

UC Cooperative Extension



Advice to Grow by...Ask Us!
Master Gardener Program

University of California
Agriculture and Natural Resources

Landscape Tree Care (Arboriculture)

Pam Geisel
Environmental Horticulture Advisor
emeritus

Landscape Tree Care

Arboriculture

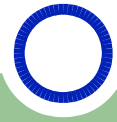
- Identification
- Tree selection (nursery and variety)
- Where to plant your tree
- How to plant your tree
- Tree staking
- Tree training and pruning
- Keeping your trees healthy

Tree Identification



Special Thanks to Scott Oneto for Images in this part of the presentation.

Why Tree Identification?



- Properly identify pests and giving pest control recommendations
- Critical for making good planting recommendations
- Identifies you as a person with experience & authority

Using Leaves for ID



- Leaf Anatomy
- Leaf Types
- Leaf Arrangement
- Leaf Venation
- Identification Exercise

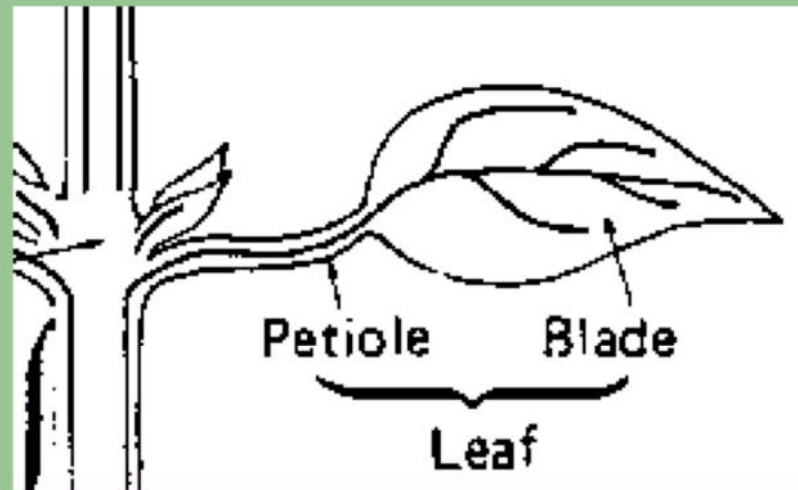
Leaf Anatomy

- Leaves composed of:

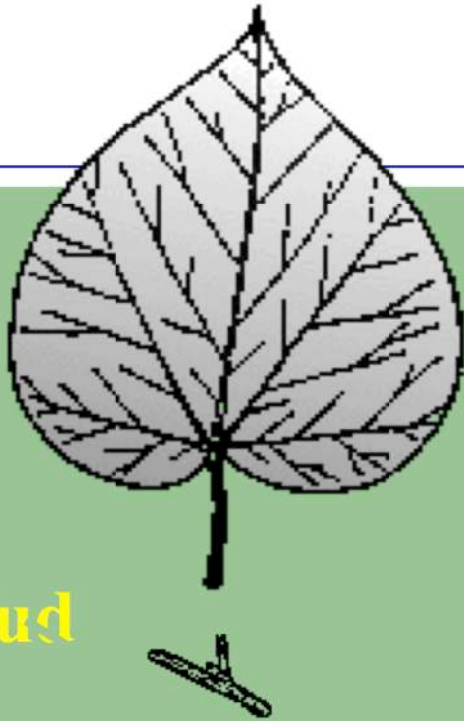
- Blade
- Petiole

- Types of leaves:

- Simple
- Compound
 - ✦ Pinnate
 - ✦ Palmate



Types of Leaves



Bud

Bud

Simple

1 Blade / 1 Petiole



No Bud

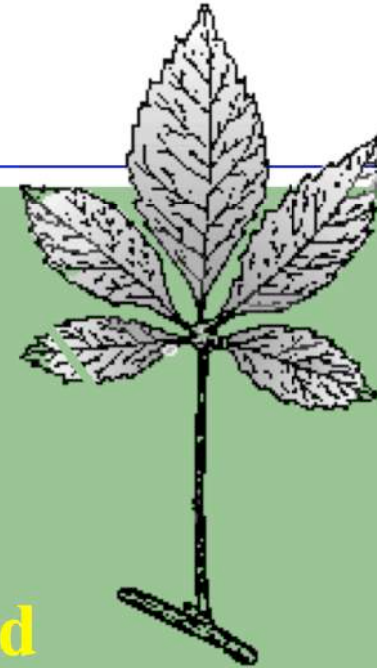
Pinnately

&

Palmately

Compound

1 Petiole / >1 Leaflets



Bud



Leaf Type

- Simple Leaf
 - A leaf with a single blade

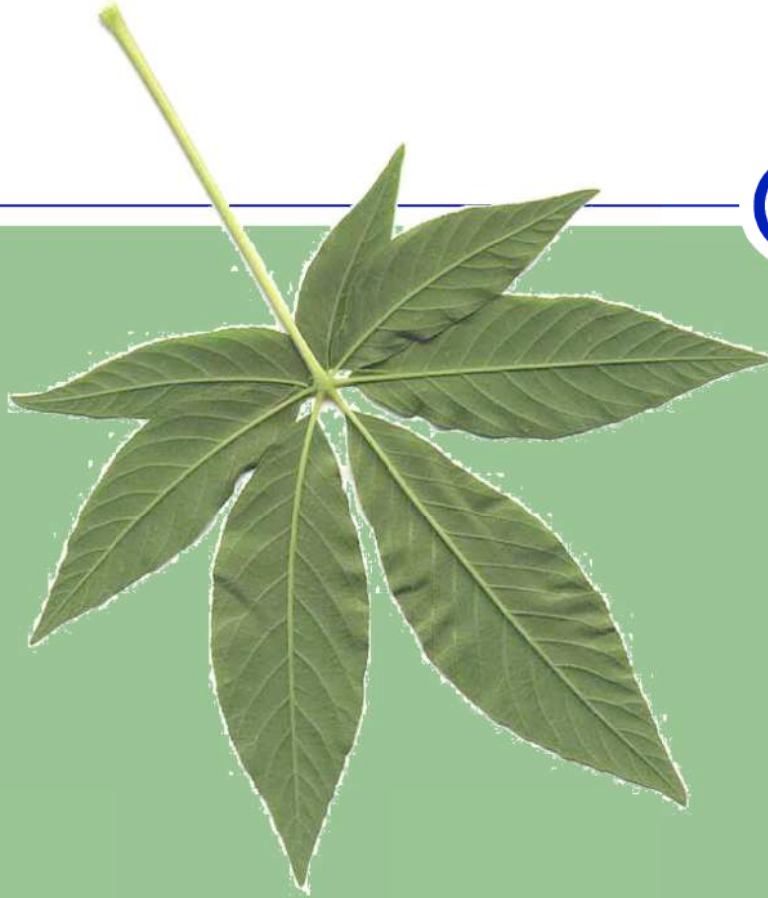


Leaf Type

- Pinnately Compound leaf
 - A leaf with multiple leaflets
 - ✦ Shaped like a feather



Leaf Type



- **Palmately Compound**

- A compound leaf with leaflets radiating from a common point of attachment like the fingers of a hand

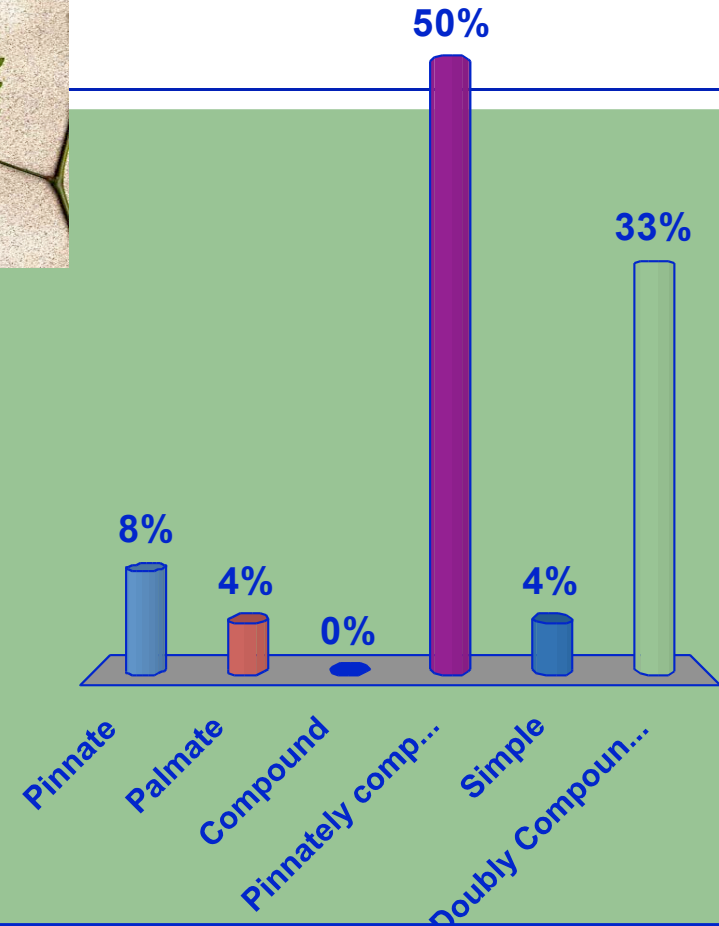
What term best describes this leaf?



What term best describes this leaf?



1. Pinnate
2. Palmate
3. Compound
4. Pinnately compound
5. Simple
6. Doubly Compound



Leaf Margin



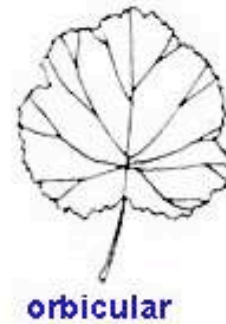
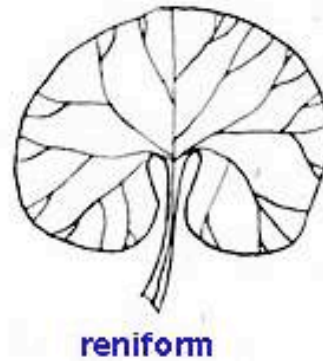
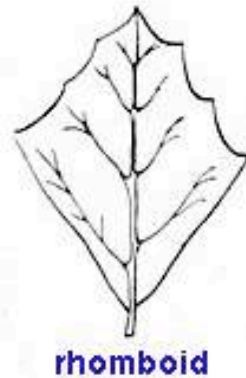
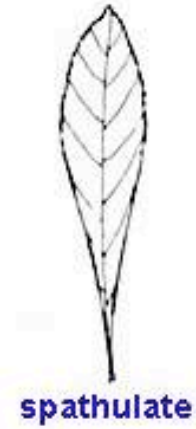
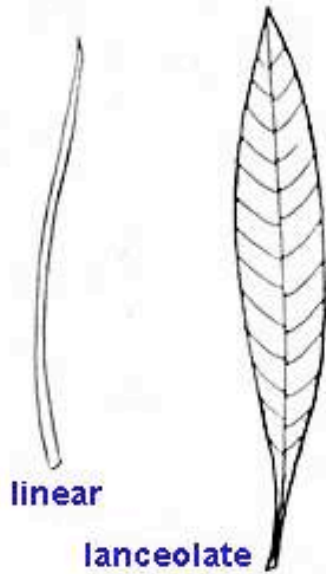
Entire



Lobed and/or serrated



Leaf Shape



Leaf Arrangement



Alternate



- One leaf at each node

Leaf Arrangement



Opposite



- Two leaves attached at each node
- Borne on opposite sides of the stem

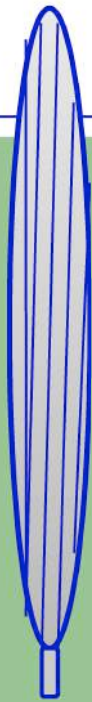
Leaf Arrangement



Whorled

- Three or more leaves symmetrically distributed around the same node

Leaf Venation



Parallel



Palmate



Pinnate

Leaf Venation

Parallel venation



- Pattern of veins in a leaf where several primary veins extend side by side throughout the full length of a leaf
- Characteristic of grasses and most monocots

Leaf Venation



Palmate venation

- Pattern of veins in a leaf in which three or more primary veins diverge from a common point of a leaf blade
- Secondary veins diverge from each primary vein

Leaf Venation



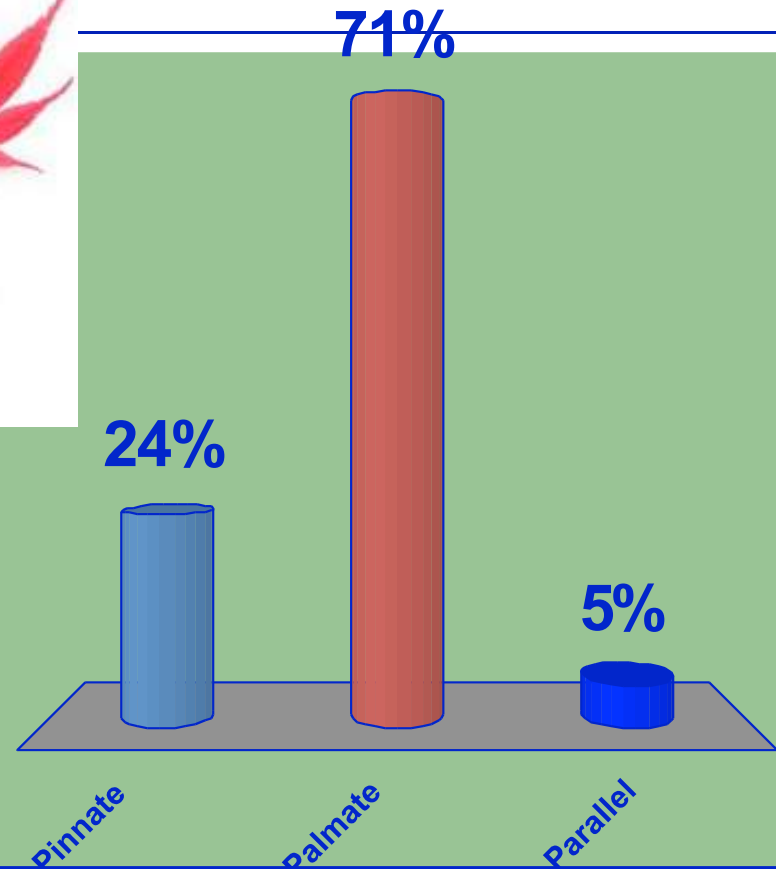
Pinnate venation

- Single large mid-vein and secondary veins diverging from it.

