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Burned Oaks: Which Ones Will Survive?

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Each year fires burn thousands of acres where the predominant vegetation is oak trees and grass. Where fires burn intensely, trees can be totally consumed. In other places, leaves on trees can be scorched, but the trees remain standing. Where fires burn only the surface vegetation, many trees appear relatively unaffected, except for some blackening of the bark near the ground. The question arises, which of these trees will survive?

This publication provides information about how to assess fire damage to burned oak trees and provides guidelines for determining whether trees should be cut down or saved. Of the major oaks in California, this publication applies primarily to blue oak, interior live oak, and black oak, although some of the information cited also addresses coast live oak, canyon live oak, and California scrub oak (see Plumb and Gomez 1983). To identify what oak tree you have on your property, see the University of California Oak Woodland Management Web site, http://ucanr.org/sites/oak_range.

Unfortunately, it is difficult to predict the degree of damage accurately from the outward appearance of trees. The factors discussed below influence how much injury has occurred.

Stem Damage

The most important variable influencing the degree of injury is whether the cambium, the tissue directly beneath the bark, has been killed (fig. 1). If it has been killed all the way around the stem, the top of the tree will eventually die, though this may take several years. However, even if a small portion of the circumference of the cambium remains alive (as little as 10%), the tree will likely survive, though the overall vigor could be reduced considerably.

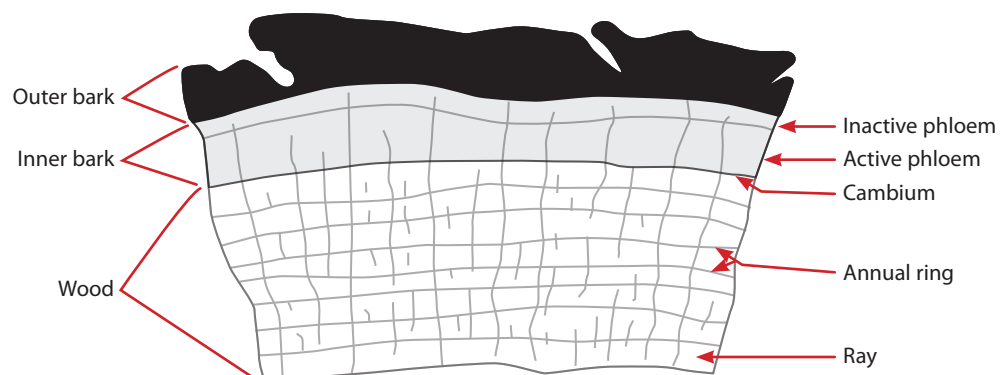


Figure 1. The parts of an oak stem.

Some species of oaks have thicker bark, which helps protect their cambium from injury. Since interior live oaks generally have thinner bark than either blue or black oaks, their stems are more sensitive to heat.

Tree size also influences the degree of susceptibility to fire. Since larger trees have thicker bark, they are more resistant to fire damage. Therefore, smaller trees exposed to the same intensity of fire are more likely to be killed or severely damaged.

How do you tell whether the cambium of a tree has been killed? There is a greater chance of lethal cambium damage if the bark has been severely blackened, and charring has reduced bark thickness. Aspects of bark charring to consider include height of char on the trunk of the tree, the amount of bark consumed, and the percentage of circumference of the bole, or trunk, charred. If the bark has been cracked or separated from the wood, the cambium is almost certainly dead. One can determine the degree of damage most accurately, however, by actually cutting away a portion of the bark to observe the cambium beneath. If the cambium is dark or yellowish, it is probably dead (fig. 2). If it is white or pink, on the other hand, it is most likely alive (fig. 3). Since this injury may take some time to show up, assessments of cambium injury should be made several weeks after the fire has occurred.

If the bark has long vertical cracks up the trunk, the survival is limited as the cambium is exposed (fig 4).

Leaf Injury

In general, leaf injury is much less damaging to the tree than stem injury. Trees that have had most or all of their foliage burned off will likely recover if the cambium is intact (fig. 5). Both deciduous and live oaks produce some new foliage each year. Thus, if the only apparent damage to the trees is scorched leaves, the tree will likely leaf out and grow normally next spring.



Figure 2. Dead cambium. *Photo: G. Nader.*



Figure 3. Live cambium. *Photo: G. Nader.*



Figure 4. Cracked bark. *Photo: G. Nader.*

Recommendations for Harvesting Fire-Damaged Trees

As mentioned previously, it is difficult to accurately assess the degree of fire damage or to make general recommendations based on what the tree looks like. If you have a valuable tree, consult a professional forester or arborist to help determine the degree of injury. Also, the references at the end of this publication can provide further detail on which to base a decision. If possible, it is also desirable to let at least one, and preferably three, growing seasons pass before making a final decision to cut large, valuable trees whose crown survival is uncertain.

Below are some general recommendations about which trees to cut and which trees to save adapted from a USDA publication on postfire management of five southern California Oaks (Plumb and Gomez 1983).

Cut Trees If

- They are less than 6 inches (15 to 30 cm) in diameter and have been scorched all the way around the base.
- They are 6 to 12 inches in diameter and have continuous charring around the base, with reductions in bark thickness.



Figure 5. Trees with burned foliage may recover if the cambium is intact. *Photo: G. Nader*



- They are greater than 12 inches in diameter and have continuous charring, pronounced reductions in bark thickness, and occasional exposure of underlying wood.
- They have basal wounds on 50 percent or more of their trunks and are located in residential or recreational areas that present a mechanical risk (where they could fall on people or structures).

Leave Trees If

- They have lost all of their foliage but sustained only minor stem damage.
- They have only spotty scorching around their base, with at least 10 percent of their cambium alive.
- They are over 12 inches in diameter and are scorched all the way around their base but have no reduction in bark thickness.

Sprouting from Killed Trees

Even if the trunks of trees have been killed and they are cut down, many oaks will sprout from their stumps. Sprouting is especially vigorous for live oaks and on almost all other oak species as well. In the spring, sprouts originating from the stump or roots will start to grow. There can eventually grow into mature trees. Sprouts generally grow much faster than shoots originating from acorns and will often produce multiple-stem trees. If the sprouts are pruned back to one or two dominant ones, these will grow more rapidly and the tendency for multiple branching will be reduced.

References

- Horney, M., R. B. Standiford, D. McCreary, J. Tecklin, and R. Richards. 2002. Effects of wildfire on blue oak in the northern Sacramento Valley. In Proceedings of the Fifth Symposium on Oak Woodland: Oaks in California's Changing Landscape. USDA Forest Service General Technical Report PSW-GTR-184, pp. 261-267. USFS Web site, http://www.fs.fed.us/psw/publications/documents/psw_gtr184/psw_gtr184_024_Horney.pdf.
- Plumb T. R., and A. P. Gomez. 1983. Five Southern California oaks: Identification and post-fire management. Pacific Southwest Forest and Range Experiment Station General Technical Report PSW-71.

For Further Information

For more information about fire and California oaks in general, visit the University of California Oak Woodland Management Web site at http://ucanr.org/sites/oak_range/.

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