Landscape Tree Care Myths and Facts

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What research teaches us about the right and wrong ways to plant & care for trees

- PLANTING
  - Tree size
  - Planting hole size
  - Use of amendments in the planting hole
  - Grass around trees
  - Staking
- FERTILIZING & MULCHING
- WATERING
- PRUNING

Myth: Plant a large nursery tree as it will grow faster & be bigger sooner than a small tree

Fact: Smaller trees establish more quickly after planting and are larger after several years

- Small trees overcome planting stress more readily since roots and top are more proportional.
- Root systems of smaller trees are replaced more quickly than larger trees
- Large trees often lose water faster than roots can absorb and transport to the leafy crown (tree top).
  - Water stress reduces production of carbohydrates (a tree's food) reducing health and growth
- The larger the tree, the greater the chance of having potbound - circling/girdling, kinked roots.

5 gallon trees are a better choice for initial survival and long-term growth & health; all of these 24" box trees died within a few years of planting

Circling/girdling, kinked roots of woody plants are a serious landscape problem:

FIGURE 1. Circling roots of this pine began restricting tree growth even before the plant was placed in the landscape.

FIGURE 2. Kinks in the main root (arrows) of this pine will cause a weak, unstable trunk; if severe, it

Harris and others, UCD 1961-1970's root research studies

- Root problems usually begin in the nursery container; continue to worsen in the landscape
- Affects tree growth, health, stability – roots confined & can't spread outward
  - Tree prone to leaning or blowing over – even years after planting
  - Tree appears water stressed or to need nutrients even if soil is moist and has been fertilized.

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Tree failure due to circling, girdling, potbound roots

Nursery container induced circling roots, restriction of roots within a root barrier box and staking too long led to the failure of this black locust, *Gleditsia* 'Purple Robe'

Purple-leaf plum, *Prunus ceracifera,* with circling roots in a restrictive planter blew over in a wind storm

Tip: Always check roots & correct problems before planting (if possible); once planted, root defects are difficult to diagnose or correct

- Loosen roots from potting mix
- Check for kinked or circling roots
- Clip circling or damaged non-woody roots - stimulates new roots
- If too many woody roots are potbound, circling or kinked don't plant - can't be fixed – return the tree

Ideal, well-distributed root system on a five gallon Tupelo *Nyssa sylvatica*

Myth: Tree roots grow deep and mirror the leafy canopy in shape

Fact: Typical tree roots are shallow and spread widely; results in a healthier tree

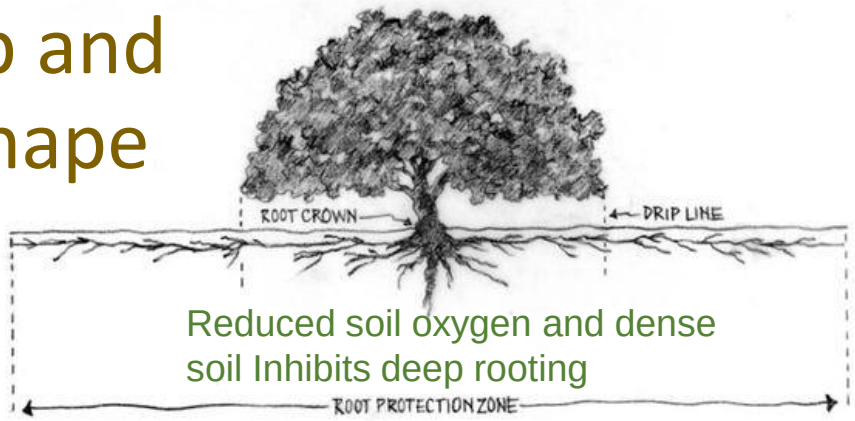
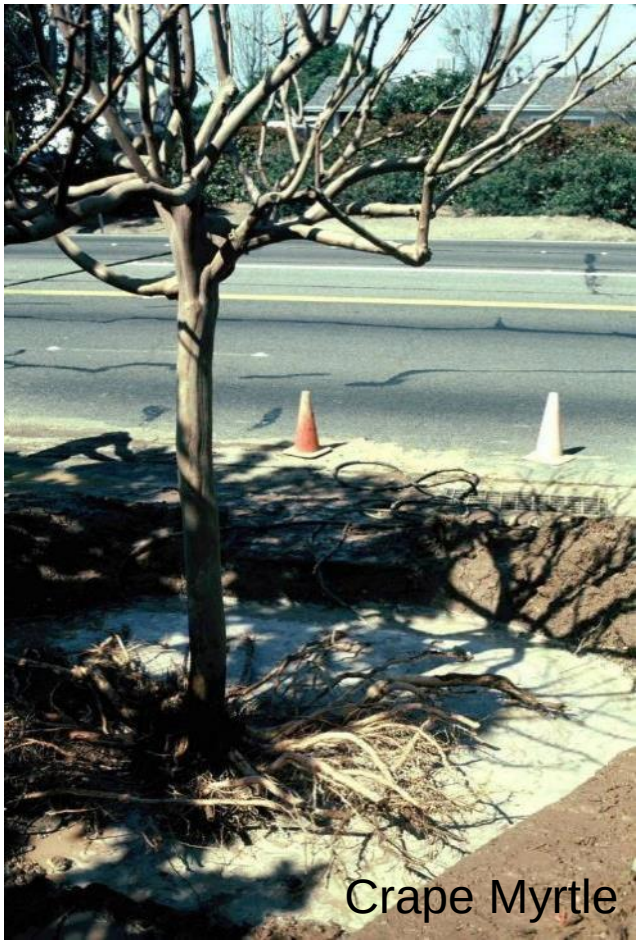


