



Landscape Notes

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Establishing Landscape Trees

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I recently walked on campus of the University of California at Davis. The campus is old for a UC, having recently celebrated the centennial of its establishment in the UC system. Naturally, like most distinguished college and university campuses, it is adorned with old specimen trees. Ivy covered halls may be one person's idea of collegiate environs but I have always identified with the majestic arboreal specimens that populate our places of higher learning. Without stately trees, a college campus is bereft of the atmosphere required to inspire that intense concentration and effort that is so necessary to the pursuit of academic achievement. I look to trees for their imposing grandeur, the wisdom of their architecture and the inspiration of their beauty--perfect design in nature. The modification of the environment around trees goes beyond temperature reduction, shade, and of course their own ecology, they also impose a psychological modification to those around them. They bring calming peace. The problem with trees in human environments is that people are responsible for their maintenance. Why is this a problem? In the text below I detail how trees are not properly cared for and suggest actions to correct the bad practice or management deficiency.

From the time of their germination as seedlings, trees begin to accumulate the associated insults of their existence. Early abuse in the form of confinement to small containers results in twisted and circling root systems. Root defects are not noticeable in many trees since the tops have vigor and continue to grow with a normal appearance. Root defects created in the first few months of life may not totally destroy the tree until many years later when the top has outgrown the constricted root system resulting in failure of the main stem. Conifers, particularly *Pinus ssp.* are



Circling or girdling roots are a common defect found in conifers especially pines

susceptible to tree failures from circling roots. Early detection, while still in a container or soon after installation in landscapes, may allow for correction by pruning out the constricting roots. The best cure is to select trees that do not have the defect and reject those that do before they are planted out.

Planting is one of the first problems trees encounter when placed in landscapes. The most common mistake I see is planting the tree too deeply. Backfill soil placed over the root ball causes two problems; 1, it creates an interface with the organic container media that prevents water from entering the root ball and 2. it places soil in contact with the trunk or crown of the tree. If backfill is of fine texture, the interface it creates with native site soil can effectively prevent water from entering the root ball and the tree will desiccate and die in its planting hole. This is a common occurrence in many landscapes. When landscapes are saturated (as many are) water penetrates the root ball leaving it continually wet. The tree does not die but is predisposed to pathogens that invade the thin bark of the tree's buried lower trunk. This results in increased *Phytophthora* (root rot) infections and in lingering disease and death of the tree. Both of these common problems can be avoided by planting the rootball at or slightly above grade. By digging the hole only as deep, or slightly less deep, than the depth of the root ball, sinking, settling and movement of fill against the tree stem will be avoided.

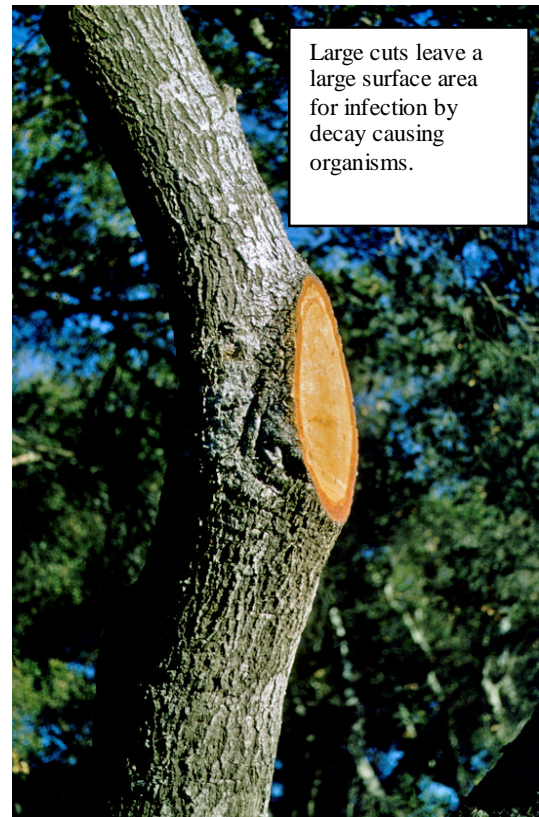


The tree on the left does not need staking yet it still has the nursery and landscape stakes with it. The tree on the right needs staking but the trunk is so small it is dwarfed by the nursery stake that holds it rigid preventing development of trunk taper. Also note the mysterious whit tube.

