



TREES 101

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The Life Cycle of a Tree



What is a Tree?



What is a Tree?

“A tree may be defined as a woody plant reaching 20 feet or more at maturity, with a single trunk and a definite crown”

Harlow, Harrar, Hardin and White;
Textbook of Dendrology



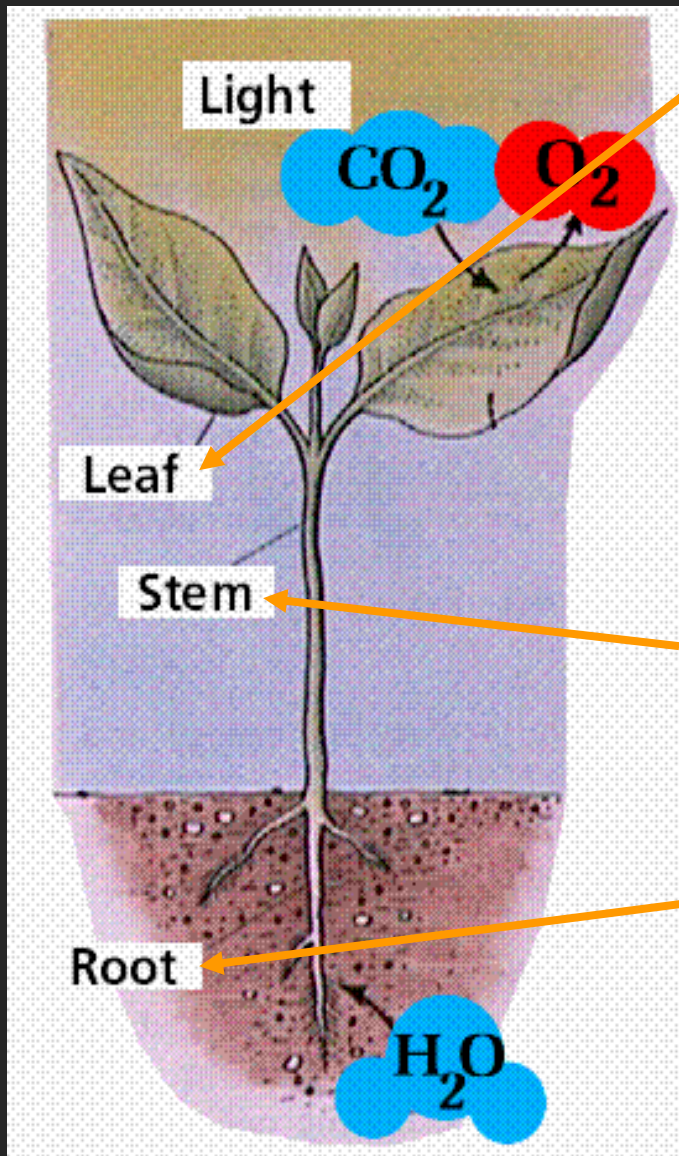


The Leaves

The Branches

The Stem/Trunk

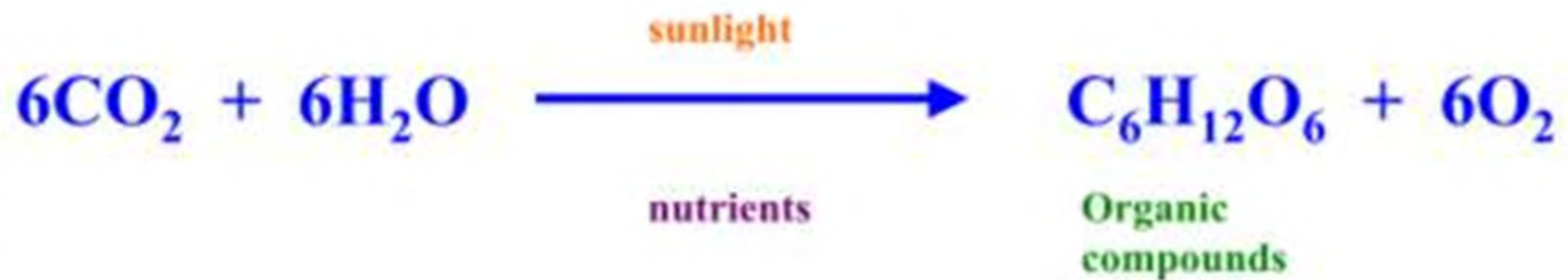
The Roots



The Leaves process water and carbon dioxide (Photosynthesis) to form complex sugars (fuel).

The Branches & Stem/Trunk transports water and solutes (Diffusion & Osmosis), to the crown via the Xylem and sugars to the roots via the Phloem.