What type of venation does this leaf have?



1. Pinnate
2. Palmate
3. Parallel



Plant Material & Identification Resources



UC Davis Arboretum All-Stars

http://arboretum.ucdavis.edu/arboretum_all_stars.aspx



The screenshot shows the UC Davis Arboretum All-Stars website. At the top, there is a navigation bar with a "home" link and the UC Davis Arboretum logo. Below the logo is a large image of a tree in a garden. The main content area features the title "Arboretum All-Stars" and a paragraph describing the program. To the left of the text are two circular images of flowers. To the right is a vertical sidebar with a list of navigation links. At the bottom right, there is a small image of a red flower and an "Inter" logo.

home

UC DAVIS ARBORETUM

Arboretum All-Stars

The horticultural staff of the UC Davis Arboretum have identified 100 tough, reliable plants that have been tested in the Arboretum, are easy to grow, don't need a lot of water, have few problems with pests or diseases, and have outstanding qualities in the garden. Many of them are California native plants and support native birds and insects. We are pleased to recommend these great plants for Valley-wise gardens. The vast majority of All-Star plants can also be successfully planted and grown throughout California.

Learn about Arboretum All-Stars

- Use the [All-Stars Database](#) to find the right plants for your garden
- [Click](#) to browse through the 100 UC Davis Arboretum All-Stars
- [Click](#) to view our new Arboretum All-Stars podcast (slide show with audio)
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See Arboretum All-Stars at the UC Davis Arboretum

When you visit the Arboretum demonstration gardens, you will see a series of beautiful, brightly-colored signs identifying the Arboretum All-Stars, each with a photo of the plant in bloom, a list of its outstanding

PLAN YOUR VISIT

VALLEY-WISE GARDENING

EDUCATION & RESEARCH

GATEWAYS PROJECT

SUPPORT

VOLUNTEER

Arboretum All-Stars

All-Stars Plant Search

Plant Sales/ Nursery

Gardening Reference

Resources

ABOUT US

CALENDAR

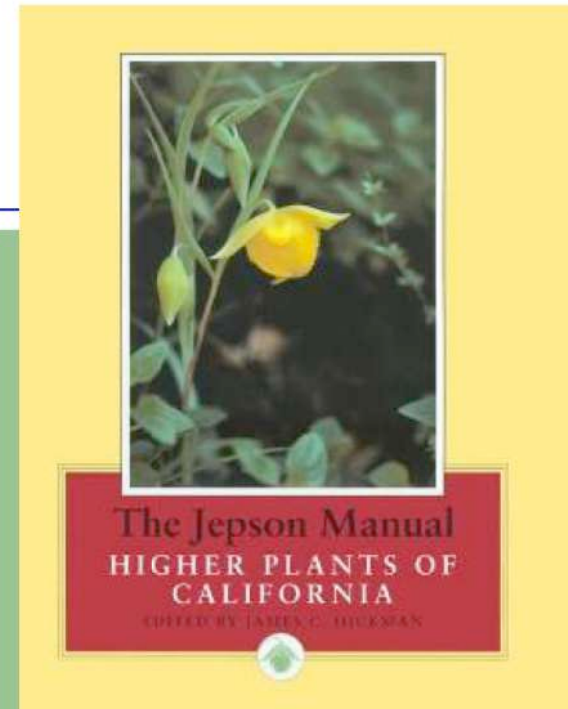
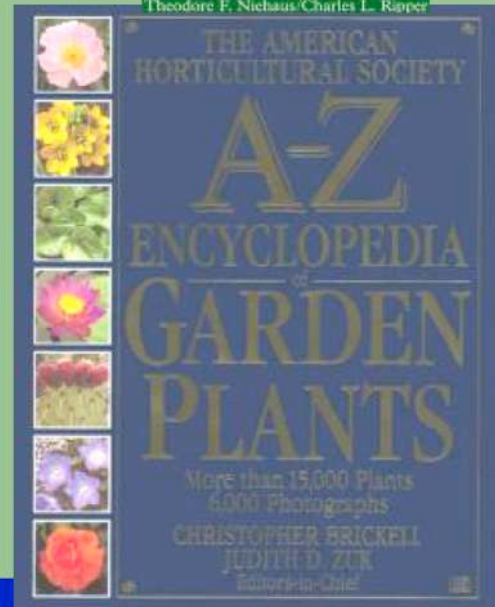
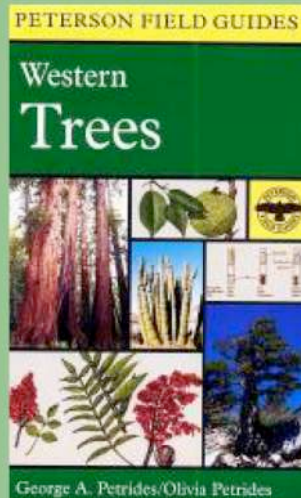
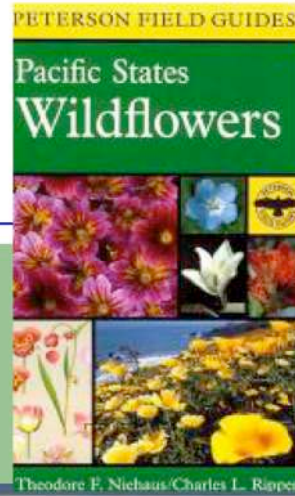
ARBORETUM ALL-STARS

MEMBERSHIP

NEWS

Inter

Reference Books



...or ask someone from
UCCE:

An Advisor, Master Gardener,
Specialist, Program Representative

Educational Plant Links

Please note that PLANTS is not responsible for the content or availability of other websites referenced below.

Contents

- Educational

- Automated Identification Keys
- Edible Plants
- Glossaries & Dictionaries
- Herbarium Specimen Databases
- Kids Web Sites
- Plant Classification
- Plant Collecting & Herbaria
- Plant Families
- Plant Identification
- Seeds
- Teacher Resources-Agriculture
- Teacher Resources-Botany

http://www.nrcs.usda.gov/Internet/FSE_PLANT_MATERIALS/publications/woodypocketguide.pdf



Search by Name

[Search Trees by Characteristics](#)

[Search Help](#)

[About SelecTree](#)

[Right Tree Right Place](#)

[Utility Precautions](#)

[Browse securely](#)

SelecTree: A Tree Selection Guide

Search for trees

- [Tree Characteristics Glossary](#)
- [Search Help](#)

I never knew how soothing trees are - many trees and patches of open sunlight, and tree-presences - it is almost like having another being.

— D.H. Lawrence



Chamaecyparis lawsoniana
'Stewartii'

Useful for extensive landscape areas or as an accent plant. Common in...

Photo by Robert O'Brien

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Search by Name

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[About SelecTree](#)

[Right Tree Right Place](#)

[Utility Precautions](#)

[Browse securely](#)

SelecTree: Search Trees by Characteristics

Tree Name

Tree Name

Planting near power lines? See [Utility Precautions](#).

Tree Characteristics

Max Height (ft)

Growth Rate

Tree Shape

Habit

Bark Color

Bark Texture

Armament

Branch Strength

Litter Type

Leaf, Flower & Fruit Characteristics



Acer capillipes

Young leaves are red...

Photo by W. Mark and J. Reimer



Welcome to the Herbaria

The University and Jepson Herbaria of the University of California at Berkeley are two collections of pressed plants housed together along with research labs, libraries, and archives. Together the Herbaria hold about 2,200,000 specimens, one of the largest collections in North America.

- The **University Herbarium**, established in 1895, holds botanical collections from around the world.
- The **Jepson Herbarium**, established in 1950, specializes in the vascular plants of California.

News from the Herbaria

The Jepson Herbarium participates in the 2008 California Wildflower Show at the Oakland Museum

Hundreds of wildflowers from around the state on display; slide lectures on horticulture, California flora, and the history of plant collecting in the state. [Link](#)

Saturday, April 19 10 AM - 5 PM
Sunday, April 20 1 PM - 4 PM

More news... <http://ucjeps.berkeley.edu/>

Featured Projects



- About ▶
- University Herbarium ▶
- Jepson Herbarium ▶
- Databases ▶
- News ▶
- People ▶
- Education ▶
- Online Resources ▶
- Publications ▶
- Research ▶
- Libraries, Archives ▶
- Contributing Authors ▶
- Quick Links ▶



Practical Exercises

Exercise 1



For each tree specimen identify

- venation
- leaf/leaflet structure
- Identify key characteristics based what you can observe with each specimen

Practical Exercises

Second Exercise



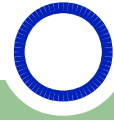
- Please list a tree for each of the following
 - Dry climate
 - Large park like tree
 - Tree with few pest problems
 - A Native Californian

I. Tree Selection



1. **NURSERY STOCK**
2. **CONSIDER LOCAL CLIMATE/SITE**
3. **SELECT LARGE TREES IF POSSIBLE**
4. **EDIBLE LANDSCAPE**
5. **AVOID INVASIVE SPECIES**

Tree Selection: Properly Identified

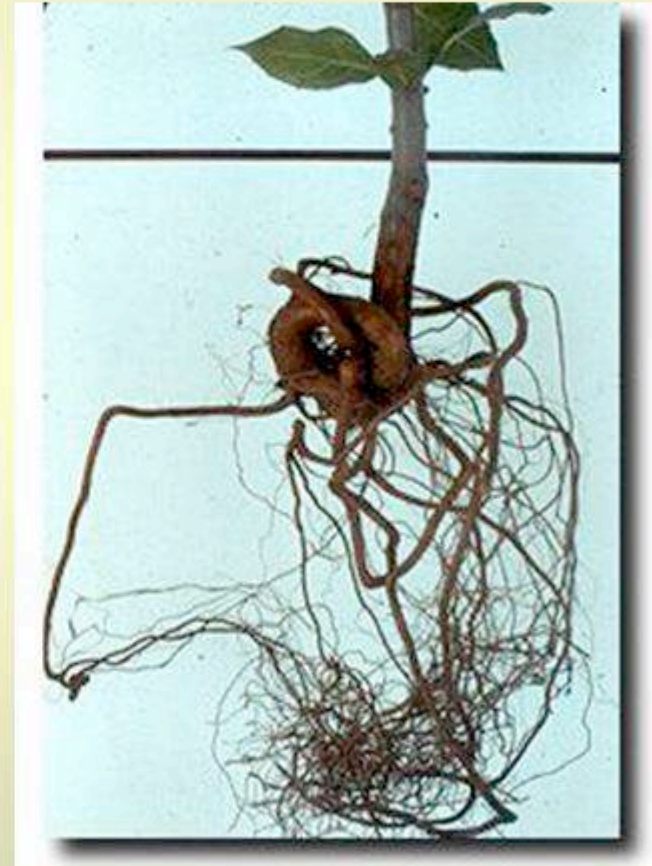


- Labeled individually by species and variety
- Be free of insect pests and diseases
- Be free of mechanical injuries

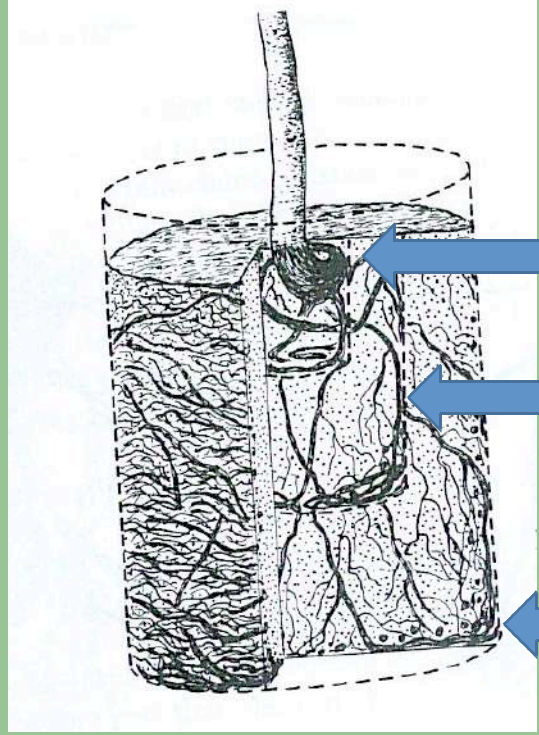


Selecting Quality Nursery Stock

- Root Structure:
Circling and/or kinked roots
- Exposure of root collar
- Rootball size relative to top and trunk size
- Root health



