

Frequently Asked Questions (FAQ's) About Oaks

By Bruce W. Hagen

Oak trees are valued for their natural beauty, longevity, property value enhancement and importance to wildlife and the environment. In general, the public recognizes these values and favors oak tree preservation. Despite this appreciation for oaks, developers and homeowners often unwittingly damage oaks during excavation, construction and/or landscaping. Although tough and resilient, oak trees can be severely injured or even killed by construction-related injuries and by changes in soil aeration and moisture levels.

The growing requirements and environmental tolerances of California native oaks must be recognized to incorporate existing oaks into the landscape without jeopardizing their health. Favorable growing conditions must be maintained through careful plant selection, minimal disturbance, and judicious irrigation.

As an urban forester with CDF, I am frequently called upon to provide technical assistance to homeowners, landowners, arborists, developers, and local planning agencies about oak trees. Most of the questions I get are regarding oak tree preservation, maintaining oaks in the landscape and pest problems. Following are some examples of the more common concerns that people have about oaks:

Q: *I want to build near some oaks on my property, but I'm concerned that I might damage them. Is my concern justified?*

A: To avoid unnecessary damage during construction and landscaping around oaks, it's important to understand what tree roots do, where they grow, and what they need to function. Roots support and anchor the tree, absorb water and minerals, store energy and produce chemicals that help to regulate growth. They grow where oxygen, water and minerals are most abundant. However, when any of these factors are deficient or in excess, root function and, ultimately, tree health may suffer.

The roots of mature oaks as well as many other tree species grow predominantly within the upper three feet of soil. They branch and rebranch many times forming an extensive network of absorptive tissue with an immense surface area. Roots often extend outward two to three times the radius of the dripline (the periphery of the foliage). The depth, spread and degree of branching, however, are greatly influenced by factors such as soil texture (relative proportion of sand, silt and clay particles), structure (arrangement of the soil particles into clumps (aggregates) creating greater porosity), soil depth, soil fertility and available moisture. Most of the roots responsible for the uptake of water and minerals are concentrated within 12 inches of the surface. Few roots grow deeper than about five feet, although some can be found growing much deeper in areas with deep, medium to coarse soils, and in fractured rock. Much of the root system is contained within the dripline, although roots often radiate well beyond. Thus, excavation for a building site, foundation, or retaining wall within the dripline can easily sever

roots.

The extent of root loss usually depends on the proximity to the trunk and depth of excavation. Other factors may be involved. In addition, oak roots, like those of most trees, are extremely sensitive to environmental change (soil compaction, raised soil grade, changed drainage patterns, increased moisture, and paving). These changes reduce the soil oxygen, impair root function or create conditions more favorable to root pathogens.

Symptoms of moderate to severe root loss are similar to those caused by drought stress: leaf-scorch, leaf-drop, slow growth, dieback and death. Recovery depends on severity, follow up treatment, time of year injury occurred, and health of the tree before injury. The only practical treatment for oaks that have sustained moderate to severe root loss is irrigation. This will help to reduce drought stress and speed recovery. Pruning foliage to compensate for root loss is generally not recommended.

Q: *My builder wants to dispose of the excess excavation soil under and around some of the oaks on my property. He assures me that it won't do any harm, but I'm not convinced. What should I do?*

A: Raising the grade over the existing roots of a tree is particularly harmful. The addition of fill-soil restricts air movement to the roots. Root growth and function suffer when the level of oxygen around the roots decreases below a certain concentration. In severe cases, the roots suffocate and die. Raising the grade can also impede drainage and water penetration. It is possible to raise the grade somewhat, if a coarse fill-material, which drains rapidly and is well aerated, is used. If a grade change is necessary, avoid deep fills, don't use fine textured soil and keep the soil well away from the trunk.

Q: *Is it really necessary to fence off the 'dripline' of oaks during development?*

A: Yes! Construction related injuries, e.g., trenching, raising or lowering of grade, soil compaction, root pruning, changes in drainage, etc., have a devastating affect on tree health. Injured trees may die quickly, decline gradually, or ultimately succumb to boring insects or disease. The area under the dripline should be considered the root-protection zone. In most cases, trees suffer little damage when this area is protected during and after construction.

Q: *What is soil compaction, and why is it harmful to trees?*

A: Soil compaction, resulting from heavy foot traffic, livestock, vehicles, parking, and construction related activities, is a serious problem for trees. Soil compaction destroys the soil's natural porosity by eliminating the air spaces within the soil. Compacted soil contains little air, holds little available water, and is harder, less penetrable and more resistant to water penetration. Consequently, root growth and tree health suffers. Soil compaction is best managed by preventing it. Soil is more readily compacted when the soil is wet and when the surface organic layer (natural mulching) is removed.