When trees are first planted in nurseries, and as they grow, they must be staked in order to maintain an efficient growing system. Nursery stakes often move out into the landscape with the tree where they remain for many years thereafter, sometimes being absorbed as the stem grows around them, or at other times limiting their growth and preventing the natural formation of taper and a strong trunk (see images above). It is our job as stewards of newly planted trees to remove the stakes at planting time and provide a new stake or stakes as necessary, to anchor, protect or support the tree without restricting its movement and trunk development.

As trees grow, we direct their growth with pruning. Not new to the industry but an increasingly critical factor for the care of trees are the tight budgets that limit pruning operations. Only the problem trees are thinned, height reduced, crown raised or otherwise maintained. Infrequent pruning necessitates making larger cuts that introduce larger columns of decay consequently shortening the

lifespan of many trees. Training young trees with frequent pruning utilizing smaller diameter cuts, results in well structured trees with a minimal amount of decay. Alex Shigo taught many arborists that wood is an energy storage system. Wholesale removal of tree energy storage systems (large branches) is destructive—it shortens tree lives, introduces decay organisms, and (often) irreparably damages tree form, function and beauty. Another outcome of topping is that it increases the cost of retaining the tree due to multiple year crown restoration and reduction pruning requirements. These practices are really only warranted for hazard reduction/abatement and then are really only a prelude to removal. Flush cuts as shown here are large and oval-shaped exposing more surface area for entry of decay fungi and should be avoided to limit entrance of decay into major scaffold limbs in trees. The well maintained tree is the frequently but judiciously pruned tree.



The water needs of trees change as they grow. During establishment, trees need to be irrigated frequently because their root system is restricted to the size of the root ball at the time of planting. In time (months to years) roots explore the native soil and trees become more drought tolerant as they rely less and less on the original container media for their water source. Young trees establish rapidly (months) where as large boxed trees may take years to establish. Often, and unfortunately, irrigation systems (especially drip) are installed and set for the establishment phase and both the system and its temporal settings are permanent—instead, they should last only through the establishment period followed by an adjustment to address the expanding root system and its needs. A common detail that is absent from installation specifications is a written plan to address future irrigation needs of trees once they become established. All too often the establishment irrigation schedule remains unchanged for years (decades) following the original installation. As trees grow, their water requirements increase. The area (soil volume) that must be moistened also increases with the root system. Trees are tremendous water scavengers and will often obtain water from other landscape areas, but in some cases this is not enough for a rapidly growing tree. Since as trees grow larger and larger volumes of soil need to be moistened, the interval between irrigations can be spread out. The once short two-three times a week establishment schedule can shift to a once a week or once a month schedule because larger volumes of soil have larger water holding capacity for the tree to use. When irrigating trees, schedule irrigations to wet the soil twelve inches deep over the rooted area and then adjust this interval for rain or day length. The root area of most established trees extends from several feet away from the trunk outwards well beyond the vertical drip line of the specimen.

Like all plants (and people) trees require essential elements to grow and reproduce. These elements are mostly absorbed as ions (exception is carbon absorbed in leaves as carbon dioxide and oxygen absorbed as water and later broken down, an urea which is absorbed as the non-ionic compound) or minerals by the root system. Fortunately western soils have abundant mineral nutrients because in arid climates these elements do not leach and as a result our soils tend to be alkaline due to an abundance of “base” cations in the soil. Often, minerals may be too concentrated and will inhibit growth. Most trees in most soils do not need to be fertilized, either at planting or during their lifetime to sustain adequate growth. When trees are irrigated, some elements especially nitrogen will leach.

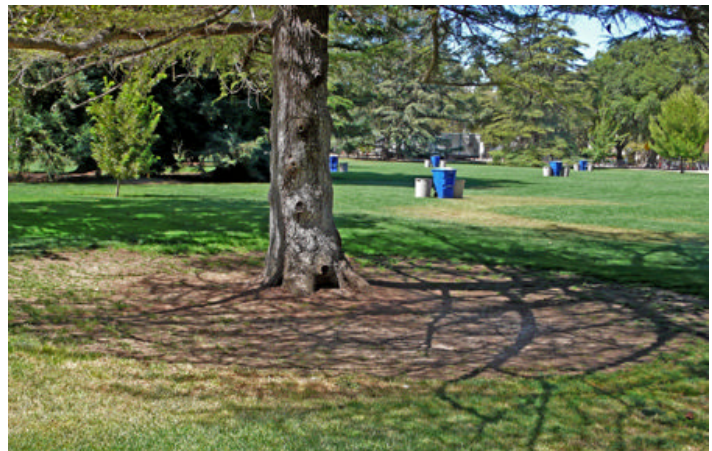
Since our irrigation water is often alkaline, the pH or soil reaction is kept alkaline. Most plants including trees like to grow in pH neutral soil. Thus some attention to soil reaction is necessary. Minerals and elements that reduce soil reaction (make soil more acid) will allow landscape trees to absorb the micro-nutrients that are already abundant in most western soils. Since nitrogen can leach from soil, it is sometimes required to fertilize the tree. If organic mulches are in place or if the natural litter layer under the tree is intact, nitrogen does not usually limit tree growth.