The Roots absorb water and nutrients with help from Root Hairs. Also, stores the complex sugars created by the leaves.



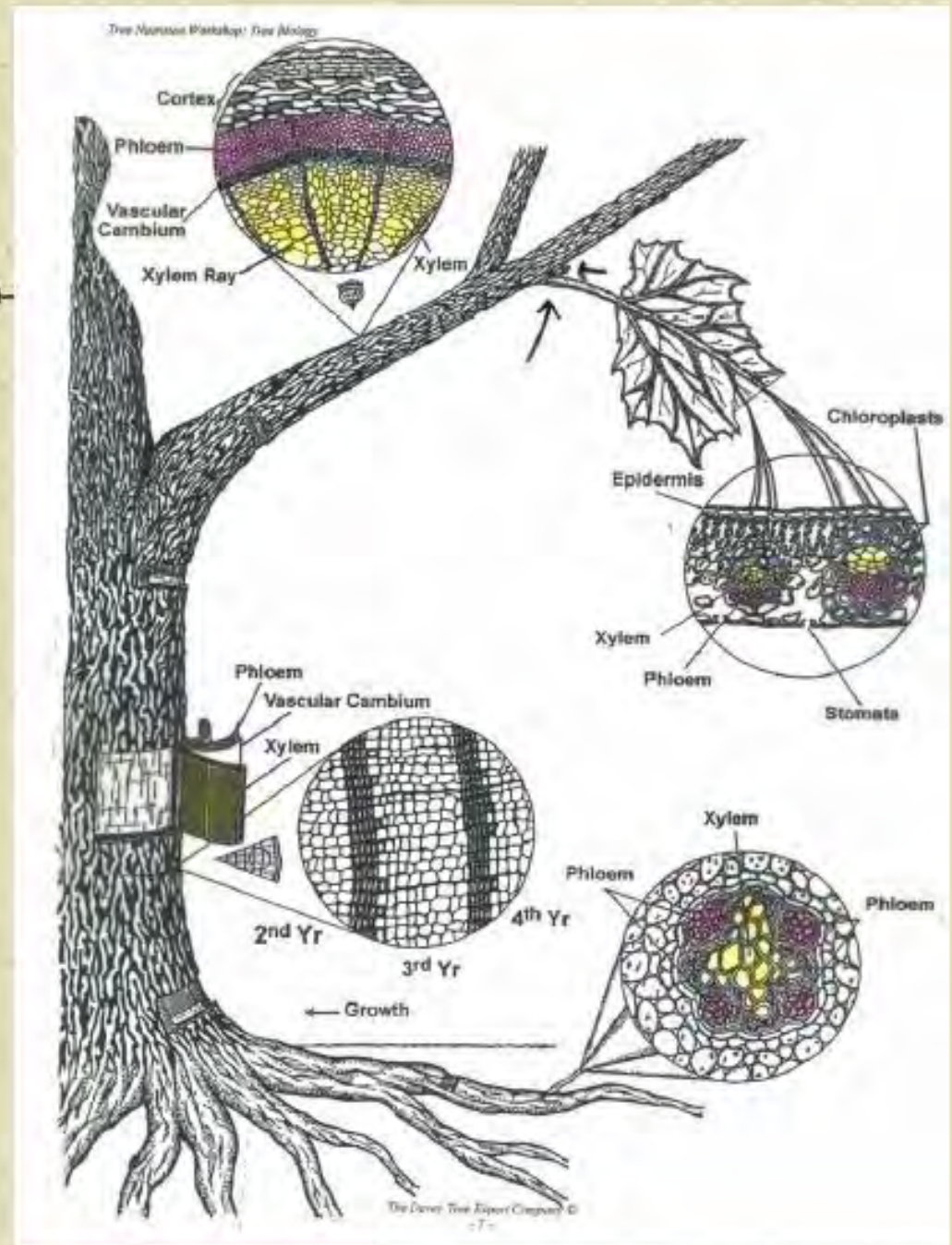
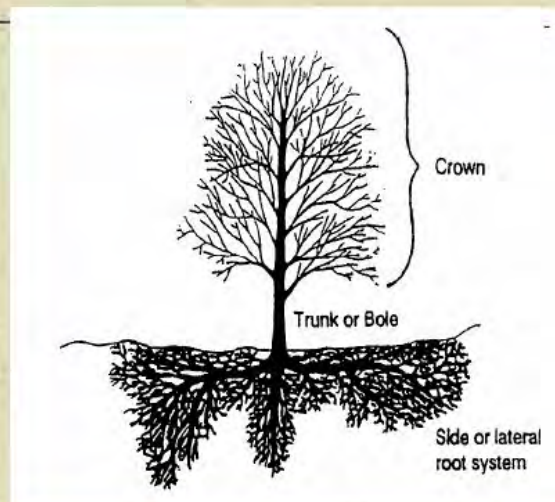


Actively growing right before dormancy and right before bud break.