Q: *I often see "healthy" looking oaks growing in turf, but heard that it's harmful. Is this true? What advice can you offer about landscaping under and around my oaks?*

A: Frequent summer irrigation of turf and other water-loving vegetation planted within the dripline, particularly near the trunk, favors the development of soil-dwelling root pathogens. Although normally inactive in dry soil, common root pathogens thrive under warm, moist conditions created when water is frequently applied to the soil during the summer. These pathogens, can, over time, kill or destroy the roots, leading to tree death or structural failure. Root diseases are more severe when soil drainage is restricted as in heavy, clay soil, hardpan, and in low areas. Disease prevention and management involves maintaining or restoring growing conditions that encourage tree health and discourage root diseases. This involves the reduction of plant stress through **judicious** watering, appropriate landscaping and proper tree care. Avoiding or eliminating turf and other water-loving ornamental vegetation under native oaks will ensure their health.

Contrary to conventional wisdom, young oaks do not adapt to frequent irrigation. Although oaks in turf or irrigation settings often appear healthy, most become increasingly susceptible to root disease with age. Soil conditions also play a role in disease development. Oaks planted in fast-draining soil may survive frequent irrigation for many years. Newly planted oaks **do** require frequent and regular irrigation until they are established, usually two to three years. This fact is often overlooked by people who assume that because oaks are drought tolerant; they don't need supplemental watering.

Q: *My oaks don't look as healthy as they used to, and the arborist I consulted says that the landscaping and irrigation is responsible. I like the landscaping the way it is, but I don't want to lose the tree. What should I do?*

A: When growing under natural, undisturbed conditions, native California oaks typically resist most serious diseases. When weakened by disturbance and/or improper landscaping and irrigation, they become particularly susceptible to disease. Two serious root diseases commonly encountered in irrigated settings are crown rot and oak root fungus. Crown rot (*Phytophthora* sp.) is one of the most common and serious problems of oaks in residential landscapes. Caused by a fungus, it is fostered by excess moisture, poor drainage and inadequate soil aeration. Oak root fungus (*Armillaria* sp.) occurs on many oaks throughout California. However, healthy oaks and those growing under natural, undisturbed conditions typically resist damage. Oaks weakened by root loss, drought, defoliation, age, over pruning, soil compaction, pavement, impeded drainage, fill soil and/or frequent summer irrigation are most susceptible. Once the symptoms of this disease become obvious there may be little that can be done.

In most cases, people notice the symptoms too late for successful treatment. However, if the disease is detected early, steps can be taken to save the tree. Treatment is best left to a consulting arborist as homeowners are seldom equipped to deal with this problem. If a specialist cannot be called in, the following measures may be of benefit:

- If turf and/or water-loving ornamentals are present under oaks, discontinue watering that portion within the drip zone. If this is impractical, redesign the turf or planting area, and the irrigation system to prevent water from hitting the trunk and wetting the soil within **at least** 10 feet of the tree's base (root crown). This is the critical zone for root diseases.

- Remove any soil, mulch or debris that has been placed or has accumulated against the trunk above the natural soil line.
- If fill soil has been placed around the tree, expose the tree's flared base (root crown) to the original soil line by careful excavation of the soil so the buried bark can dry. Remove soil within about one foot of the trunk and down until the tops of the large roots are exposed.
- Leave the root-crown exposed. If necessary, provide drainage to prevent water from collecting around the root-crown during the winter. Cover the excavated area with a grate or decking if it is deep or if you use the area around the tree. CAUTION - Trees that have had moist soil around their bases often develop decay in the root-crown. Such trees are often structurally weak and prone to fall, even if their tops appear healthy. Consult a certified arborist to determine their health and safety.
- Allow turf in the nonirrigated area to die and slowly decompose.
- Relocate ornamentals that require frequent irrigation. A list of plants compatible with the environmental requirements of native oaks can be found in the California Oak Foundation's publication 'Compatible Plants Under and Around Oaks'.
- Water drought-tolerant plants only as needed to maintain health, growth and appearance. Hand-water or use a drip system or soaker hose.
- Fertilization is usually not necessary and may delay recovery or even encourage the disease.
- Assess tree's need for supplemental watering based on environmental conditions.

Q: *Should I rake up the dead leaves and tree debris that collects under my oaks?*

A: Leave the natural leaf litter to blanket the soil. It helps to conserve soil moisture, reduce soil temperature, and provides essential nutrients upon breakdown. It is also an important food source for earthworms and other beneficial soil organisms, which improve soil aeration and ultimately root health. Try to keep the soil surface beneath oaks mulched with 2-3 inches of coarse, organic mulch such as natural leaf litter, shredded or chipped bark, wood chips, etc. Unless incorporated into the soil there is no need to add nitrogen to non-composted mulch. Be careful not to place the mulch directly against the trunk. Avoid the use of weed-inhibiting plastic tarping. Solid sheeting reduces the availability of air and water to the roots, and the impervious material interferes with natural nutrient recycling.