Illustration from *Compatible Plants Under & Around Oaks*, Calif. Oak Foundation 1991, Pg. 4, Fig. 1 Guidelines for Tree Protection



- Tree roots don't grow "deep"; 90% of roots are in the top 18" of soil ; 99% in top 3'
- Roots extend 2-4 times or more beyond the dripline (edge of branches)
- Root diameter spread can be 1 ½ - 2 times the tree's height
- Taproots are rare
- "A tree is like a wine glass on a dinner plate"*

*Attributed to Dr. Thomas O. Perry, Former Associate Professor, School of Forestry, North Carolina State University, Raleigh

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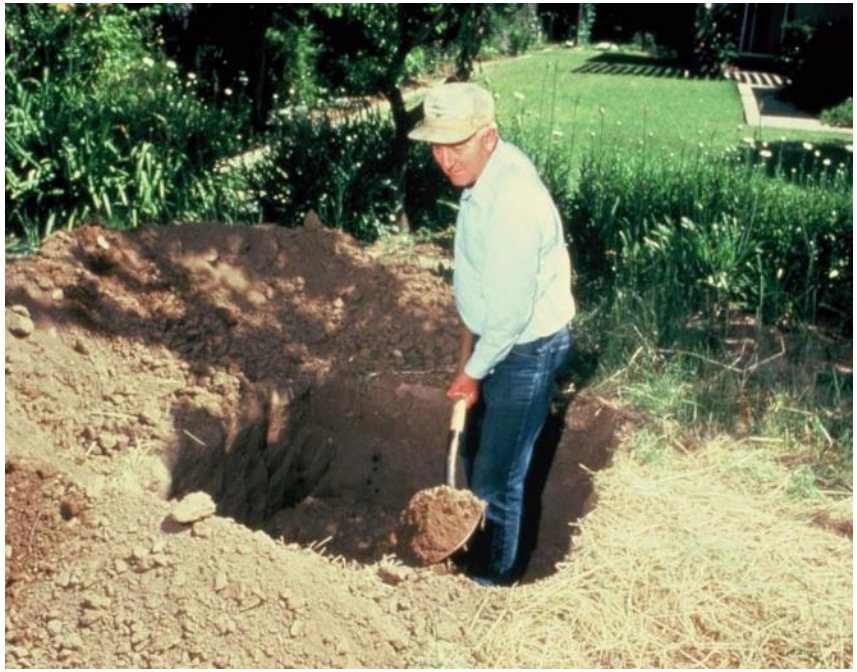
Myth: Trees need a big, deep planting hole to grow deep roots

Fact: Research shows that deep holes often act as tree graves

Camphor tree
Cinnamomum camphora

Trunk & root crown buried; top slowly dying back



Lee Frey, former Farm Advisor, Sacramento County, 1981

Tree health and stability is affected by planting too deeply and/or covering the root crown

- Low oxygen reduces roots' ability to take up water & nutrients efficiently; absorbing roots die back
- Tree is more susceptible to root/crown diseases, like *Phytopthora* water mold fungi and wood rots

Valley Oak
Quercus lobata

Buried root flare led to fungal infection & decay

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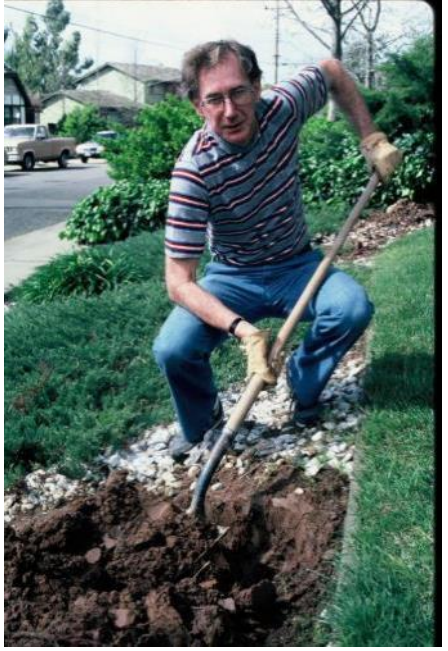
Tip: Best planting practice: Make tree holes shallow and wide

- Width - minimum two times the diameter of the root ball
- Compacted or clay soils: three to five times the diameter of the root ball is better – create a “planting area”
- Depth – At least at soil grade - best planted slightly above ground level; dig hole 1-2” less than top of lateral roots



- To minimize settling, plant on a pedestal of undisturbed soil, a mound or firm soil
- Don’t cover the root-crown (trunk-root flare) with soil or thick mulch
- Don’t plant too deep

  --No telephone pole trunks!