Inactive in soil above about 90-92 degrees

Tree Biology

5% Leaves
15% Limbs
60% Trunk
15% Woody Roots
5% Absorbing



Outer Bark protects tree from injuries.

Inner Bark (phloem) carries prepared food from leaves to cambium layer.

Cambium (microscopic) builds the cells.

Sapwood (xylem) carries food from roots to leaves.



Heartwood
(inactive) gives
strength to tree.



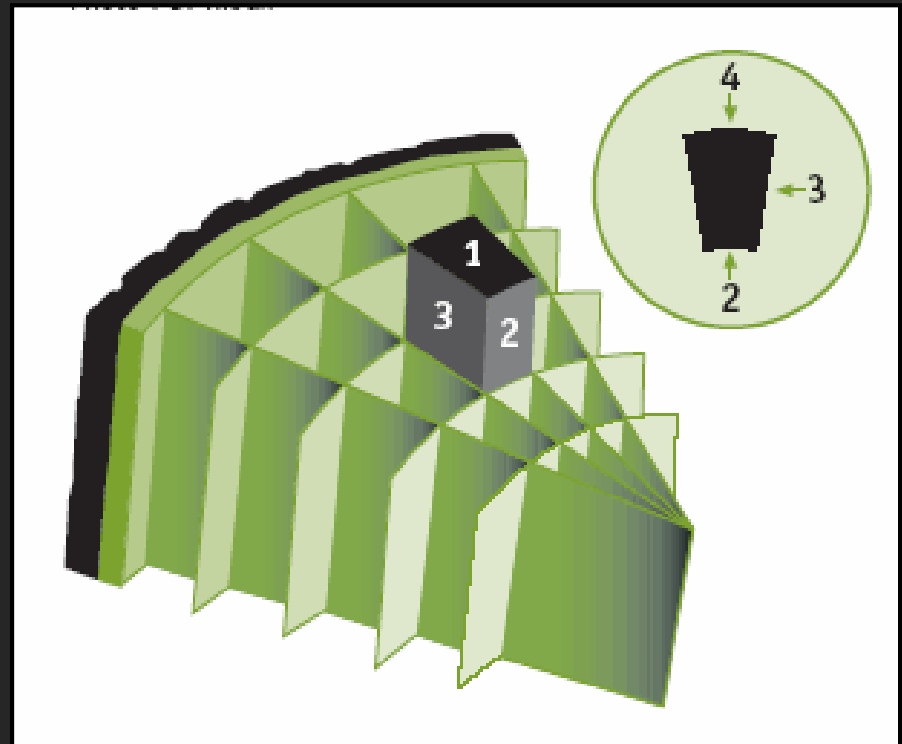
Tree Defense Systems

- Trees DO NOT have immune systems
- Defense adaptations: Physical
 - Thick bark
 - Hairy leaves
 - Thorns
 - Thick cuticle
- Chemical:
 - Resist insect feeding or animal browsing (bad taste)
 - Pathogen infection or decay (barriers)

C.O.D.I.T.

Compartmentalization Of Decay In Trees

- 1. Stops Vertical Spread*
- 2. Stops Inward Spread*
- 3. Stops Lateral Spread*
- 4. New growth closes wound
(this is what we see on the
bark)*