An area of great concern to me is how we plan for trees to be used in landscapes and then how they are maintained after installation. Mistakes are made on both ends and the middle-- the landscape architect, the landscape installer and the maintenance company is not without fault in this process. Trees are mostly large organisms, they occupy large spaces. In nature, trees compete with each other and they usually have ways to survive competition from their neighbors and from the environments in which they grow. Trees are typically not given enough space in landscapes to do the business of being trees (see image right) Trees require room to expand and sunlight to reach optimum size and shape. Space should be allocated both in the soil and above ground so that trees can attain their genetic potential.



Trees are programmed to develop to certain sizes, shapes and character according to the resources available to them in their native habit. When these parameters are altered, problems develop. On my stroll through the UC Davis quad I appreciated the large spaces in which trees were given to grow.

They had access to soil and sky—enough to meet their needs. I noticed that all the trees had the turf-grass removed from under their canopies. This is an excellent idea because grass plants compete for water and nutrients and may be allelopathic, that is they exude chemical compounds that can inhibit the growth of trees. The crazy part is that after providing an area for litterfall (essential for accumulation of natural mulch supportive of tree growth and healthy root systems), the litter was being raked and removed from under each tree because it looks untidy. Removing the leaves, bark, twigs and other fallen parts



deprives the tree of minerals that are necessary for nutrient recycling and alters the microbial activity in the underlying soil. Trees naturally shed leaves, fruit, bark and branches that decay and add carbon to feed the soil microbial community. This is an important aspect of growing trees. Increase the litter-fall area and trees will grow better. Coarse mulch can be added to improve aesthetics and to make up for “lost litter”!

Newly planted and young trees are often mulched with coarse barks or other organic amendments. This is a good thing. However, sometimes the mulch applications get a bit generous.

Mulch applications in concert with deep planting can be deadly and should be avoided. When mulches are placed around newly planted trees, they should not cover the base of the tree. It is best to keep mulch zones very thin to none at all at the base of the tree.

Another failure in the planning of tree spaces is the poor understanding of the effects that construction damage has on trees. Often trees are subject to compaction from driving vehicles on the soil over their root systems and from change in the grade around their stems and root systems. Grade changes (either fill or cut) are major predisposing events for the onset of root rot diseases and should be avoided if possible. Trees that do not show good flare roots above ground should be carefully inspected to see where the grade should be. Soil should be removed from around the base of tree stems. Loss of fill around trees is rarely a problem unless it has been removed with machinery (cuts) while also taking away major portions of the root system.



Over mulching is bad for young trees

A final comment is necessary to call attention to something I see constantly in landscapes which I don't understand at all. See the image just below this text. Four inch PVC piping is shown protruding out of the soil in two places next to a young landscape tree. What is the reason for this? I have no idea. I have heard many theories such as the tubes provide aeration of the root systems. Well if this is the case, why are the caps not ventilated? They form a pretty tight seal. I have been told that the tubes are access tubes so water can be monitored under the tree. I would like to have the contract for that one-- in the condo project I just walked there must have been over 1000 tubes installed. Sometimes the tubes have the irrigation installed inside them sending water below the root zone--this is a waste of water. These tubes amount to little more than landscape pollution. I have never seen them removed from landscapes when they are no longer necessary (which is really right after installation). Don't do this!! Please STOP installing tubes around trees. It is senseless!!!!



Excess fill is also bad for many trees

Successful management of healthy trees requires an understanding of basic tree biology, knowledge of their native environment, awareness of their needs during nursery culture, and as they are moved into their new homes in landscapes. Paying attention to the trees after they are installed and attending to their needs in a thoughtful and timely manner will result in a much enhanced landscape.



The mystery of tree tubes