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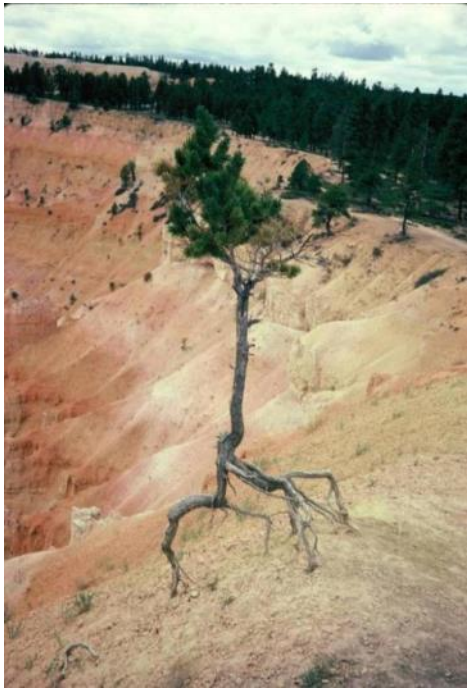
Planting too high may also cause problems:

- Exposed absorbing (feeder) roots may dry and lose function
- Roots may not be stable enough to support a large tree

Trees in nature often adapt to erosion-exposed roots, but are subject to wind throw

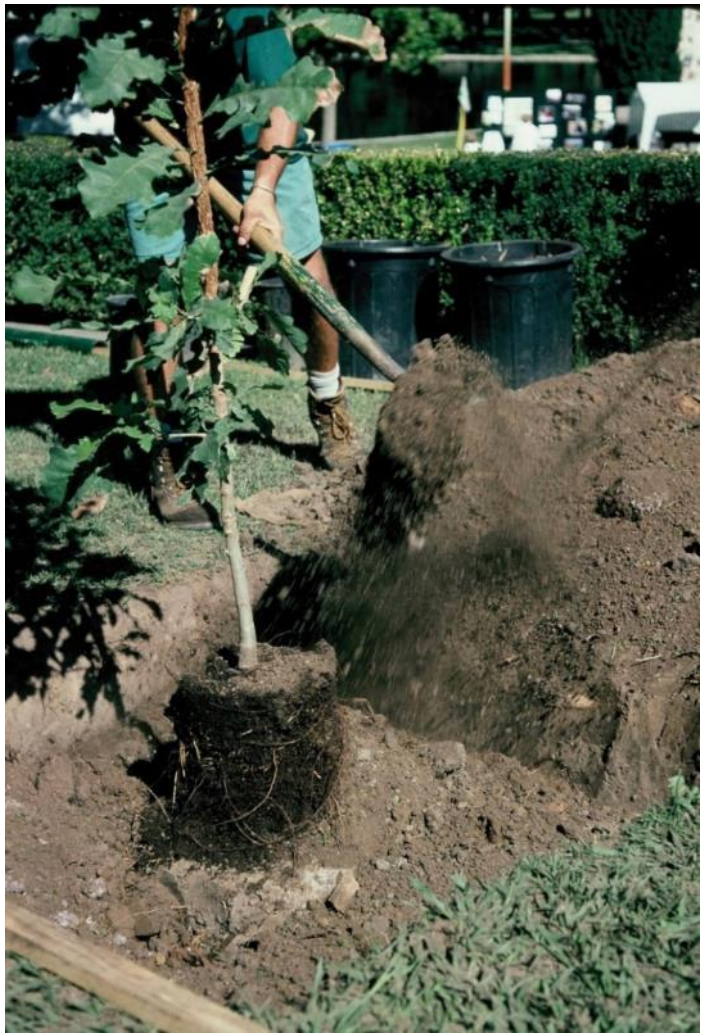


Myth: Soil amendments/compost/organic matter (OM) should be added to the planting hole of trees and shrubs, especially in clay soils

Our homemade compost

Three of our seven compost piles

Fact: Amendments for woody plants are not necessary; often create problems



- "Adding fertilizers, soil amendments, or root stimulants to the planting hole or backfill soil is not recommended." *Planting Landscape Trees* UC Pub. 8046
- Seldom is there any difference in growth of trees (or shrubs) when planted in amended vs. unamended planting soil
- Roots are slow to grow into surrounding, native soil – flower pot effect
- Soil moisture problems - bathtub effect
- OM decomposes - plant may sink
- Use the original soil that came out of the dug hole