Species Selection

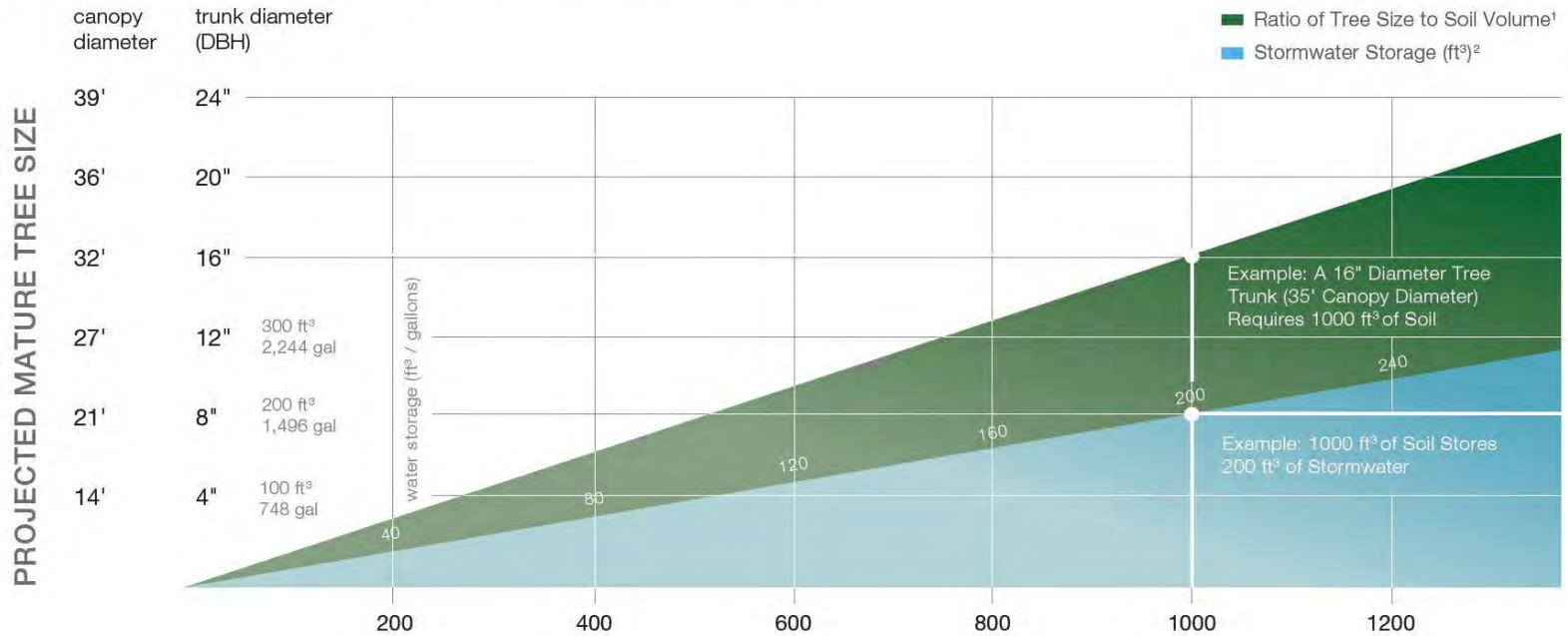
- Mature size matters
- What grows well in your area
- Avoid invasive species



Soil volume & Depth



HOW MUCH SOIL TO GROW A BIG TREE?



Tree roots need space



Re-routing the Sidewalk

- When damaged sidewalks are repaired they can be re-routed around the tree trunks.
- This can eliminate the need to prune roots that caused the walk to lift.



Place Trees on the Other Side

- Damage can be reduced by planting trees on the side of the sidewalk away from the curb.
- This places the root flare in open soil instead of between the sidewalk and curb.



Avoid Hardscape Overkill

- In the example provided, new trees were probably not needed in this location because of the large healthy trees already present, several feet behind the new curbing.

Smaller trees need less root space

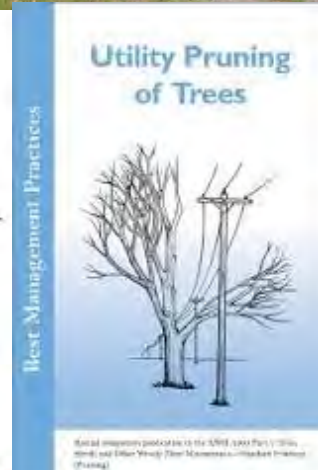
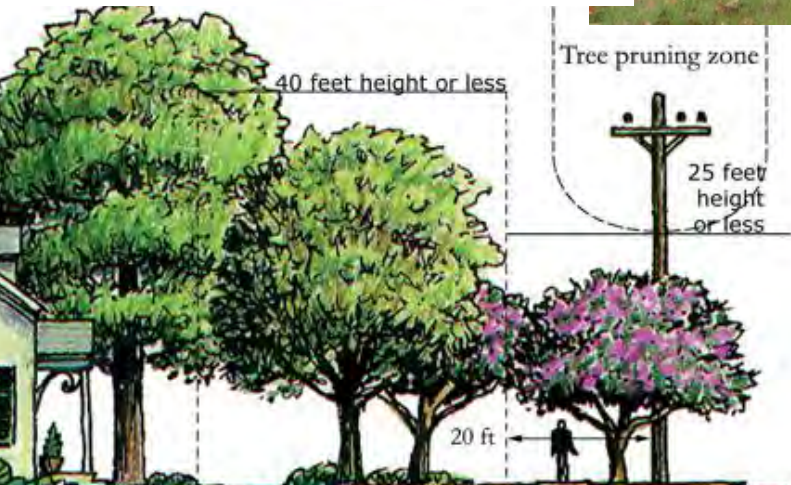
Shallow roots can damage structures and are hazardous

Utility lines

Utility Pruning



Right Tree Right Place



What grows well in your area?

