Avoid planting redwood outside their normal range. Redwoods require ample summer irrigation and good drainage. They do poorly in site where the soil is compacted, poorly drained or over-irrigated (saturated).
- Prune out and dispose of infected branches and dead tops. Prune infected branches close to the trunk so that no stubs remain.
- Chemical control for this 'disorder' has not been investigated and does not appear to be feasible.
- Improving health is far and away the most effective strategy to prevent or manage this disease. Sanitation, the removal and disposal of infected branches, is also important measure to minimize 'within' tree disease spread.
- Fertilization is not recommended unless there is a know nutrient deficiency. The addition of nitrogen based fertilizer has been implicated in exacerbating disease problems.