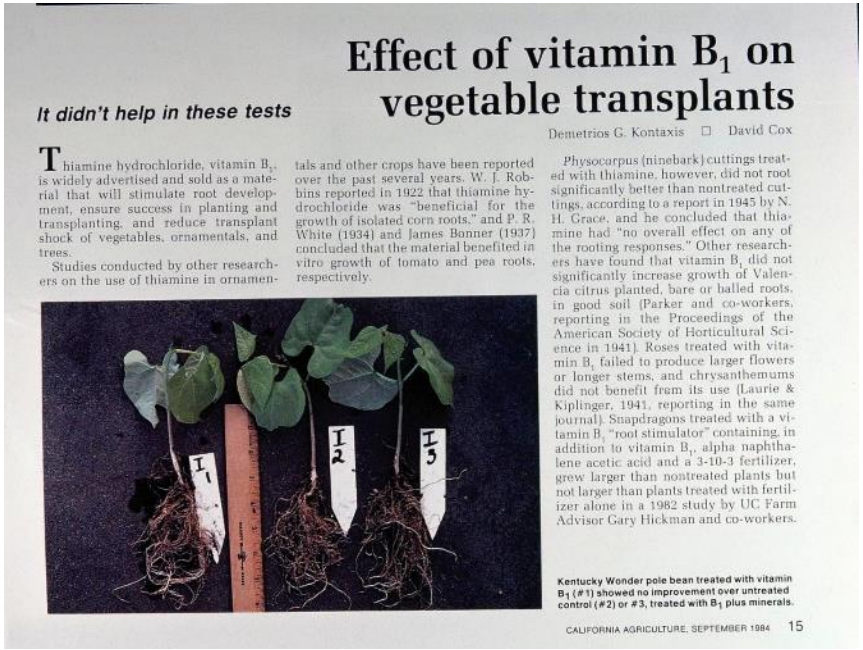
Tip: Amendments are often beneficial when used for entire planting areas

- Such as: vegetable gardens; annual & perennial beds; containers, raised beds & lawns
- If used, amendments must be thoroughly mixed with the native soil, otherwise layers form that prevent proper water flow

Myth: Vitamin B1 root stimulant helps overcome transplant shock; new plants grow better, larger

Fact: Ineffective – doesn't increase plant or root growth or the number or size of flowers. If indicated, fertilize instead.

Research since 1941 – no plant benefit adding vitamin B1 (thiamine)



Effect of vitamin B_1 on vegetable transplants

It didn't help in these tests

Demetrios G. Kontaxis □ David Cox

Thiamine hydrochloride, vitamin B_1, is widely advertised and sold as a material that will stimulate root development, ensure success in planting and transplanting, and reduce transplant shock of vegetables, ornamentals, and trees.

Studies conducted by other researchers on the use of thiamine in ornamentals and other crops have been reported over the past several years. W. J. Robbins reported in 1922 that thiamine hydrochloride was "beneficial for the growth of isolated corn roots," and P. R. White (1934) and James Bonner (1937) concluded that the material benefited in vitro growth of tomato and pea roots, respectively.

Physocarpus (ninebark) cuttings treated with thiamine, however, did not root significantly better than nontreated cuttings, according to a report in 1945 by N. H. Grace, and he concluded that thiamine had "no overall effect on any of the rooting responses." Other researchers have found that vitamin B_1 did not significantly increase growth of Valencia citrus planted, bare or balled roots, in good soil (Parker and co-workers, reporting in the Proceedings of the American Society of Horticultural Science in 1941). Roses treated with vitamin B_1 failed to produce larger flowers or longer stems, and chrysanthemums did not benefit from its use (Laurie & Kiplinger, 1941, reporting in the same journal). Snapdragons treated with a vitamin B_1 "root stimulator" containing, in addition to vitamin B_1, alpha naphthalene acetic acid and a 3-10-3 fertilizer, grew larger than nontreated plants but not larger than plants treated with fertilizer alone in a 1982 study by UC Farm Advisor Gary Hickman and co-workers.

Kentucky Wonder pole bean treated with vitamin B_1 (#1) showed no improvement over untreated control (#2) or #3, treated with B_1 plus minerals.

CALIFORNIA AGRICULTURE, SEPTEMBER 1984 15

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Myth: When you fertilize you "feed" the plant

Fact: Fertilizer is not "plant food"

- Trees make their own food (carbohydrates) through photosynthesis
- Poor plant growth is often caused by other factors
  - soil, water, root problems, weather, environmental conditions
  - insects, diseases