Tree Selection: Quality Nursery Stock

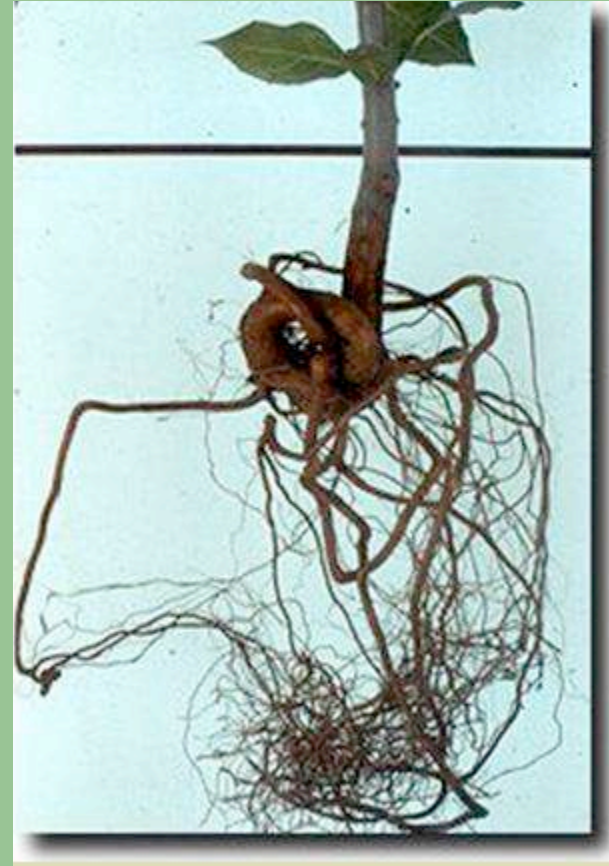
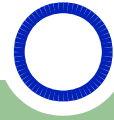


Trunk/crown surface root zone

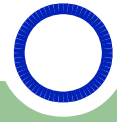
Center root zone

Peripheral root zone

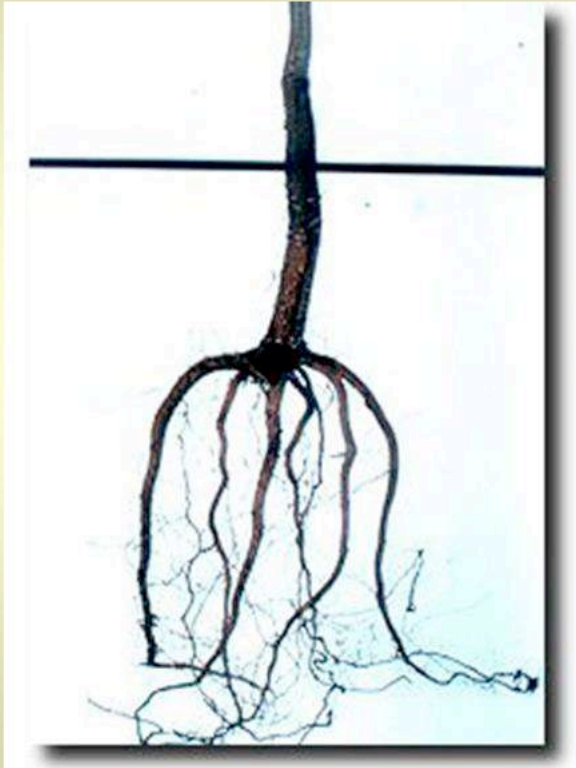
Tree Selection: quality nursery stock



Tree Selection: Quality Nursery Stock

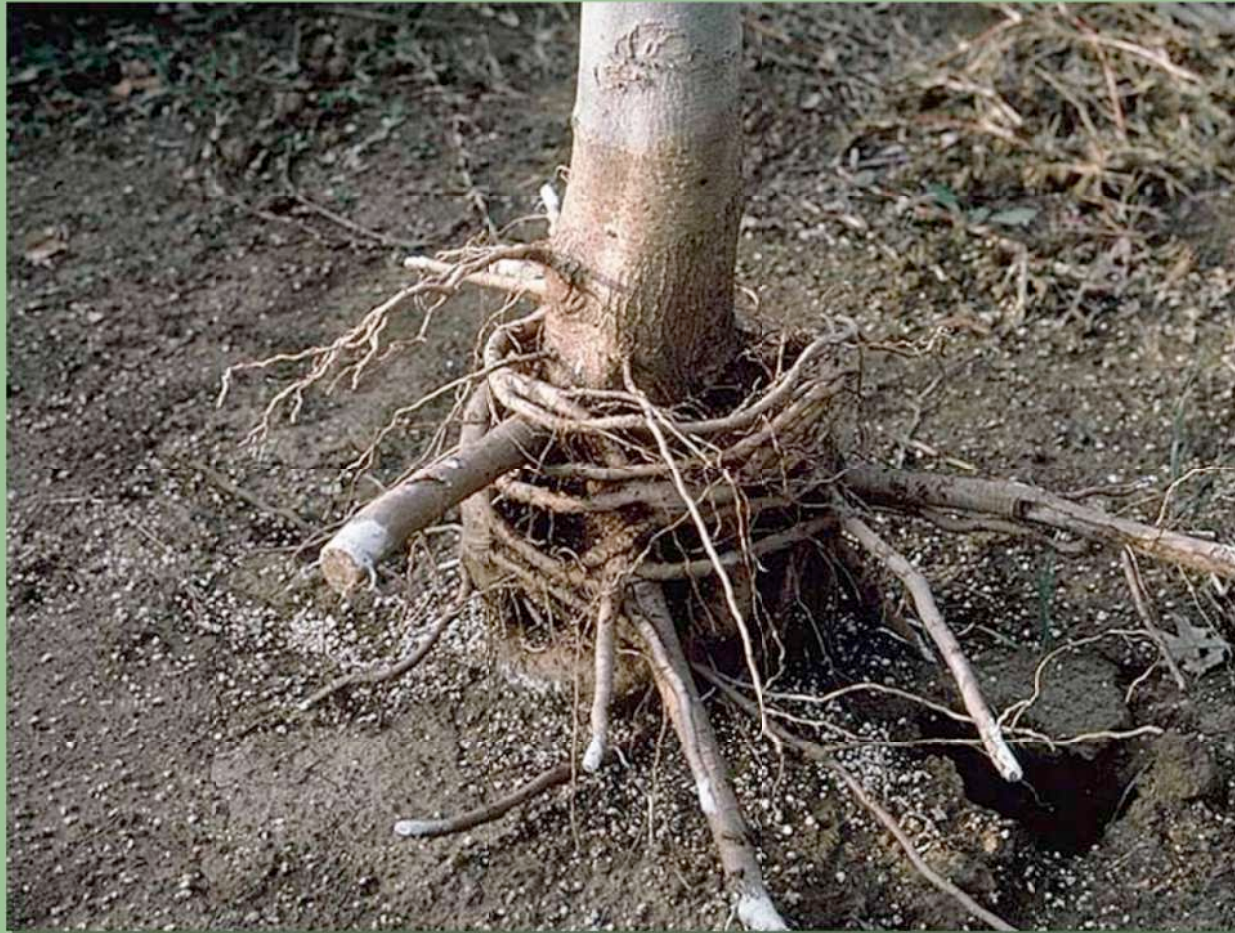


Preferred root structure

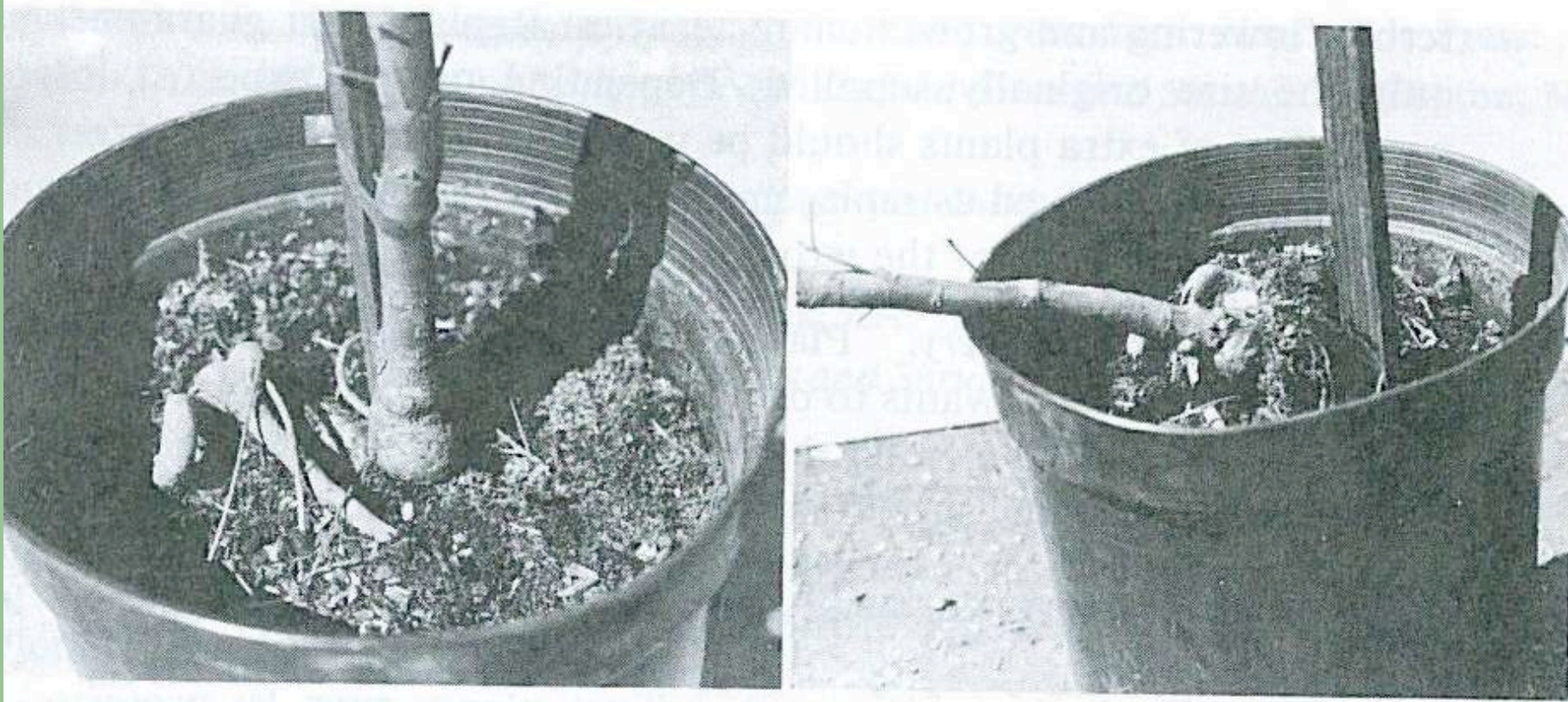
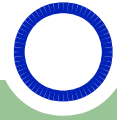


Avoid roots like these

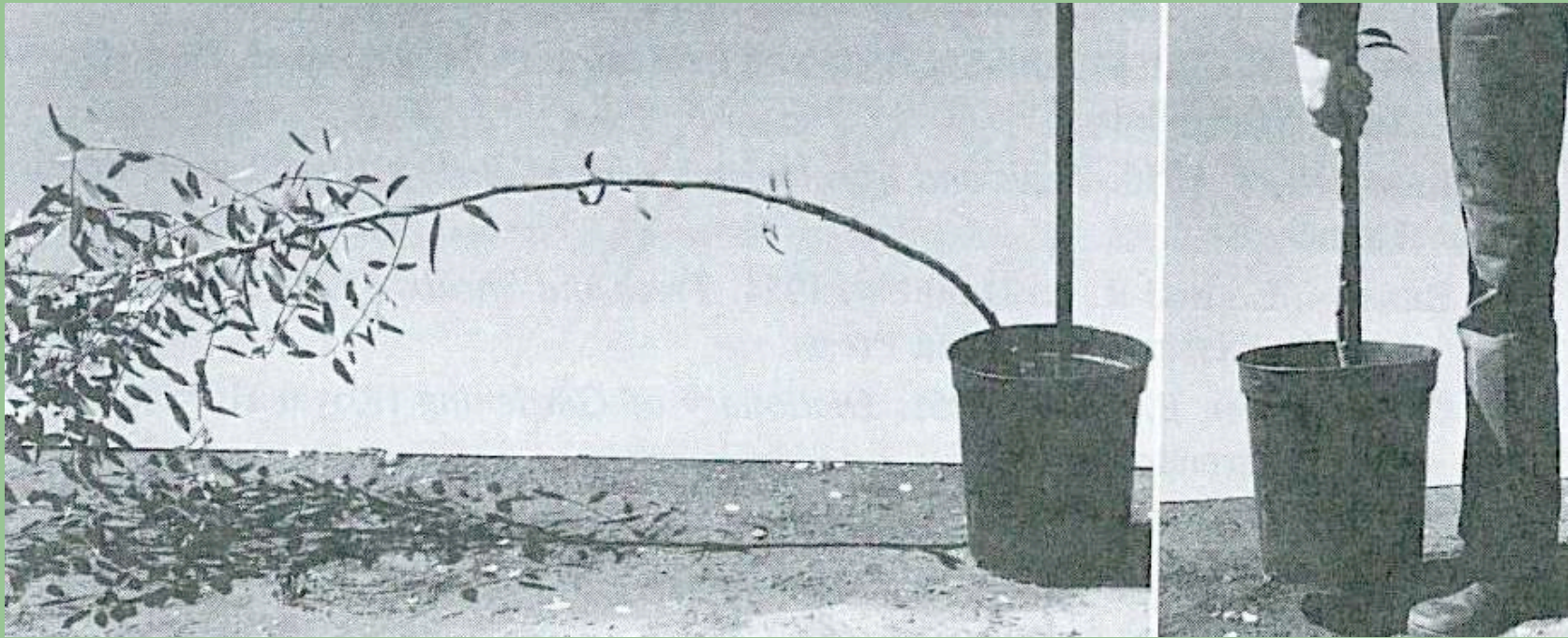
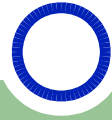
Tree Selection: Quality Nursery Stock