Texas Tree Planting Guide

HOME | FAQ



Express Tree Selector

The quickest way to find the best trees for your yard



Custom Tree Selector

Gives you more choices for trees to plant in your yard



Tree Planting & Care

More info to help you buy, plant and care for your new tree



Custom Tree Selector

I will plant my tree in this county:

Option 1: The space available for my tree is...

- A small area, less than 120 sq.ft. or with growing space restrictions (overhead wires, on the sides)
- Somewhat restricted, less than 180 sq.ft.
- A large space, more than 180 sq.ft.
- Not sure



Click to view
Available Space
graphic

Option 2: I want a tree that is...

- Small, 20 ft. tall or less at maturity
- Medium, 20-40 ft. tall at maturity
- Large, more than 40 ft. tall at maturity
- No preference



Click to view
Tree Heights
graphic

Option 3: I want a tree with leaves that are...

- Deciduous, leaves drop in fall
- Evergreen, leaves stay green all year
- No preference

Option 4: I want a tree that... (check all that apply)

- Is a Texas native
- Has reliable fall color
- Has showy or fragrant flowers
- Has attractive fruits or seeds
- Has fruits or seeds eaten by wildlife
- Is Firewise

Option 5: The place I will plant my tree... (check all that apply)

- Is extremely dry or droughty
- Is poorly drained or stays wet
- Is shady all or most of the day
- Has salty soil or sea-spray
- Has highly alkaline soil (> 7.5 pH)

[Read more about soil conditions](#)

Show Trees

Start Over



Texas Tree Planting Guide



HOME | FAQ

Recommended trees for Travis County



American Elm
Ulmus americana

American Elm

Ulmus americana

Leaf Type: Deciduous

Comments: Fast-growing, vase-shaped shade tree that tolerates a wide range of conditions.

[More About this Tree](#)



American Holly
Ilex opaca

American Holly

Ilex opaca

Leaf Type: Evergreen

Comments: A striking landscape tree, can be used as a screen. Plant away from pedestrian areas.

[More About this Tree](#)



American Smoketree
Cotinus obovatus

American Smoketree

Cotinus obovatus

Leaf Type: Deciduous

Comments: One of the best trees for fall color. Might be hard to find in the nursery.

[More About this Tree](#)



Anacacho Orchid-tree
Bauhinia congesta

Anacacho Orchid-tree

Bauhinia congesta

Leaf Type: Deciduous

Comments: Delicate-looking native tree with showy flowers.

[More About this Tree](#)



Arizona Cypress
Cupressus arizonica

Arizona Cypress

Cupressus arizonica

Leaf Type: Evergreen

Comments: Good plant for screening that is well-suited to limestone soils.

[More About this Tree](#)



Baldcypress
Taxodium distichum

Baldcypress

Taxodium distichum

Leaf Type: Deciduous

Comments: Adapted to many soil and moisture conditions. Grows well in wet areas.

[More About this Tree](#)

Bigtooth Maple

Acer grandidentatum

Leaf Type: Deciduous

Bluewood

Condalia hookeri

Leaf Type: Evergreen

INVASIVE PLANTS TO AVOID

Invasive plants are those that spread into areas where they are not native. Their introduction causes or is likely to cause economic or environmental harm or harm to human health

The following plants have already invaded preserves and greenbelts in Austin. They spread by seeds, berries and spores that can be easily transported long distances. For a more extensive list, visit www.texasinvasives.org