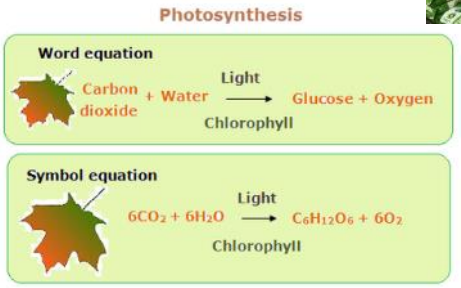
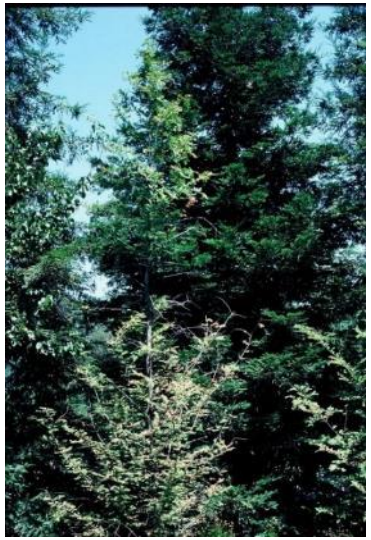


Illustration from: biology-igcse.weebly.com

Fertilizer supplies plants with nutrients and minerals - not food!

Japanese maple scorched & sun-bleached

Juniper died from root rot



Dawn redwood was under-watered; coast redwood in back has more extensive roots and doesn't show water stress

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Myth: Mature trees & shrubs need regular "feedings" of fertilizer for good growth

Fact: Fertilizer is usually not needed for older, woody ornamentals

- Most soils contain the nutrients needed for landscape trees and woody ornamentals.
- For faster growth, recently planted and young trees and shrubs may benefit from nitrogen only.

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Tip: Mulch with organic matter (wood chips, bark, compost) instead of applying fertilizer. "Feeds" the soil.

healthy soil = healthy roots = healthy plants

- Increases biological activity which improves soil structure, porosity, aeration, fertility
- Reduces compaction and erosion
- Insulates soil – cooler roots grow better
- Conserves water
- Controls weeds – 3"-6" layer
- Protects trees from mower/trimmer damage
- Improves landscape appearance

Many non-woody plants grow better when fertilized

Lawns, vegetables, berries, fruit trees, flowering perennials, plants in containers & raised beds

Avoid the “chicken soup” cure-all approach of applying fertilizer at the sign of any plant problem

Before assuming fertilizer is needed, do some detective work:

- Is the plant in the right location?
- How is the watering?
  - is the soil too dry or too wet?
  - is the irrigation system adequate?
- Are there any signs/symptoms of an insect or disease?
- Could a bad root system be the problem? Healthy roots are needed to absorb water and nutrients.
- Try improving the soil - use mulch and compost.

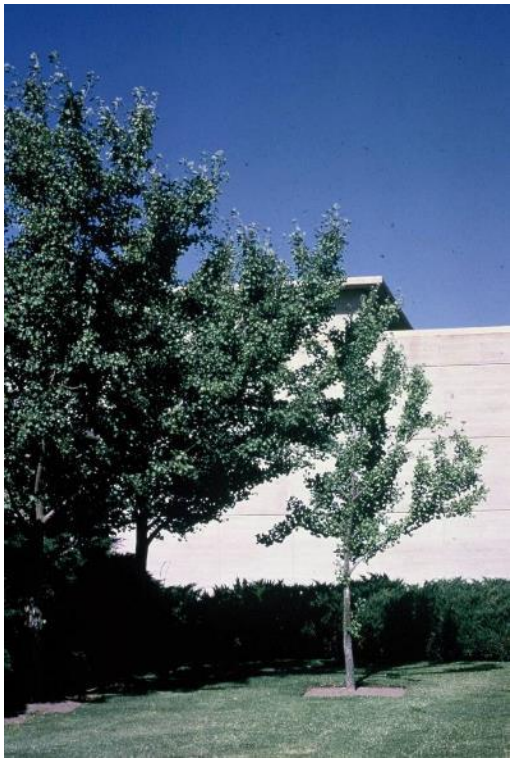
Lace bug “bleaching”

Weigh the value of fertilizing a plant against the possible negative plant and environmental effects, as well as cost

Runoff from landscapes carry pollutants, including excess fertilizer, directly into creek and rivers

Myth: Trees planted in lawns steal water and nutrients from the grass

Fact: Turfgrass dramatically stunts the growth of young trees due to chemical inhibitors in the grass (allelopathy) and water & nutrient competition of grass



Tall fescue effect on Southern magnolia two years after planting (turf-free area of 0, 4 & 196 sq.ft.) - trees in the grass-free plots had trunk diameters up to 500% larger; also greater height, more branches & larger leaves

Lawn gingko has fewer branches, small, nutrient-deficient leaves, a sunburned trunk and poor growth compared with the vigorous, healthy ginkgoes outside the turf

Research information and photos provided by Dr. Richard Harris, former UCD Env. Hort. professor; several studies were conducted between 1966-1969 – one published study-- Harris, Richard W. 1966 *Influence of turfgrass on young landscape trees.* Proc. Int. Hort. Congress *17:80*

Tip: Keep grass at least 12-15” (24-30” dia.) from the trunk of newly planted trees for 2-3 years

Hackberry

Crape myrtle two years after planting from a five gallon and 31 years later

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A permanently maintained, grass-free area helps prevent “Lawn Moweritis” and “Weed-Wacker Woe”

Lawn mowers & string trimmers injure cambium - cut off water & food supply; reduces tree vigor & growth; may lead to death

Vandals caused this damage!