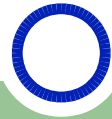
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Tree Selection: Quality Nursery Stock



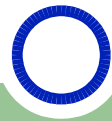
Tree Selection: Root Collar



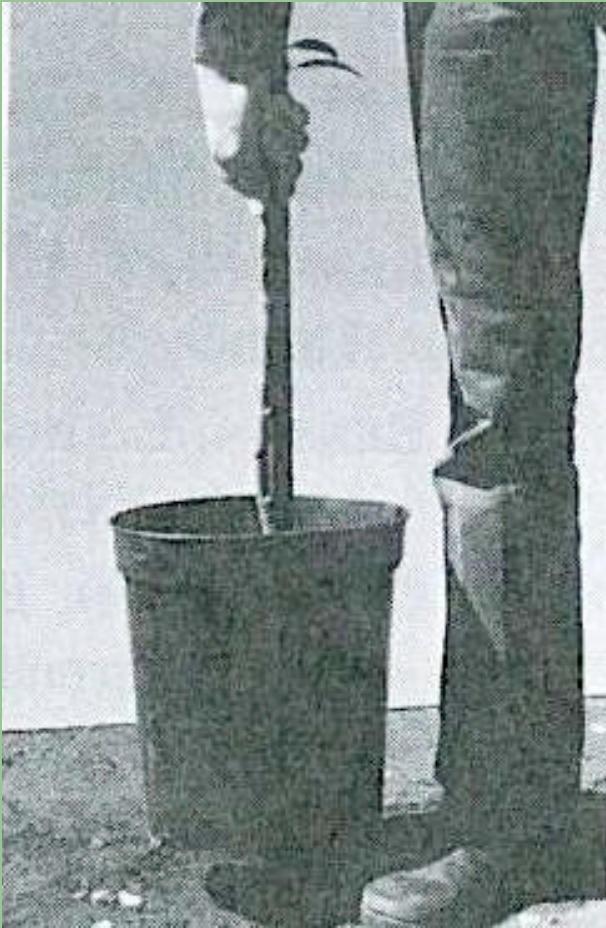
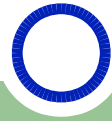
- The uppermost roots or Root Collar should be within 1" above or below soil surface



Tree Selection: Rootball

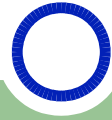


Tree Selection: Rootball

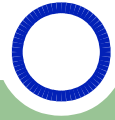


When lifted,
both the trunk
and root
system move
as one.

Tree Selection: Rootball



Tree Selection:

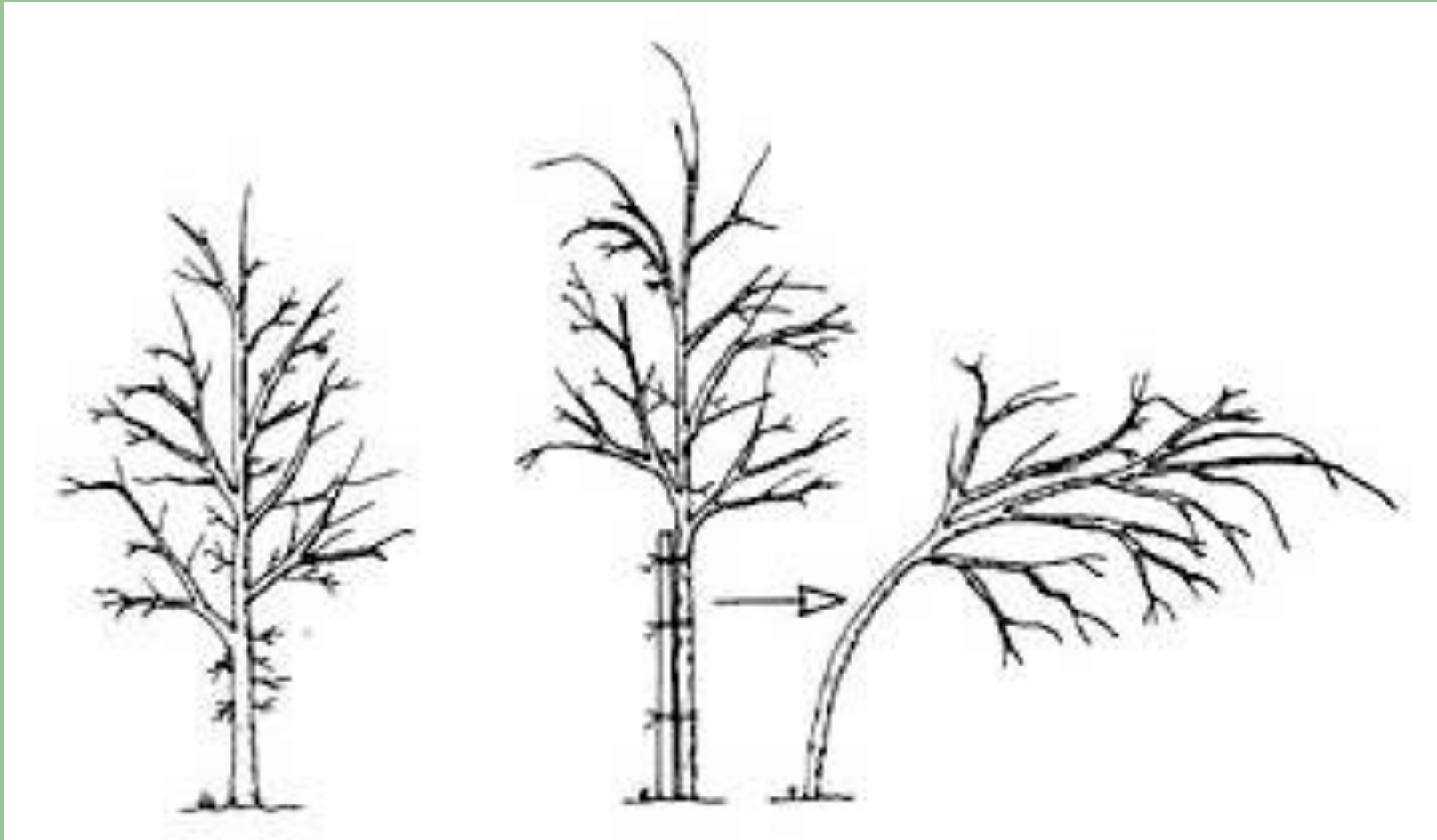
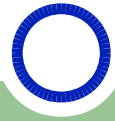


Trunk and Crown Characteristics for Nursery stock

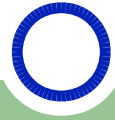
- Trunk diameter and container size
- Trunk taper
- Central leader
- Radial distribution of main scaffolds
- Branch diameter relative to trunk
- Angle of attachment
- Distribution of temporary branches



Tree Selection: Trunk Diameter, Taper and Size



Tree Selection: Trunk Diameter, Taper and Size



Trunk diameter at 6" (six inches) above the soil surface:

Container Size Trunk Diameter (inches)

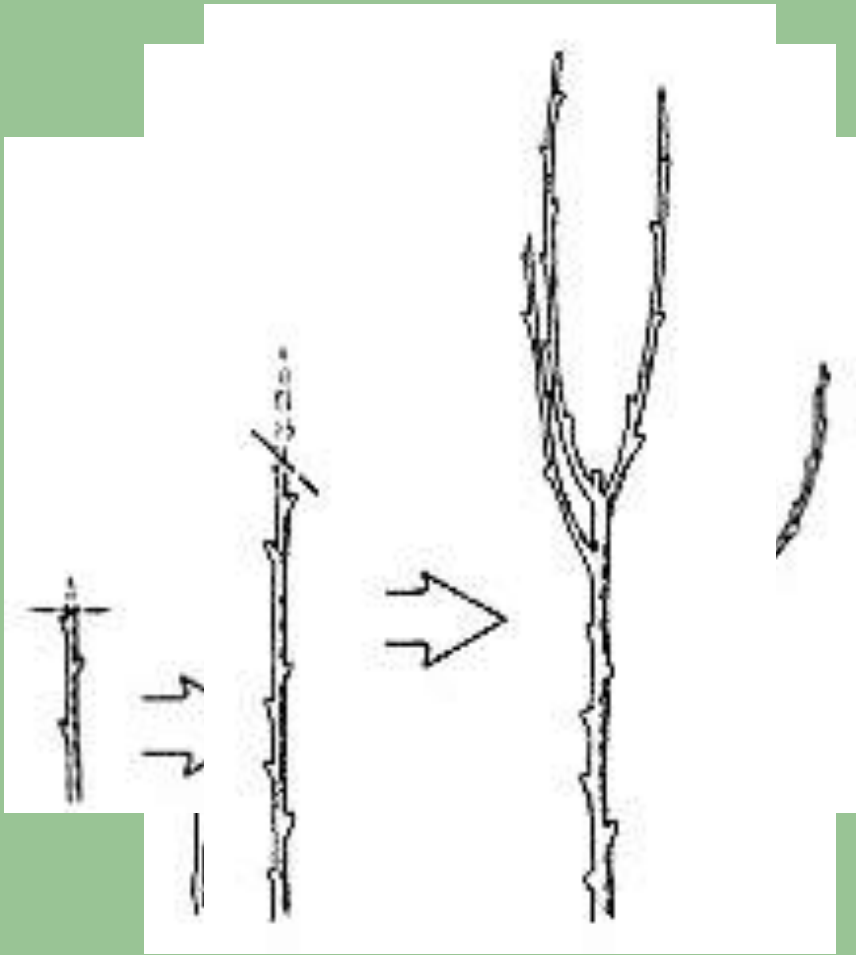
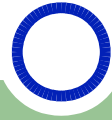
5 0.5" to 0.75"

15 0.75" to 1.5"

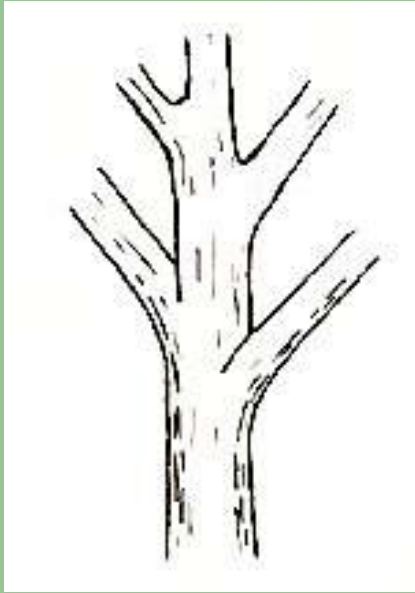
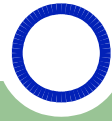
24 inch box 1.5" to 2.5"



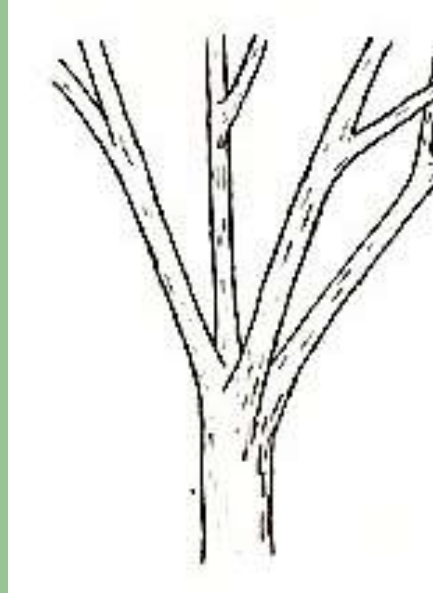
Tree Selection: Central Leader



Tree Selection: Main Branches

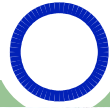


Good



Not Good

Tree Selection: Main Branches



Tree Selection: Branch Diameter



Good

Not Good

Tree Selection: Angle of Attachment



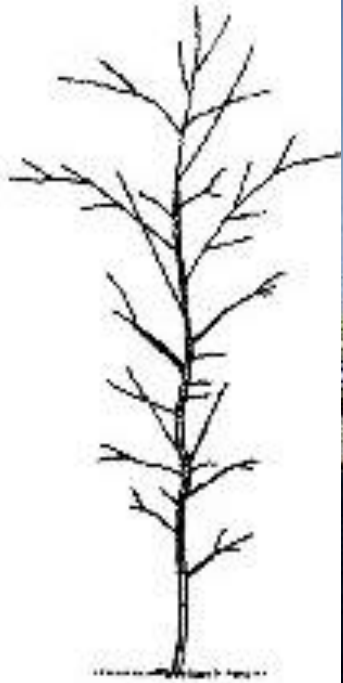
Good

Not Good

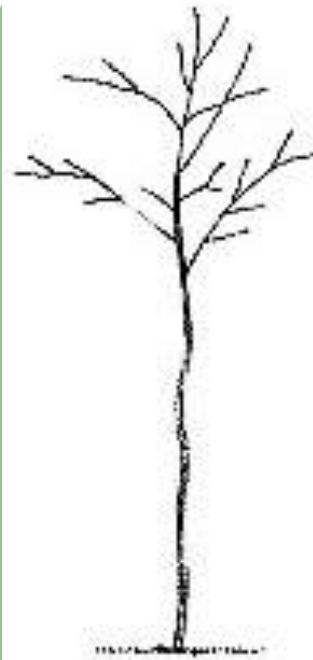
Narrow angles of attachment lead to tree failures



Tree Selection: Temporary Branches

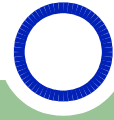


Good



Not Good

Select Trees For Local Climate And Site



- Use landscape adapted natives, or climate appropriate trees.
- Select trees with resistance to key local pests.
- Consider characteristics: shape, bark patterns, leaf and flower color.
- Consider leaf and flower litter.
- Consider longevity
- Select for your personal taste and landscape needs.

