



UNIVERSITY *of* CALIFORNIA COOPERATIVE EXTENSION

Agriculture & Natural Resources

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Disturbance Around Oaks

Young native oaks are tolerant of environmental changes and will usually adapt to landscaping practices. But as oaks mature their environmental tolerances become set and changes can weaken or kill them. For example, a mature oak is well adapted to California's naturally dry summer weather. If the environment of an adult tree is changed by the introduction of summer watering—for gardens, lawns or improved pasture—fungi will proliferate on its roots and begin to kill it. Unfortunately there may be few visible signs of a fungus attack before it is too late. On the other hand a young tree on well-drained soils raised under a regime of summer watering maintains some resistance to threatening fungi even into adulthood.

The most vulnerable parts of a mature tree are the root crown (at the base of the trunk) and the entire root zone. Oak roots are relatively shallow and extend from the root crown outward reaching some distance beyond the tree's drip line (the outermost edge of a tree's foliage). For management purposes consider a tree's root zone as being one third larger than the drip line area. Ideally there should be no disturbance within this zone. This means no grading, digging, trenching, covering the ground with asphalt or concrete, or landscaping with plants that require summer watering. Even excessive traffic, operating heavy equipment, and parking vehicles should be avoided.

Think of the root zone as the minimum ground required for its survival. The best way to live with a mature oak is to leave it and the area beneath its canopy alone. If modifications are unavoidable strive to keep the root zone area in as natural a condition as possible and keep ground disturbance as far away from a tree's trunk as possible.

Threats To The Root Zone

A mature oak is accustomed to a certain balance of moisture, air, soil temperature, and nutrients. A change in these factors can severely alter conditions for the tree. The most common activities that alter a tree's root environment are:

Changes in grade. This includes any changes in the ground level under the tree either by mounding up soil or excavating it. Excavating soil can destroy the roots and expose them to damage by surface activities. Mounding up the soil reduces the oxygen supply to the root zone, which can suffocate a tree. Depending on climate and soil moisture, additions of soil can also encourage root rot.

Changes in drainage. Changes in the drainage around an oak can put water into the root zone during the season when soil temperatures are high and oaks need to be dry. Saturated soils inhibit the exchange of oxygen in the root zone and encourage the proliferation of soil-borne diseases.



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Soil compaction. Heavy traffic or the operation of heavy equipment can cause soil compaction, that is, the spaces between the soil particles become compressed. Since a tree "breathes" through the exchange of gasses that occurs within these spaces, compaction will lessen gas exchange suffocating the tree.

Paving. Paving presents many of the same hazards as soil compaction, and compaction itself often occurs in preparation for and during paving. When the ground is covered with a nonporous material, such as asphalt or concrete, the free passage of moisture, air and other gases within the root zone is impeded. There are porous materials however that are more compatible with the oak environment and make excellent ground coverings. Porous brick with sand joints, for example, or gravel, bark, wood, mulches and many other similar such materials provide an attractive ground covering that permits the free passage of water and air.

Regardless of the permeability of the ground covering, nothing should be placed within a six-foot radius of a tree's trunk—the minimum area that should always be left undisturbed and uncovered.

Fills. In general do not fill within the drip zone of a tree because fills tend to compact the soil and hence reduce permeability. They also promote water entrapment in the root zone, encouraging root and crown rots. Use retaining walls outside of the drip line to protect the natural grade under the tree.

Trenching. Trenching is a commonly overlooked cause of tree mortality. When utility trenches are dug into the root zone, major portions of a tree's roots may be cut or severely damaged. When a large proportion of the roots are damaged, trees die. Trenching in the root zone should be avoided whenever possible.

Perhaps the best alternative to trenching is to place utilities in a conduit which is bored through the soil. This eliminates the need for trenching, and the small size of the conduit minimizes root damage. If utility conduits are unavailable, try to have all utilities placed in a single trench, as multiple trenching is a common culprit in tree deaths.

After any trenching in the root zone, the tree should be carefully pruned to remove canopy material proportional to the roots lost or damaged.

Disturbance beyond the root zone. Beyond the root zone, mature oaks are usually less affected by landform and drainage changes, soil compaction, paving, fills, and trenching activities. But the indirect effects must still be considered. Watch out for fill materials that could pond water around a tree. Consider the effects of nearby pools on local soil moisture, and watch for bank or hillside cuts that could drain moisture that a tree is used to receiving. Any activity that changes the environment of a mature tree, even indirectly, could threaten its well-being.