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Better yet – keep trees out of lawns

Helps water trees properly too, as lawns and trees have different water needs

Myth: Securely stake trees to develop a stable root system and strong trunk

Fact: Rigid staking produces weaker trees with less root development

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TIP: Trees (like all plants) need movement – called *thigmomorphogenesis* - to grow strong. Plant growth hormones (auxins) are reduced when movement is restricted --Leads to:

- greater height at expense of trunk caliper (thickness), taper and root development
- tree bends away from the stake due to shading – wood doesn't form properly
- reduced length and number of roots

Rigidly staked tree on left can't stand upright; tree on the right grown without a stake stands on its own

Tip: Use the two-stake method when staking is needed for support:

- First, remove the nursery stake. (Never keep a tree tied to the nursery stake.)
- Place two stakes on either side of the rootball.
- Place ties at the *lowest* point on the trunk where the tree, when pulled to the side then released, will return to the upright position.
  - ties should be near top of stake; tree can move in the wind without injuring the trunk or snapping in two
- Use two broad ties to avoid injury to trunk tissue.

Staking photos #1,2,3 are from a 1978 UC publication #2576 *Staking Landscape Trees* (out-of-print). Based on the research of Harris, Leiser & Davis, professors at UC Davis.

Recent staking examples - (stakes left too tall on most)

Improper staking may weaken tree and cause permanent tree injury




Stakes and ties may cause serious tree damage leading to branch or tree death

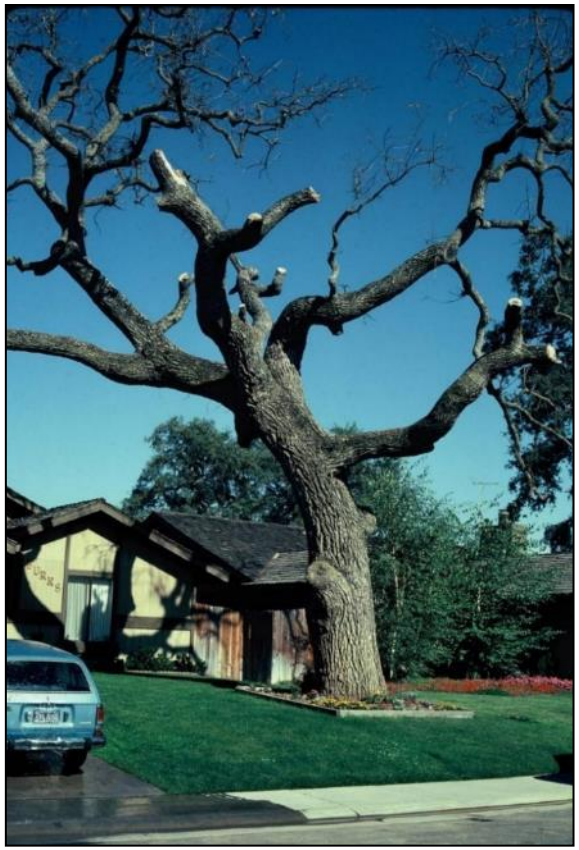
How long to stake? Don't let the tree support the stakes!

- Shortest time possible; 1-2 growing seasons
- If tree won't stand alone after two seasons:
  - Re-stake; lower ties
  - Thin top to reduce weight and wind resistance
  - Encourage trunk laterals
  - Check for circling, potbound roots

Myth: Most tree problems are caused by insects and diseases

Fact: Improper watering is a leading cause of decline & death of trees

Excess irrigation killed these native oaks



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Overwatering can lead to reduced tree growth; root suffocation; root and root-crown diseases; decline & death

Algae & moss in a tree basin in summer is a sign of irrigating too frequently

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Frequent lawn irrigation/poor drainage led to oak root fungus infection of camphor and golden raintree; eventually killed the trees

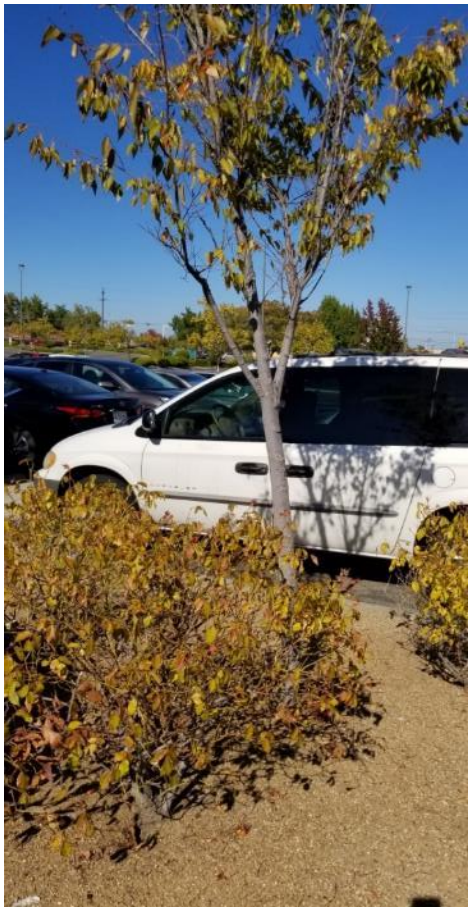
Mushroom fruiting bodies on this *Cinnamomum camphora* tree are “honey mushroom” of *Armillaria* root rot fungus