UC Davis Arboretum All-Stars

http://arboretum.ucdavis.edu/arboretum_all_stars.aspx



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home



ARBORETUM
All Stars

Arboretum All-Stars

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Arboretum All-Stars

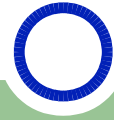
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- Plant Sales/ Nursery
- Gardening Reference
- Resources

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- CALENDAR
- ARBORETUM ALL-STARS
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Local Botanic Gardens, Arboreta etc.





Trees *not*
appropriate for
local climate and
site...



utterstock.com · 63478216

Jacaranda in
Northern
California?

Tree Selection: Avoid Key Pests



Common name**ELB****DED**

English elm

HS

HS

Scotch elm

HS

HS

American elm

S

HS

'Homestead'

S

R

'Liberty' group

S¹

MR

'New Horizon' and 'Valley Forge'

S¹

R

'Pioneer'

S

R

Siberian elm

S

MR

'Frontier'

MR³

R

Chinese elm

R⁴

MR

'Prospector'

R

R

zelkova

R

MR

hackberry

NS

NS

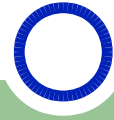
hornbeam

NS

NS

Trees are listed in order by susceptibility.

Tree Selection: Characteristics and Litter

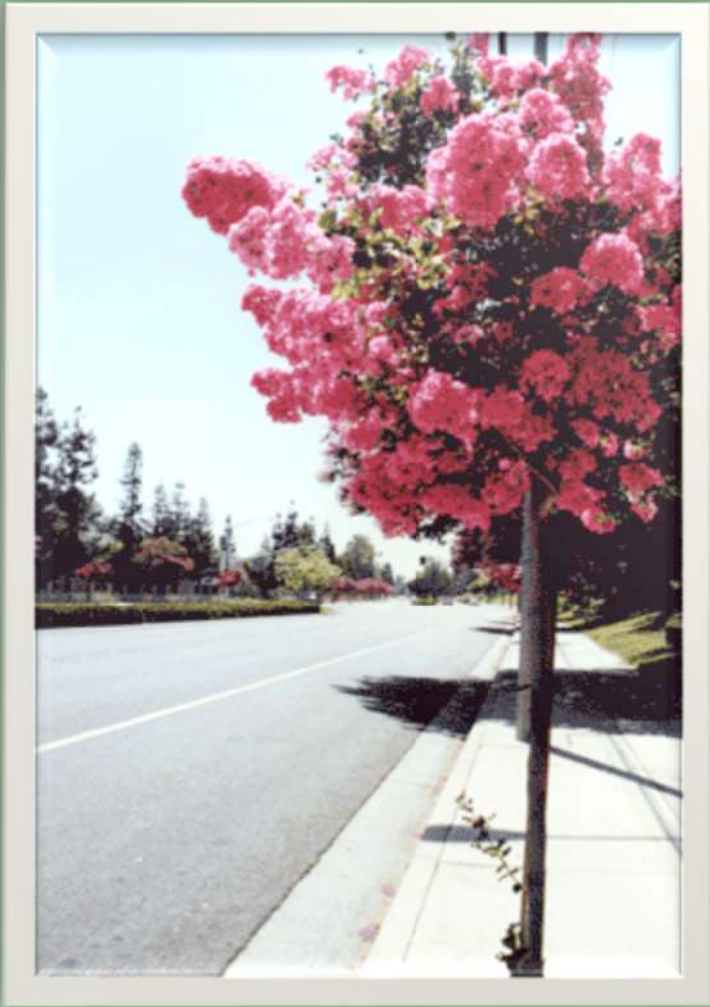


Plant Large Trees That Have Longevity



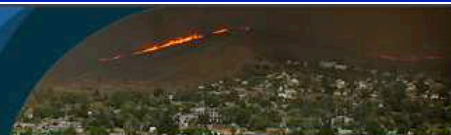
- Trees moderate temperature thereby reducing fossil fuel usage for heating and cooling.
- Larger trees can seize more CO₂ and cast more shade.
- Trees remove greenhouse gases from the atmosphere and store it until they decompose- The longer they live the better.





Fire Safe Landscapes

UC
CE University of California Cooperative Extension
Sustainable and Fire Safe Landscapes



PRINT

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About Us

Climate, Fire, and Habitat in Southern California

Invasive Plants and Wildland Health

Defensible space, fire safe landscaping, and fire hazard reduction

Fire resistant buildings

Chronology of Wildfires in Southern California

Fall

Winter

Spring

Summer

Pests and Diseases of Southern California Oaks

[Southern California SAFE Landscapes Guidebook](#)

[SAFE 2009 LA Calendar](#)

[SAFE 2009 Ventura Calendar](#)

Wildland Fire Safety Starts in the Home

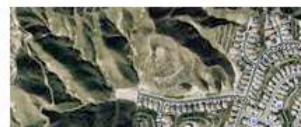


Fire safety in the wildland-urban interface starts in the home, with the use of fire-resistant building materials and architectural features, good practices to avoid starting fires in and around the home, and a good fire response plan for your family. Beyond the home, develop a fire-resistant landscape where plants and hardscape are maintained so that they do not easily transmit fire. Establish your defensible space so that the risk of fire transmission to

your property is reduced, and **fire fighters can safely protect your home**. Fire is a part of the natural environment in Southern California. There is no way to completely ensure that your home will not be exposed to wildfire. If you live in the wildland-urban interface, it is not a question of IF a fire will occur, but WHEN. Preparation for wildfire requires that YOU take responsibility for your safety, property, and pets in the event of a fire. Maintain your property to reduce the risk of damage during a wildfire, and be **fully** prepared to evacuate. The information in this guidebook can help you reduce, but not eliminate, the risk of fire.

WHAT IS THE WILDLAND URBAN INTERFACE?

The wildland-urban interface (WUI) is the area where urban and



More Information

SAFE Landscapes is a project of the Natural Resources Program based in Los Angeles and Ventura County Cooperative Extension. Click for more about other CE programs in [Los Angeles](#) and [Ventura](#) Counties

Click here to download the Southern California SAFE Landscapes Guidebook

Click here for the [SAFE Landscapes in the WUI Fact Sheet](#)

Click here for the [Making Your Property Fire Safe Fact Sheet](#)

UCCE Collaborated on the [Roadmap to Fire Safety in the Santa Monica Mountains](#)

UC Fire Links:

[UC Center for Fire Research and Outreach](#)

[California Fire Science Consortium](#)

[UC Oak Woodland Management](#), for information on fire recovery in oak wildlands

<http://ucanr.edu/sites/SAFElandscapes/>



Select trees for less to the landfill...



- Plant to match the space, to avoid constant pruning to maintain a certain size.
- Compost/mulch/leaves on site
- Reduced water/fertilizer applied.
- Salvage and recycle

Plant to match the space: Avoid constant pruning and the creation of green waste.



Xylosmas don't stay small for long!

Carolina Cherries can grow up to 40'+ surface roots + fruit = disaster



Compost on Site or Mulch Waste



But don't make it too much of a good thing!

Salvage & Recycle

Find long term uses for dead or dying trees

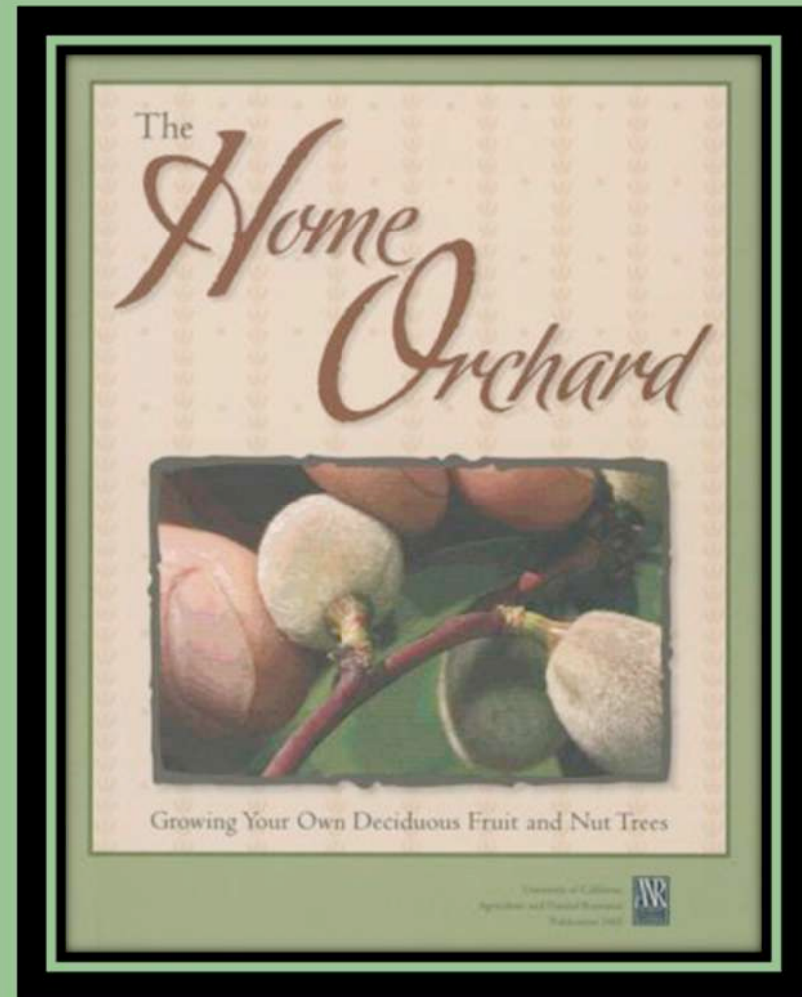


Tree Selection ... Edible Landscapes

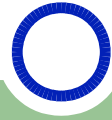


Grow food in your garden for yourself, your family and your neighborhood

- Edible landscapes
- Trees with edible fruit
- Support over the fence sharing
- Personal orchards or container fruit trees



Avoid Planting Invasive Species



- Tamarix (Salt Cedar)
 - Siberian Elm
 - Tree of Heaven
 - Chinese Tallow tree
-
- CA Invasive Plant Council
www.cal-ipc.org/
 - www.plantright.org



What are invasive plants?

Regional invasive and alternative plants

What you can do

Benefits of Planting Right

FAQ

Testimonials

Water gardens

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SPREAD THE WORD

[PlantRight](#) > [Invasive Plants and Alternatives](#) > Recommended alternatives to *Sapium sebiferum*

RECOMMENDED ALTERNATIVE PLANT DETAILS

Have a gorgeous garden and a successful business — all with non-invasive plants! Below are recommended alternatives to the invaders in your region that are beautiful, vigorous, and appropriate for your climate. Grow them with pride, and the confidence that you're protecting California from invasive plants!

If you are a home gardener, ask your nursery professional for even more ideas.