Common Name	Botanical Name	Non-Invasive Alternatives
Bamboo, Running	<i>Phyllostachys aurea</i>	Evergreen Yaupon, Bamboo Muhly
Cat's Claw Vine	<i>Macfadyena unguis-cati</i>	Carolina Jessamine, Crossvine
Chinaberry	<i>Melia azedarach</i>	Chinquapin Oak, Texas Red Oak
Chinese Parasol Tree	<i>Firmiana simplex</i>	Bald Cypress, Arizona Cypress
Chinese Pistache	<i>Pistacia chinensis</i>	Chinquapin Oak, Texas Red Oak
Chinese Tallow	<i>Sapium sebiferum</i>	Viable alternative unknown
Giant Cane*	<i>Arundo donax</i>	Evergreen Yaupon, Roughleaf Dogwood
Japanese Honeysuckle	<i>Lonicera japonica</i>	Coral Honeysuckle
Kudzu	<i>Pueraria lobata</i>	Virginia Creeper, Coral Vine
Ligustrum, Wax Leaf	<i>Ligustrum japonicum</i>	Barbados Cherry, Cherry Laurel
Ligustrum, Japanese	<i>Ligustrum lucidum</i>	Evergreen Sumac, Evergreen Yaupon
Mimosa (non-native)	<i>Albizzia julibrissin</i>	Desert Willow, Redbud
Mulberry, Paper	<i>Broussonetia papyrifera</i>	Cherry Laurel, Texas Persimmon
Mulberry, White	<i>Morus alba</i>	Cherry Laurel, Texas Persimmon
Nandina (berrying varieties)	<i>Nandina domestica</i>	Bush Germander, Texas Sage, Barbados Cherry
Photinia, Chinese	<i>Photinia spp.</i>	Evergreen Sumac, Evergreen Yaupon
Privet, Common	<i>Ligustrum sinense, Ligustrum vulgare</i>	Evergreen Yaupon, Dwarf Burford Holly
Pyracantha	<i>Pyracantha spp.</i>	Evergreen Sumac
Russian Olive	<i>Elaeagnus angustifolia</i>	Cherry Laurel, Texas Persimmon
Tamarisk, Salt Cedar	<i>Tamarix spp.</i>	Arizona Cypress, Bald Cypress
Tree of Heaven	<i>Ailanthus altissima</i>	Chinquapin Oak, Lacey Oak
Vitex	<i>Vitex agnus-castus</i>	Mexican Buckeye

* Illegal to sell

These plants travel by runners, rhizomes, spores and stems. While they are not generally transported long distances, they can invade nearby or "downstream" areas. Avoid planting near parks and preserves.

Common Name	Botanical Name	Non-Invasive Alternatives
Elephant Ear	<i>Alocasia spp., Colocasia spp.</i>	Arrowhead, Crinum Lily, Tuckahoe
English Ivy	<i>Hedera helix</i>	Leadwort Plumbago, Mountain Pea
Holly Fern	<i>Cyrtomium falcatum</i>	River Fern
Vinca	<i>Vinca major & V. minor</i>	Leadwort Plumbago, Mountain Pea
Wisteria (non-native species)	<i>Wisteria sinensis, W. floribunda</i>	Passion Vine

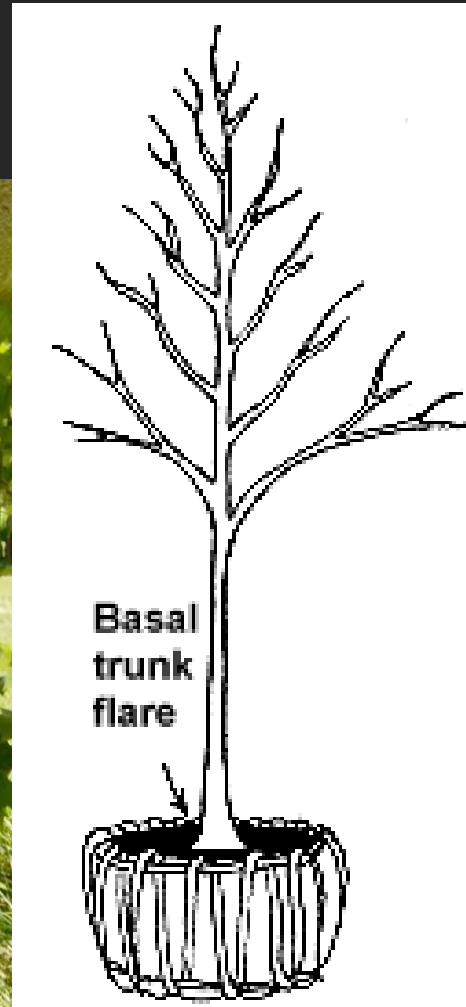


Already have these plants? Most plants can be controlled by trimming back berries, seedheads or runners.

THIS PLANT LIST IS ONLY A RECOMMENDATION AND HAS NO LEGAL EFFECT IN THE STATE OF TEXAS. IT IS LAWFUL TO SELL, DISTRIBUTE, IMPORT, OR POSSESS A PLANT ON THIS LIST UNLESS THE TEXAS DEPARTMENT OF AGRICULTURE LABELS THE PLANT AS NOXIOUS OR INVASIVE ON THE DEPARTMENT'S PLANT LIST.