Q: *I've heard that oaks should never be watered, is that correct?*

A: No! Although native oaks are well adapted to California's dry summers, there are several instances when supplemental irrigation is appropriate. First and foremost is the need to minimize the effects of drought, particularly for those oaks whose root zones have been impacted by excavation, pavement or removal of natural leaf litter. Such trees can benefit from one to several thorough waterings during the hot, dry summer when drought stress is greatest. If the winter is unusually dry, supplemental watering in the spring can complement natural rainfall. However, when the frequency of irrigation exceeds a monthly application, root health is likely to suffer. Another reason for the occasional watering of oaks is when natural water sources have been diverted. Extensive pavement, retaining walls, culverts and drains cause precipitation to run off rather than penetrate the soil around the trees. One further very important reason is to reduce stress due to lack of water following moderate to severe root loss from construction

injury or transplanting. Infrequent irrigation may also benefit oaks growing in heavily compacted soil.

Water the soil from halfway between the trunk and the drip line to 10-15 feet beyond, allowing water to penetrate the soil to a depth of 8 to 12 inches. It may take 4 to 6 hours to penetrate to this depth. Apply additional watering 1-2 times during dry summers. Keep water at least 10 feet from the trunk. The length of time for irrigation will vary based on the rate of water flow, method of irrigation (soaker hose, sprinkler, etc.), area covered, rate of water penetration and topography. You may have to experiment a little to get good water penetration. To check the depth of penetration, dig a small hole in the irrigated area 24 hours after watering. If the soil is moist at the desired level, the watering time is adequate. Insufficient watering is marked by dry soil, while standing water indicates excessive watering or impaired drainage.

Q: *Will fertilization improve the health of my oaks*

A: Healthy, mature oaks growing under natural conditions usually do not require supplemental fertilizer. However, oaks in landscaped areas where the leaf litter is regularly removed, or where there is extensive landscaping, may benefit from periodic, moderate fertilization. Stressed and weakened oaks should be fertilized sparingly, unless a mineral deficiency has been diagnosed. Poor growth and appearance are usually the result of poor growing conditions or root disease rather than mineral deficiencies. Over-fertilization can stimulate excessive growth, encourage pest problems, injure roots or burn foliage. Improving the root environment through mulching, judicious watering, aeration (shallow holes or careful soil loosening) will usually improve tree growth. The yearly application of coarse, wood-chips mulch will also provide nutrients upon break down. This is a more natural way to fertilize trees.

Young oaks may be fertilized to encourage growth. Mature oaks, on the other hand, may be moderately fertilized to maintain health, rather than stimulate growth. If the leaves of your tree are dark green and it appears to be healthy, fertilization is probably unnecessary. If you suspect a mineral deficiency, consider soil and leaf analysis. Consult your local University of California Cooperative Extension Office for more information.

When appropriate, apply nitrogen-based fertilizer in the late summer to fall or early spring when there is rain to carry the water-soluble mineral elements into the soil. As long as it is thoroughly watered in, nitrogen fertilizer may be applied during the growing season. If rain is lacking, water the minerals into the soil, about 6 inches deep, avoiding the area within 10 feet of the trunk. Inexpensive, water-soluble fertilizers such as ammonium sulfate, ammonium nitrate or urea may be used. Slow release fertilizers (water insoluble) may be preferable to quick release (water soluble/non-coated) fertilizers because they release their mineral nutrient(s) gradually. Complete fertilizers containing nitrogen (N), phosphorous (P) and potassium (K) are more expensive and often unnecessary. If you use a complete fertilizer, select one high in N and low in P and K. Fertilize declining, stressed root injured oaks sparingly (one pound actual nitrogen per 1000 square feet of exposed soil surface within 2X the radius of the dripline every other year, or less frequently. Younger trees can be fertilized more frequently and at more moderate rates, e.g. 2-3 pounds per 1,000 feet of exposed soil surface area. Fertilizer is best applied by

broadcasting (spread by hand) over the tree's root zone.