GUIDE TO PLANT CARE

☀ FULL SUN ☀ PARTIAL SUN ● SHADE

💧 HIGH WATER ⚖ MEASUREMENT 🚰 LOW WATER 🚫 DROUGHT TOLERANT

Plant Care Key



Pistacia chinensis

Common name: Chinese Pistache

Sun needs: ☀ Water needs: 🚰

This plant grows well in the following regions:

- North and Central Coast
- Desert
- Central Valley

II. WHERE TO PLANT YOUR TREE



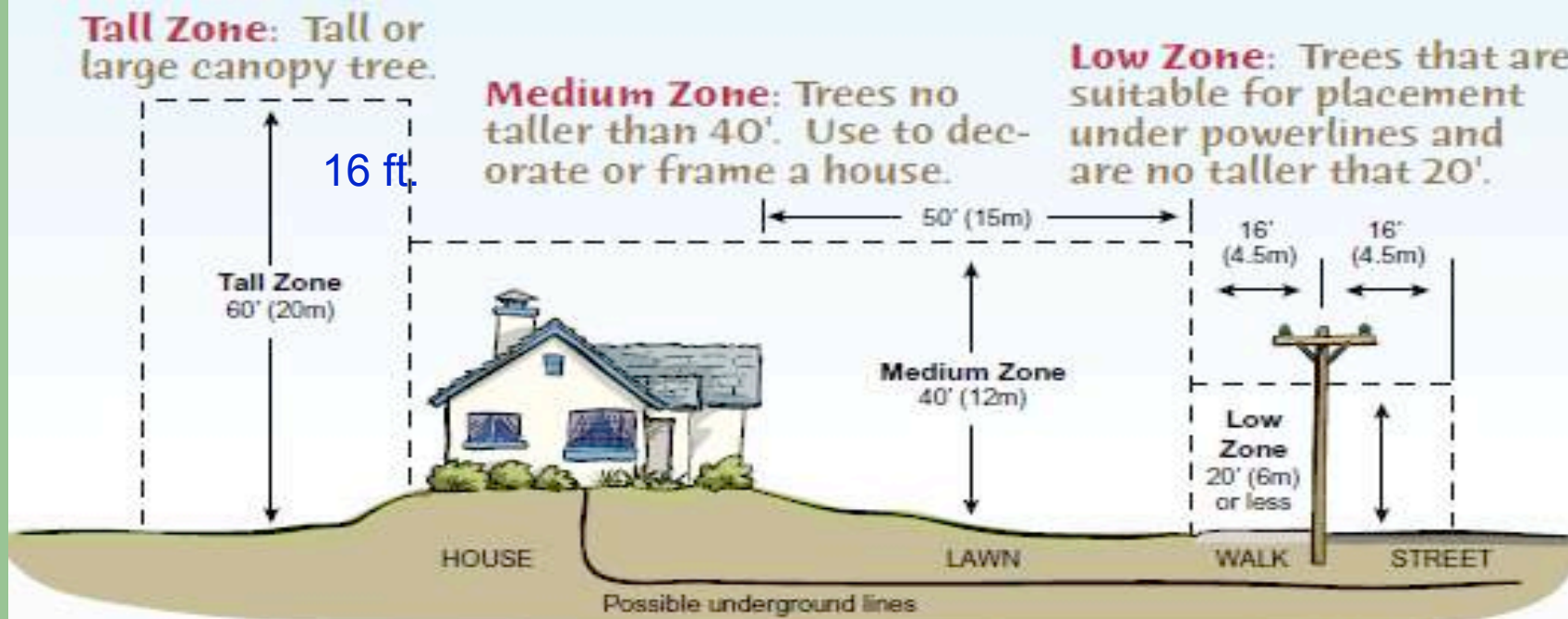
1. Consider tree size at maturity
2. Consider powerlines
3. Consider soil
4. Consider root structures

Tree Selection and Site



- ▶ Avoid planting in close proximity to underground utilities.
- ▶ Plant 15' away from permanent structures.

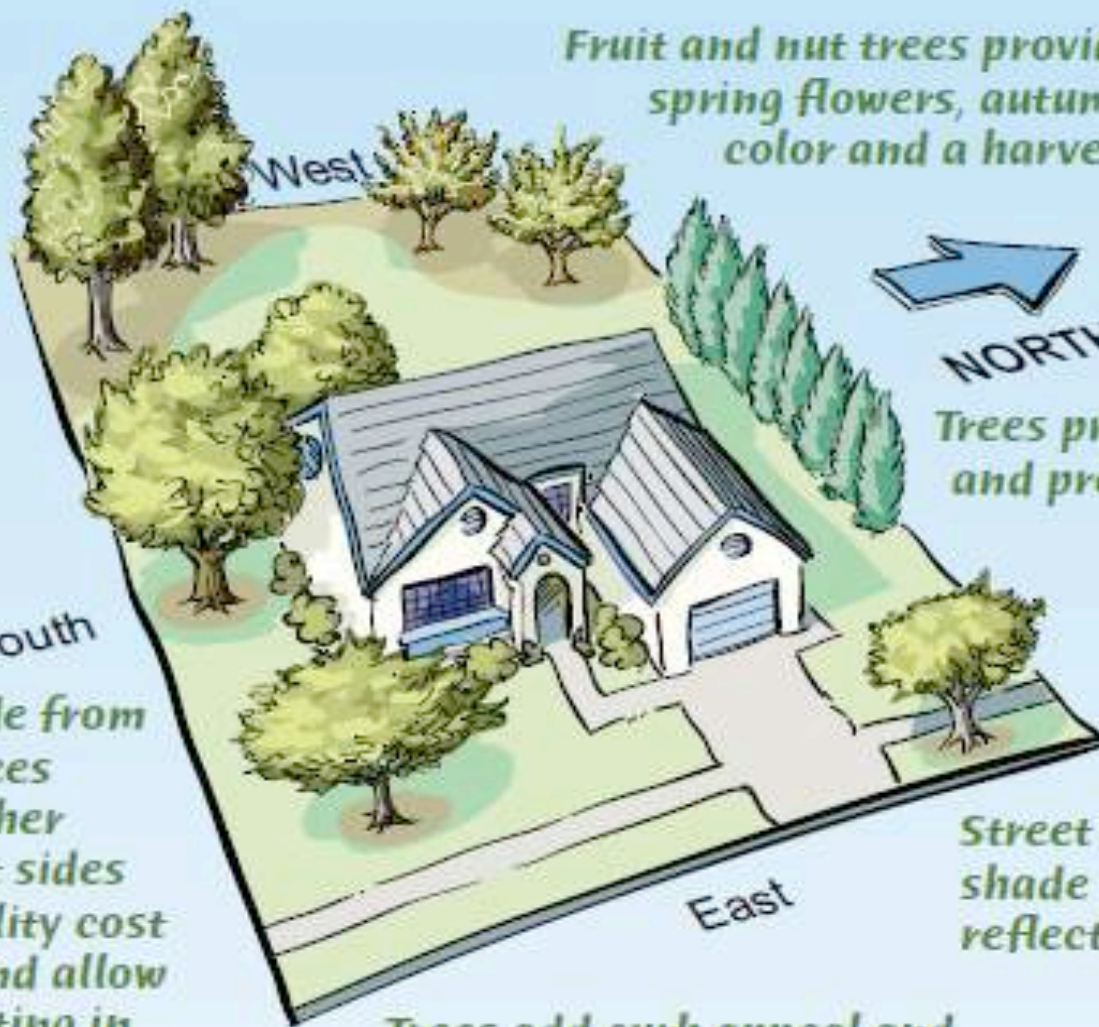
deciduous
placed
south
can lo
by 10-
for so
winter



Tree placement:

Trees provide habitat for wildlife

Fruit and nut trees provide spring flowers, autumn color and a harvest



NORTH

Trees provide privacy and protection from strong winds

Summer shade from deciduous trees placed on either south or west sides can lower utility cost by 10- 15% and allow for solar heating in winter months

Street trees provide shade and reduce reflective heat

Trees add curb appeal and increase property values

Soil

- Protect soil/tree roots from compaction
- Prevent erosion
- Mulch



III. HOW TO PLANT YOUR TREE



- 1. PLANTING**
- 2. WEEDS**
- 3. FERTILIZATION**

PLANTING LANDSCAPE TREES

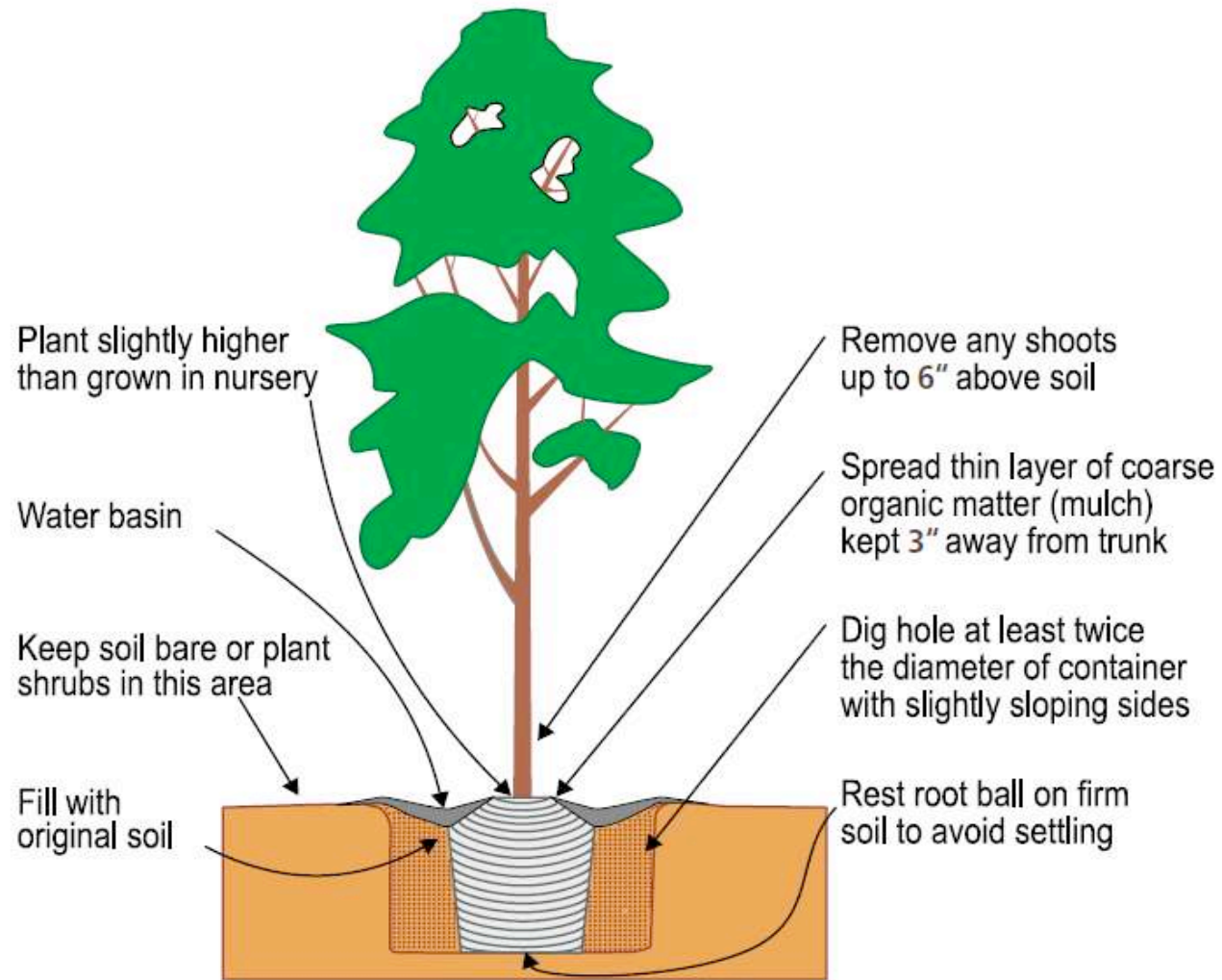


Figure 1. Proper planting of a container-grown tree.



Fertilizing New Trees

- Adding fertilizer, soil amendments, or root stimulants to the planting hole or backfill soils is not recommended. Most nursery grown trees are well fertilized during production and seldom respond to fertilizing at planting, except in the most infertile soils.



IV. TREE STAKING



- Remove stakes within 1 year
- The more freedom to move the better.
- Most conifers, trees with upright growth habits, and trees planted bare-root usually do not need support.

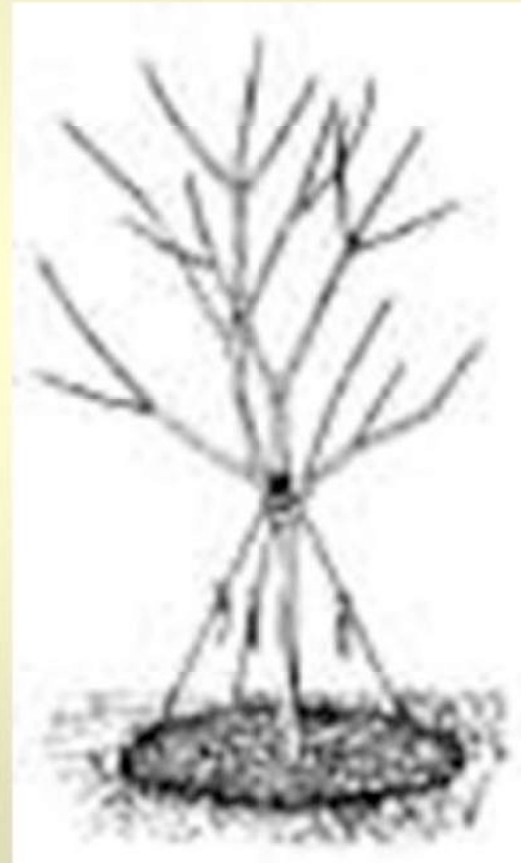
Staking Landscape Trees

- When, why and how long
 - Purpose of staking
 - To anchor
 - To protect
 - To support



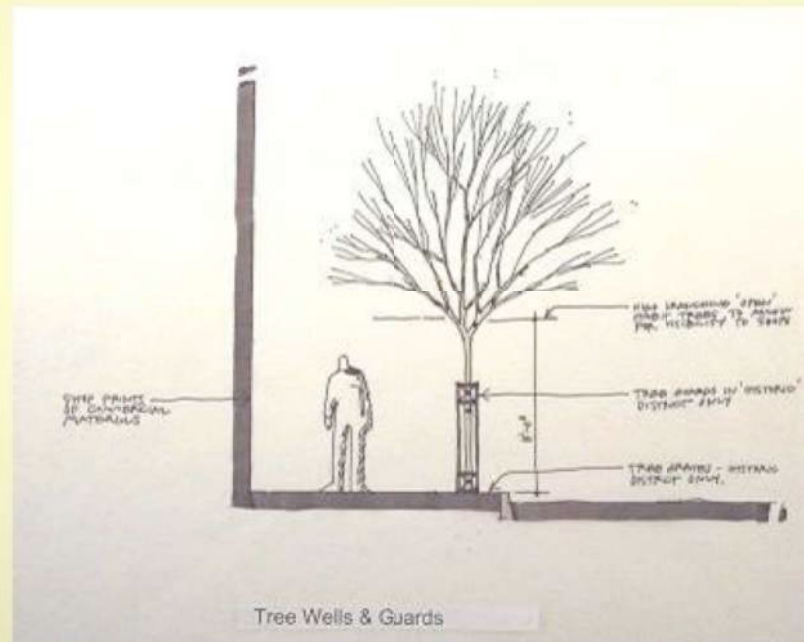
To Anchor

- Anchor staking is appropriate when rootball is small and canopy is large
- When soil is very heavy, wet clay



To protect

- Appropriate for street trees and to prevent vandalism



To Support

- Allows tree to stay upright when trunk has little trunk taper
- Best when done for only short period of time
- Remove stakes as early as possible



Steps in Staking

- Remove nursery stake
- Place two stakes in the ground outside the rootball.
- Determine the height of supporting tie
- Cut off excess stake 2-3 inches above the tie





Figure 2. (A) Valley oak tied and staked too high. (B) Stakes and ties properly adjusted.