Mycelia of *Armillaria* fungus under bark of *Koelreuteria* have strong mushroom odor

Too much water, too often is the cause of these pineapple guavas' decline; low oxygen and root rot is killing the plants

Thick moss in a planter in July is a bad sign!

Underwatering trees can also lead to reduced growth, decline and death from poor leaf and root quality, sun scalded trunks and insect borers



Tip: Know your soil and when to water. Check soil before and after watering with a probe, moisture meter, trowel or screwdriver.

Photos from 1980's UC slide show on soils by Farm Advisor, Lee Frey, Sac. Co.

- Determine how deep the water went into the soil
- See how far the water spread from the plant
- Look for runoff, puddling, wet or dry areas

Feeling the soil helps determine if it's dry or wet

Soil probes are available on-line and maybe at some local nurseries and garden centers; water districts often give out free moisture meter to customers

- These are called soil samplers, tubes or probes
- One on-line brand is called a *tube sampler soil probe*

Myth: "Deep" roots mean trees don't depend on lawn watering

Fact: Trees decline or die if lawn irrigation is reduced or stopped; tree roots are shallow, especially so in lawns

Ornamental pear during 2014 drought

The dying or dead birch, redwoods and ash tree were all photographed the summer of 2022.

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Myth: Trees grow "too tall" and must be topped (headed back) for safety

Eucalyptus (far left) are often the victims of topping

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Fact: Topped trees are hazardous, prone to decay, borers, limb breakage & blowing over

Never top trees!!

Bulletin #8 *Don't Top Trees* available on-line from the Arbor Day Foundation

Topped trees can never be restored to a strong, safe tree!!

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Topping destroys a tree's function and beauty and is a blight on the neighborhood

A topped tree is never a safe tree! Someday branch or tree failure will occur!

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This is not pollarding. It is improper pruning

Myth: Mulberry trees need to be pruned back annually

Fact: Topping (heading) mulberries eventually leads to dieback, decay & limb failure;

A topped mulberry is a hazard and can't be restored.

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Pollarding is the removal of one or two years' worth of growth using hand shears. These are properly pollarded sycamores.

Sycamores pruned using thinning cuts look natural

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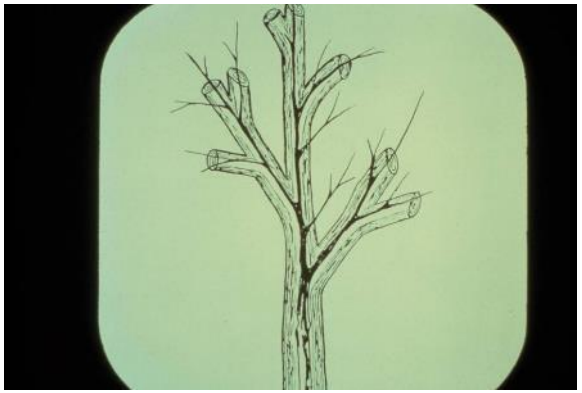
Fact: Thinning is the proper pruning cut for all landscape trees

A thinning cut is removing a branch back to its point of origin - retains the *original branch attachment* and natural limb growth

- reduces unwanted shoots; minimizes decay; limbs less likely to fail in a wind storm; tree is safer, healthier and more attractive



Illustrations from 1980's slide show based on the 1981 UC Pub. #2574 *Pruning Landscape* Trees (out of print) written by Harris, Leiser & Davis, UCD & Douglas Hamilton, Alameda Co

Proper thinning retains a tree's original growth pattern, beauty & safety

- At least ½ the foliage should originate in the lower two thirds of the tree.
- Remove as little of the leafy crown as possible. No more than 25% of the foliage. – less is better for older trees