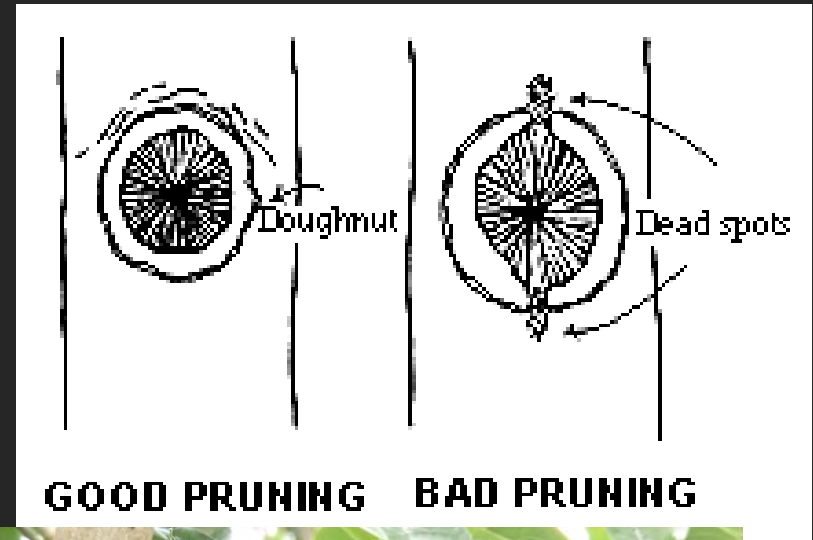
High Quality Trees

- A strong form with well-spaced, firmly-attached branches



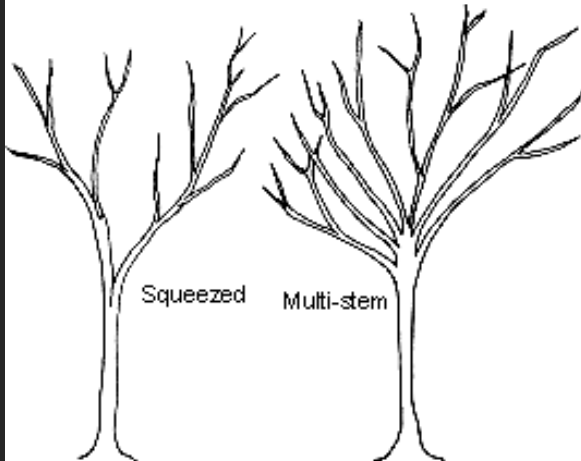
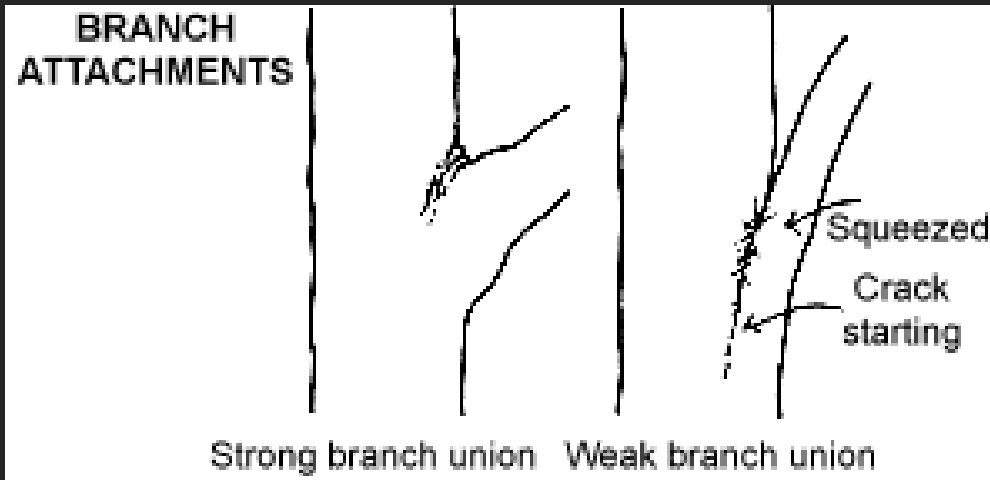
Poor Quality Trees

A trunk with wounds from mechanical impacts or incorrect pruning



Poor Quality Trees

- A weak form where multiple stems squeeze against each other or where branches squeeze against the trunk



Poor Quality Trees

- Crushed or circling roots in a small root ball or small container
- ‘Pop the Pot’



Don't Forget the Roots!!!

- Shop for good structure AND good roots.
- Natural root flare should be evident.
- Check the integrity of the root ball.
- Check for an abundance of fibrous roots.

The amount and condition of the roots in the root ball greatly affect survival.
Don't be afraid to pop it out of the pot.

What if you're stuck with Poor Quality Trees?