V. TREE TRAINING



- 1. AT PLANTING**
- 2. YOUNG TREES**
- 3. THINNING VS. HEADING CUTS**



Pruning at planting??

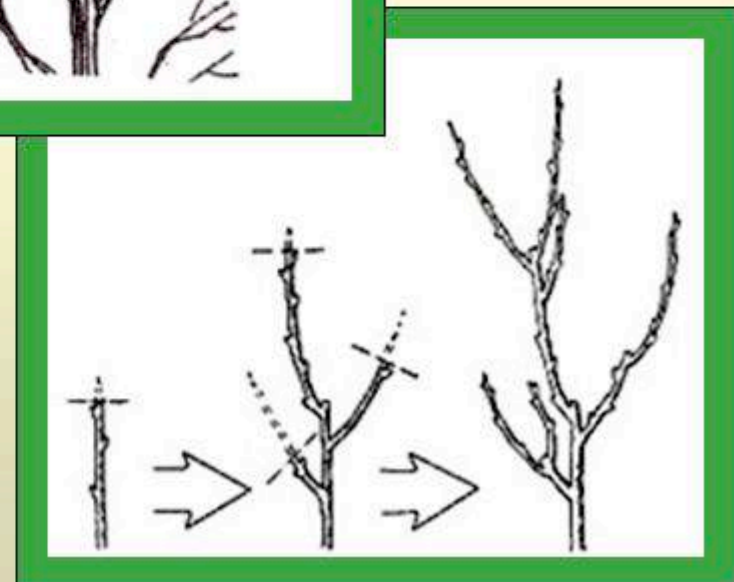
?

Restrict pruning to the removal of damaged, dead or branches that compete with the central leader.



Structural Issues for Young Trees

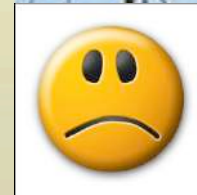
- Maintaining the **central leader** to avoid co-dominant stems.
- May require restructuring on young trees with strong apical dominance and no lateral branches.





Impact From Multiple Leaders

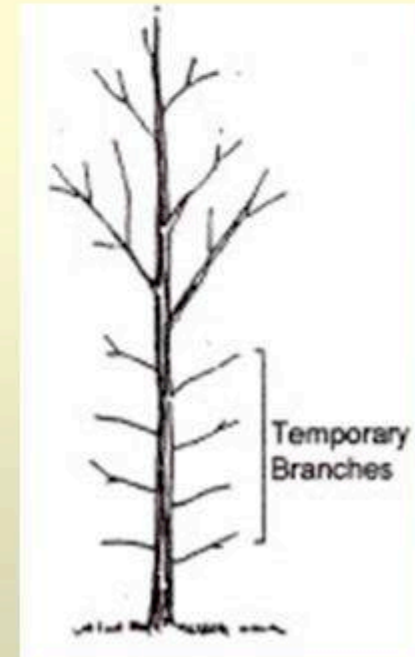




Photos courtesy of Urban Tree Foundation Nursery
Specifications

Structural Issues for Young Trees

- **Temporary branches**
 - Protect against vandalism
 - Protect against sunburn
 - Strengthen and increase trunk taper
 - Increase total tree growth
- **Height of lowest permanent branch** should be determined by function.





Function of lower branches

Protects trunk from sunburn

There is less to landscape!

Is visibility a concern?

Fire danger?





Reduce over a 2-3 year period, removing the largest ones first.

Two Types Of Pruning Cuts:

- Thinning Cut:
- removes a branch at its point of origin, or to a lateral branch strong enough to assume the terminal role.
- Trees pruned w/ thinning cuts are more open, retain natural shape and allow more light penetration into the canopy.



Responses to Thinning Cuts



- Invigoration of growth is spread throughout plant.
- Plants become more open and retain natural form.
- More light/ air penetrates canopy



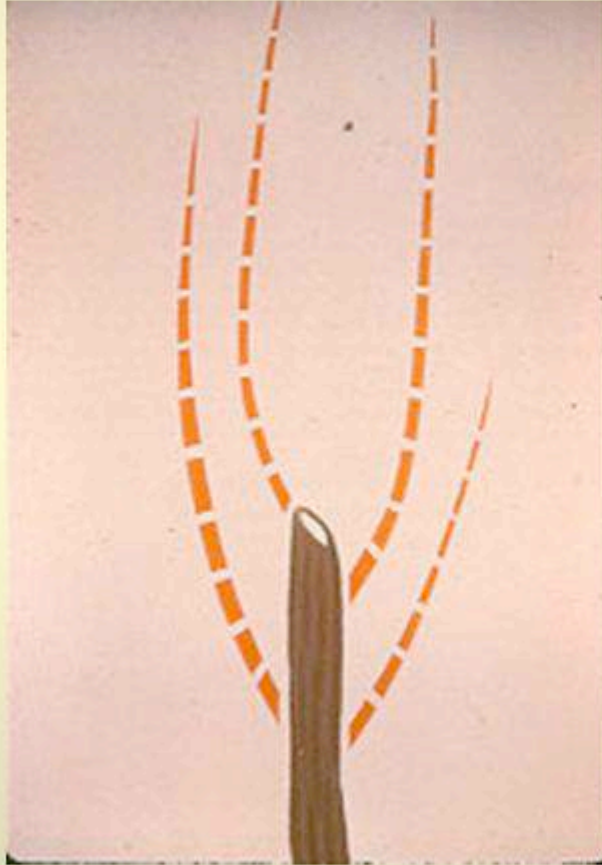
Second Type of Pruning Cut:

Heading Cut:

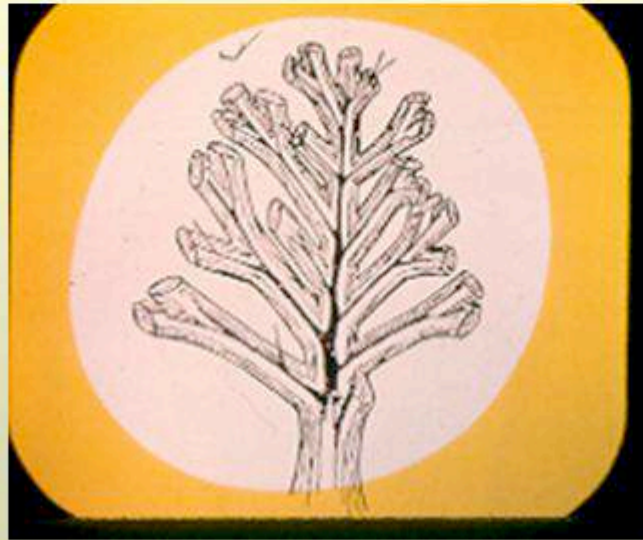
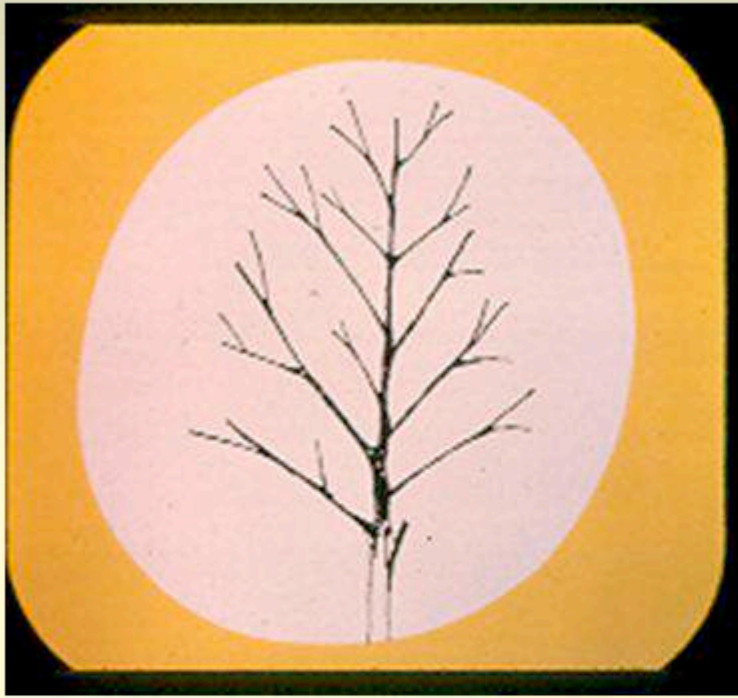
- Removes a growing branch back to a bud or a lateral back to a stub.
- Results in vigorous, upright shoots just below the cut.
- New shoots can be weakly attached.



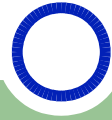
Responses to Heading Cuts



- Stimulates buds directly below cut and usually results in vigorous, upright growth.
- Lower buds do not usually grow unless severely pruned. (epicormic shoots)

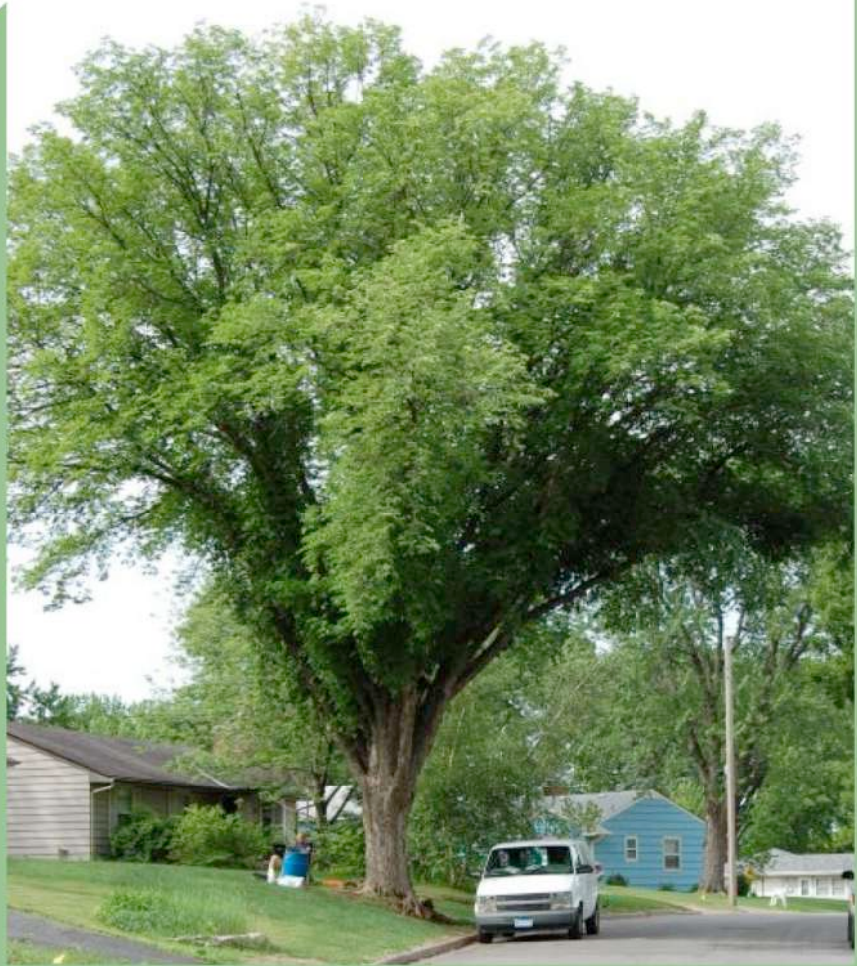


Topped Trees

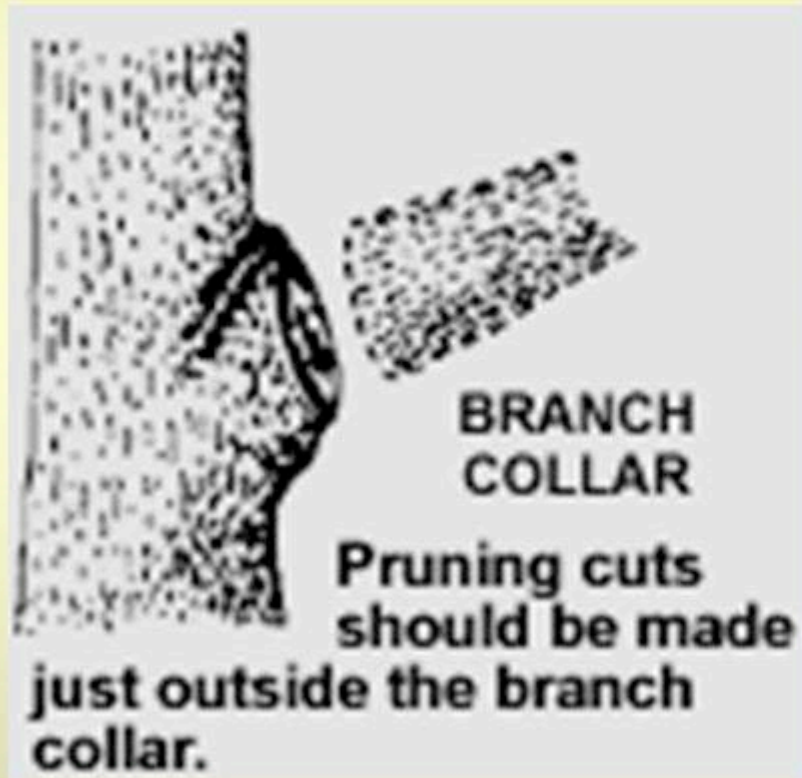


- Vigorous/weak limbs
- Unnatural appearance of tree
- Prone to limb failure



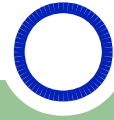


Location of Pruning Cuts



- **“Natural Target Pruning”** appears to be most satisfactory with cuts made only up to the branch bark collar.
- **Avoid flush cuts or “Conventional Pruning”**
- Decay of pruning cuts is less likely the higher in the canopy the cuts are made.