Mulberry pruned properly with thinning cuts

Native Valley Oaks - *Quercus lobata*

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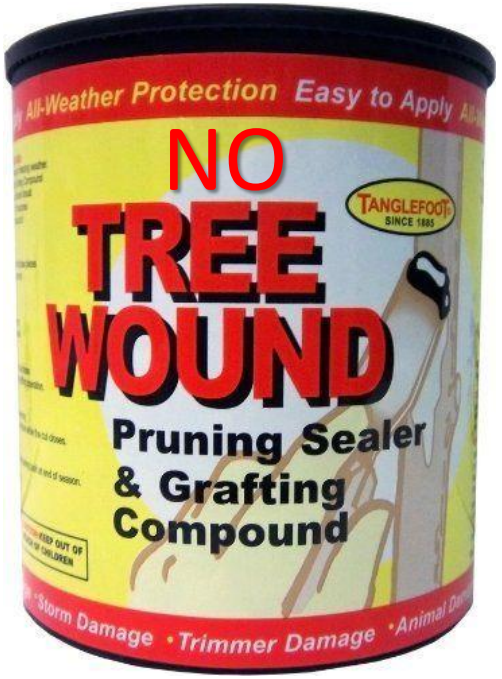
Excessive thinning or *lion's-tailing** is often as harmful as topping; leads to sunburn, borers, decay, wind damage & limb breakage

*Improper pruning technique resulting in a concentration of foliage at the tips of branches and multiple branch wounds

Myth: Prune close to the trunk or branch and paint the wound for better wound "healing".

Fact: These are obsolete, often harmful, practices. Trees don't "heal" wounds; they wall them off, aka compartmentalize. Wound paints are ineffective. May be toxic to plant tissue.

Don't use!!



Flush cuts remove the *branch collar* (the tree's natural barrier to decay); creates larger trunk wounds; invites decay fungi and bark beetle attack

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Tip: To remove a branch correctly, prune just outside the *branch collar* – the wrinkled, swollen area at the base of all branches contains decay inhibiting chemicals

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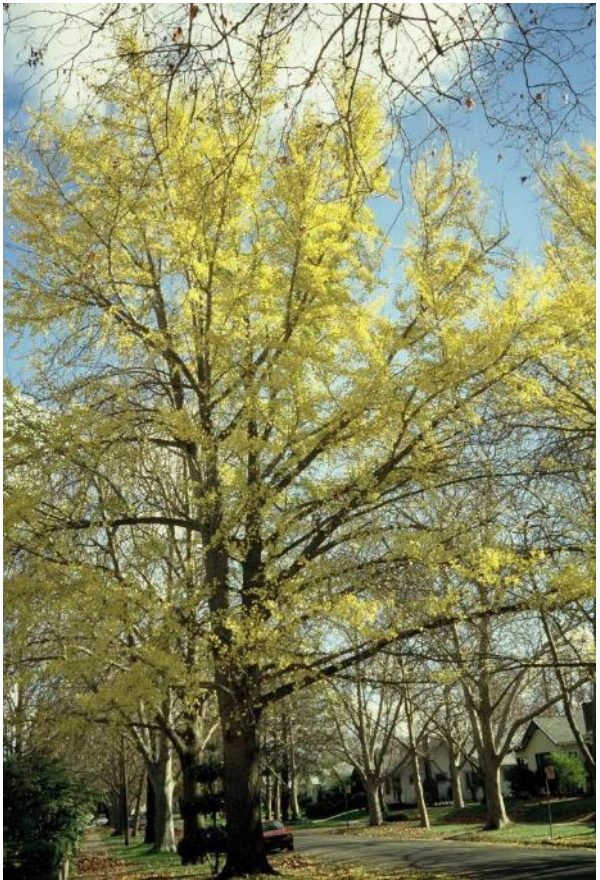
Proper pruning cuts aid wound callusing and closure; helps prevent decay fungi and insect attack

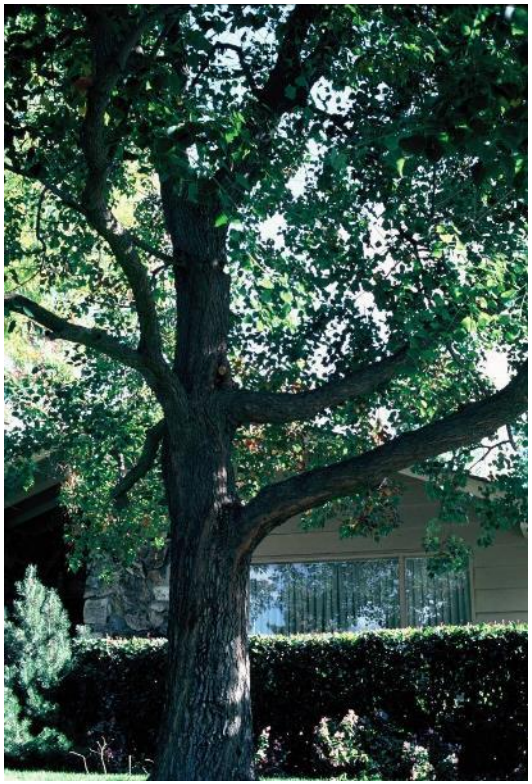
Educated pruning results in a tree that is attractive and safe while saving time and resources

Red Maple

Valley Oak

Properly cared for trees add beauty, health benefits and additional value for homes, the community & wildlife.





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I like photographing trees!

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