Q: *Can I add landscaping under and around my oaks without jeopardizing the trees?*

A: Yes, but you must do so with some discretion. First, keep the area within the dripline as natural and undisturbed as possible. Do not remove the natural leaf mulch. This organic material conserves water, provides nutrients, improves soil structure and moderates soil temperatures. Avoid injuring oak roots or substantially altering the soil conditions where they grow, particularly within the dripline. Avoid water-demanding ornamental vegetation such as lawns, ground covers, and shrubs like rhododendrons, azaleas, and camellias. Use plants that are compatible with oaks, e.g., drought tolerant. Use plants as accents rather than as ground covers. Extensive landscaping will disturb the root system and compete for available water and minerals. In such cases, supplemental (infrequent) irrigation and fertilization may be beneficial to avoid drought stress and mineral deficiencies. Avoid all planting under declining oaks, and allow trees that have sustained construction damage several years to recover before landscaping beneath them. Plant no closer than 10 feet from the trunk. Select plants that are low growing. Plant taller growing shrubs outside and away from the dripline. In fire-prone areas, prune the lower leafy canopy to a height of at least 8 feet for fire safety, and avoid the use of tall growing plants (more than 24") that can carry fire into the tree's crown above. (See next question regarding pruning.)

Select plants that will tolerate the dry soils and partial shade typically found beneath native oaks during the summer. Many of California's native plants are well suited to this environment; they are also attractive and pest resistant. These plants are available from nurseries specializing in native plants. Many exotic species also perform well, and are available at local nurseries. Plant ornamentals requiring full sun outside the dripline. Native bunch grasses, which naturally grow under oaks and other ornamental grasses, are becoming increasingly popular. Unlike regular lawn grasses they require little water and maintenance. Their attractive textures and colors allow them to be used as specimen (feature) plants. When massed together, native grasses give the appearance of a meadow, ideal for the establishment of colorful wildflower annuals. Unfortunately, native grasses typically are quite flammable and can increase fire hazard. Use them sparingly as accents rather than ground covers in areas with a high fire hazard potential.

Plant bulbs, seeds and container grown plants during the fall and winter to ensure their survival. If rain is lacking, water these plants twice a week for several weeks. Use a drip system to establish the plants so that only a small area is wetted. Once established, many plants will survive with little or no additional watering. Avoid root damage from trenching for irrigation systems by placing water lines and soaker hoses directly on the soil surface and covering with mulch.

Q: *My oaks have never been pruned. Do they need to be pruned, and if so how?*

A: Pruning can be used to manage tree safety, improve aesthetics, extend useful life span, manage certain pest problems and minimize conflicts with people, buildings, vehicles and power lines. When improperly done, it destroys natural shape and beauty, creates hazards, causes stress, reduces longevity and increases cost and reduces property value. Trees are routinely mis-pruned by well-intentioned

people, who don't understand how trees grow or respond to pruning. They are often motivated by fear of tree failure as trees grow in size or the misconception that trees need to be pruned to maintain health.

Pruning may not be desirable or beneficial. There is always some negative impact, at least temporarily. When done improperly, pruning can be destructive. Severe (hard) pruning can kill or seriously weaken trees by removing too much foliage. This diminishes food production (photosynthesis) causing stress, which may result in energy depletion, dieback, increased susceptibility to pests, or decline. Problems, however, seldom develop when pruning cuts are few in number, kept small and properly made. Damage, of course, depends on extent of pruning, size of wounds, time of year, and tree health prior to pruning. Pruning can also alter branch spacing and attachment strength, architecture (shape, foliage density and distribution), and susceptibility to decay. Thus, trees should be pruned only as needed to accomplish the desired goal. Some goals, however, may be incompatible with tree health.

Important concepts to consider when pruning:

- Pruning large trees is both dangerous and difficult; it is best left to professionals. Consult an arborist, preferably someone certified by the Western Chapter of the International Society of Arboriculture.
- Prune only as needed.
- Have a valid reason to prune each branch.
- Remove as little foliage as possible particularly for particularly on older or declining oaks.
- Prune with the health of the tree in mind.
- Remove dead branches if they pose a safety hazard to people, property or structures. Dead branches can be left in trees in naturalized settings for wildlife purposes.
- Keep cuts small and few in number. Don't stub unwanted tree branches; remove them at the trunk or branch where they originate.
- Don't cut branches flush to the trunk or branch; leave the collar or swollen area at the branch base intact. Removal of the collar will encourage decay
- Wound dressing does not prevent decay and should not be used on pruning cuts.
- Prune in the late winter to early spring, or early to mid-summer. Avoid pruning when the leaves are forming and in the fall when leaves are shedding.
- Dead and weak branches can be removed at any time
- Correct extensive structural problems gradually.
- Avoid thinning interior foliage.
- Don't alter natural shape.
- Avoid excessive crown raising (removal of lower branches, sometimes called lion-tailing).
- Don't top oaks and other trees to reduce tree height or spread.

Destructive pruning, e.g., topping and over-thinning, diminishes health, safety, longevity, aesthetics, environmental benefits, and property value. Proper pruning minimizes foliage removal and avoids significant changes to the tree's natural shape, growth habit and size. This saves money, reduces impact on health and maintains maximum environmental benefits.

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