Branch Collar



- The layers of wood behind the branch collar is a decay-resistant structure called the branch core.
- The branch core resists the spread of decay organisms into the parent branch or trunk during the time it takes for the callus, to seal over the wound.

Pollarding and Pleaching



YOUR TREES HEALTHY

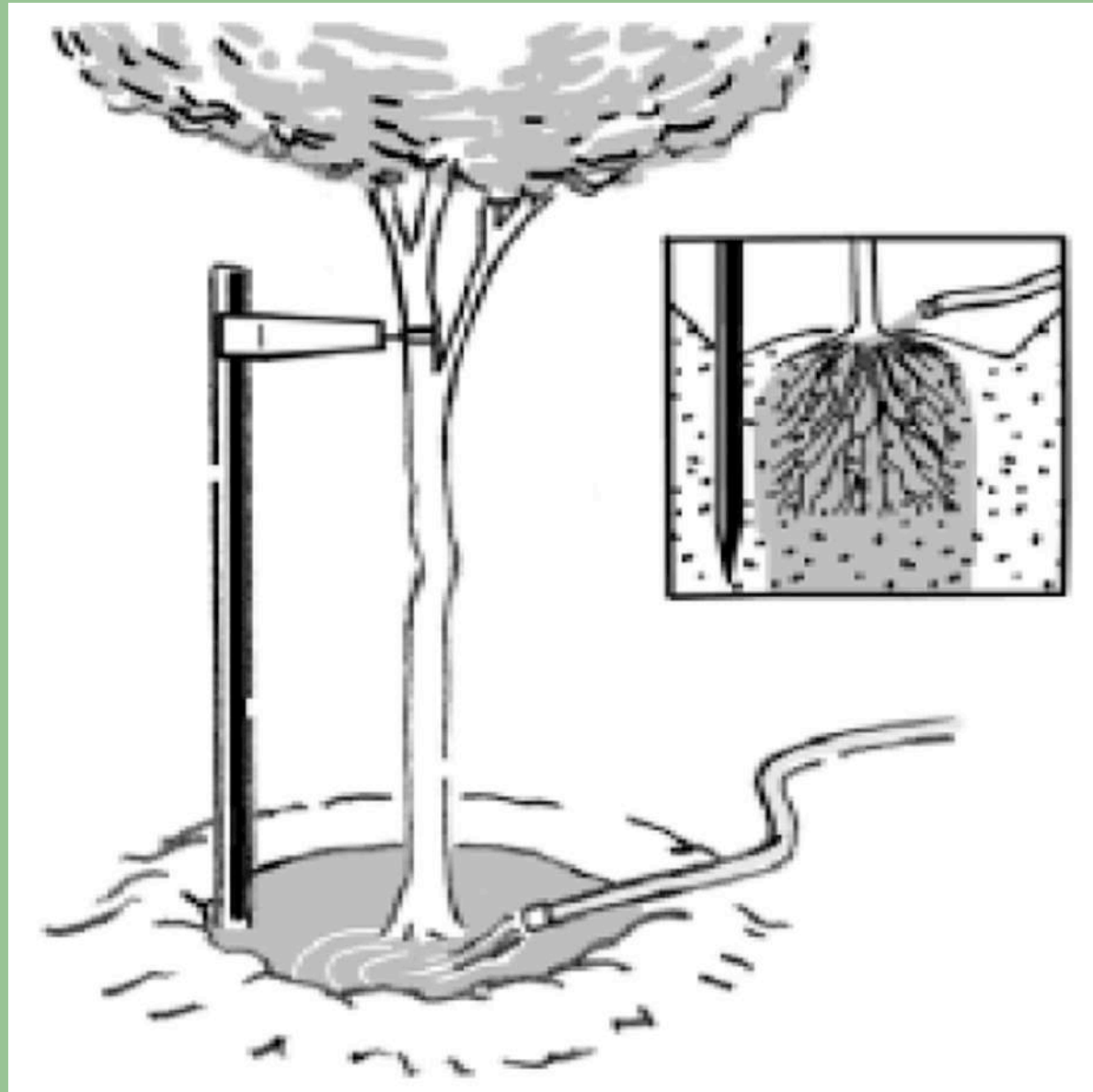


- 1.WATER
- 2.MULCH
- 3.AVOID DAMAGE

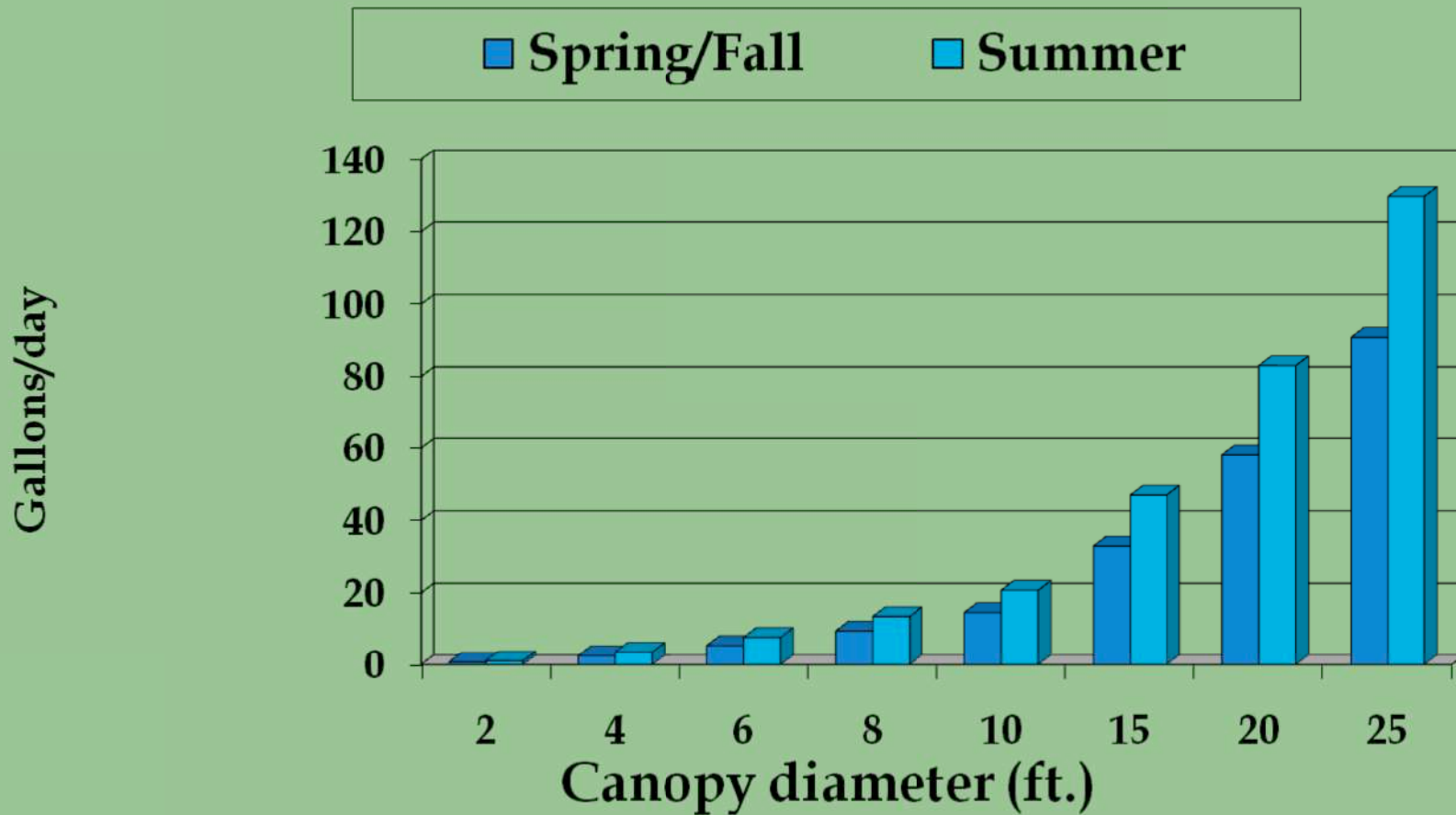


Irrigating

- After planting, regular watering is important
- Water where the tree roots are – expand this area as the tree grows
- Irrigate infrequently and deeply
- Tree species, soil type and weather all affect water needs



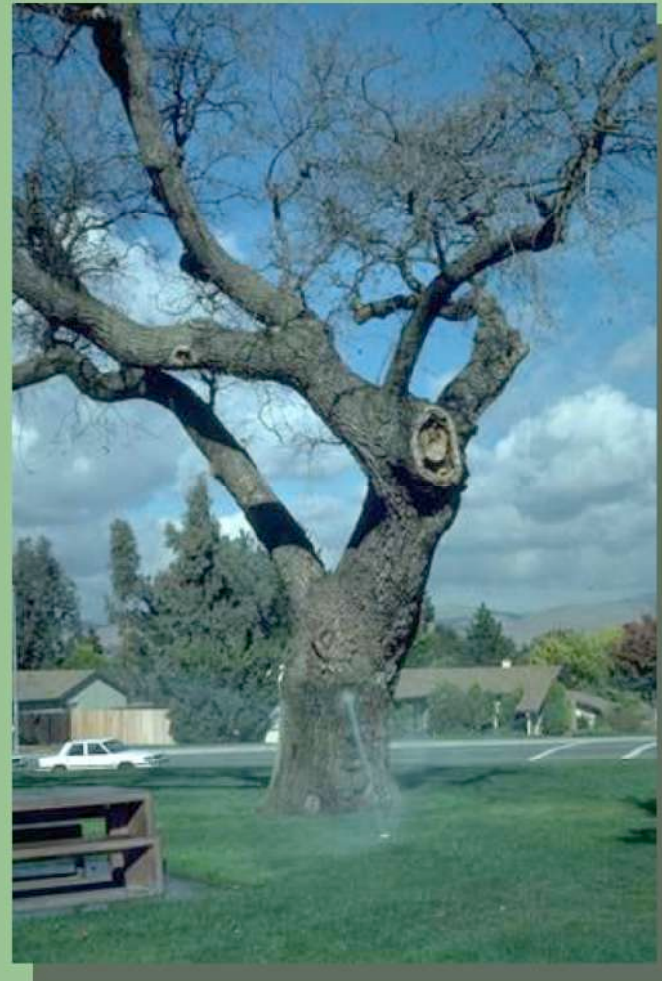
Fruit Tree Water Requirements are Determined by Canopy Size



Water Conservation



- Mulch
- Plant selection
- Hydrozone
- Minimize turf
- Efficient, tree friendly irrigation systems
- Audit your irrigation system
- Manage irrigation to avoid run-off



String Trimmers = Bad



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ANR Catalog

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Agriculture and Natural Resources



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Mites are common pests in landscapes and gardens and can be found on trees, vines, berries, vegetables, and ornamental plants. Mites are not in the arachnid class along with spiders and ticks.

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Welcome!

The UC Master Gardener Program designed the California Garden Web to serve as a portal to organize and extend the University of California's vast collection of research-based information about gardening to the **public**. The California Garden Web focuses on sustainable gardening practices and uses a question and answer format to present solutions. The blog below highlights gardening issues pertaining to the season.

California Gardening Blog

The Language of Flowers

Did you ever wonder why we always give and receive red and white flowers for Valentine's Day? The language of flowers became popular in the 17th and 18th centuries. Virtually every flower,...

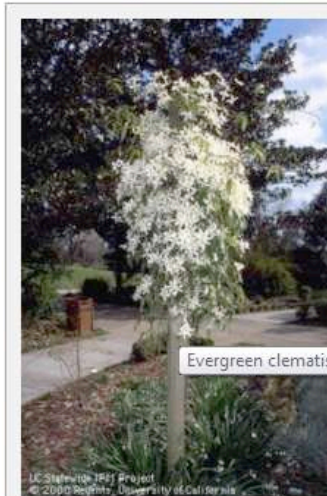


Posted on **Tuesday, February 7, 2012** at 9:04 AM

[Comments: 0](#)

Author: [Pamela M. Geisel](#) Author: Janet Hartin

California Gardening



Evergreen clematis grow

Evergreen clematis growing on a post.



Thank You! Any Questions?