What you really need to know for successful tree planting:

1. Start with the right species
2. Choose the right specimen
3. Location, location, location
4. Call 811 for utility locate
5. Dig a wide, shallow hole – don't bury the root flare
6. Don't spoil it rotten – no amendments
7. Protect from wind or vandalism with stakes – ONLY IF NECESSARY
8. Protect from heat, drought and competition – Mulch, mulch, mulch
9. Adequate water

If you're starting with a poor specimen:

1. Root prune - No circling or girdling roots
2. Correct crown defects early
3. Just say NO! Take it back to the nursery.

Planting Containerized & Container Grown Trees

Check for natural root flare & girdling roots

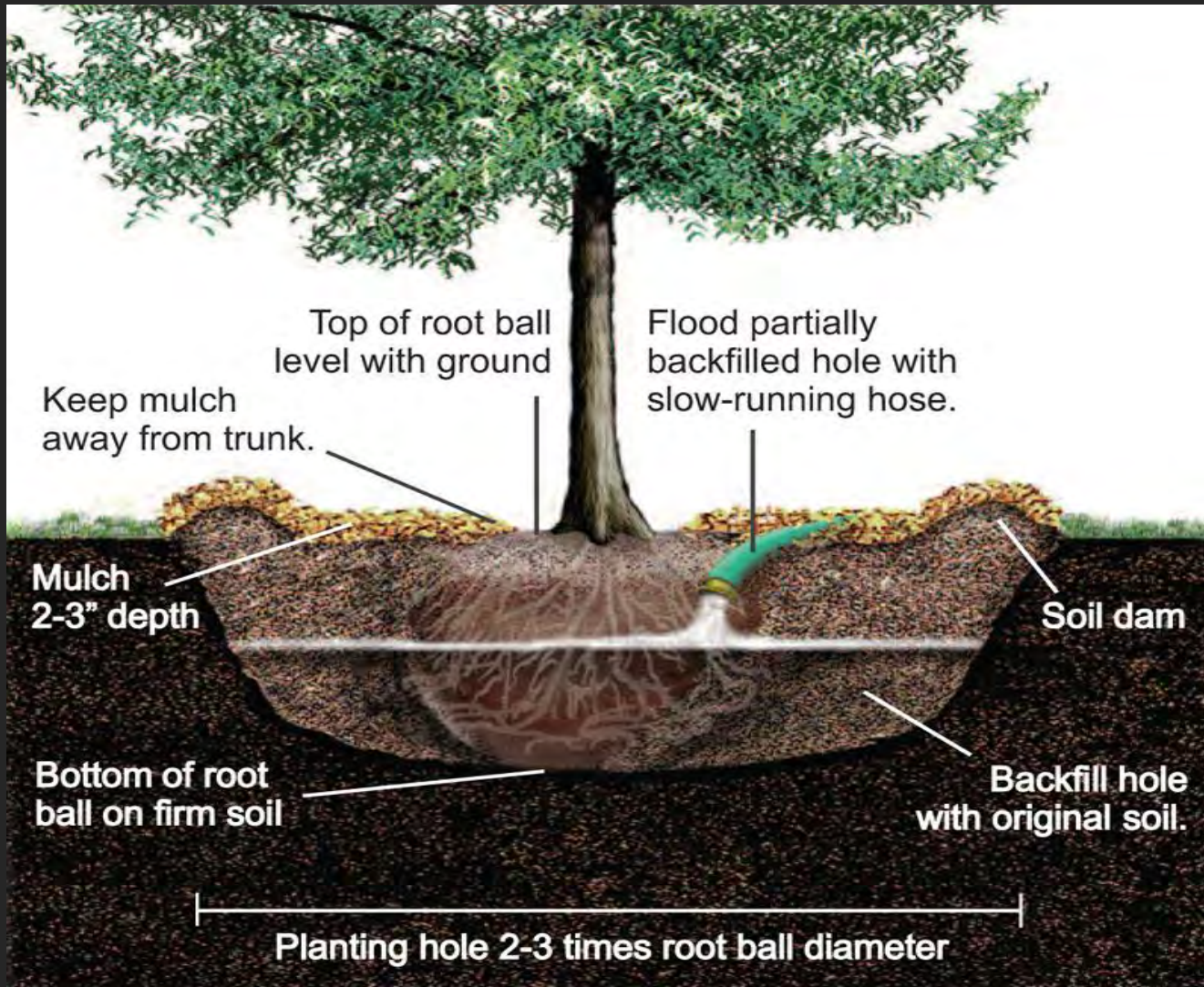


Planting Containerized & Container Grown Trees

- Sides of root ball should be roughened
- Root pruning is often necessary (nursery standards)



Proper Planting

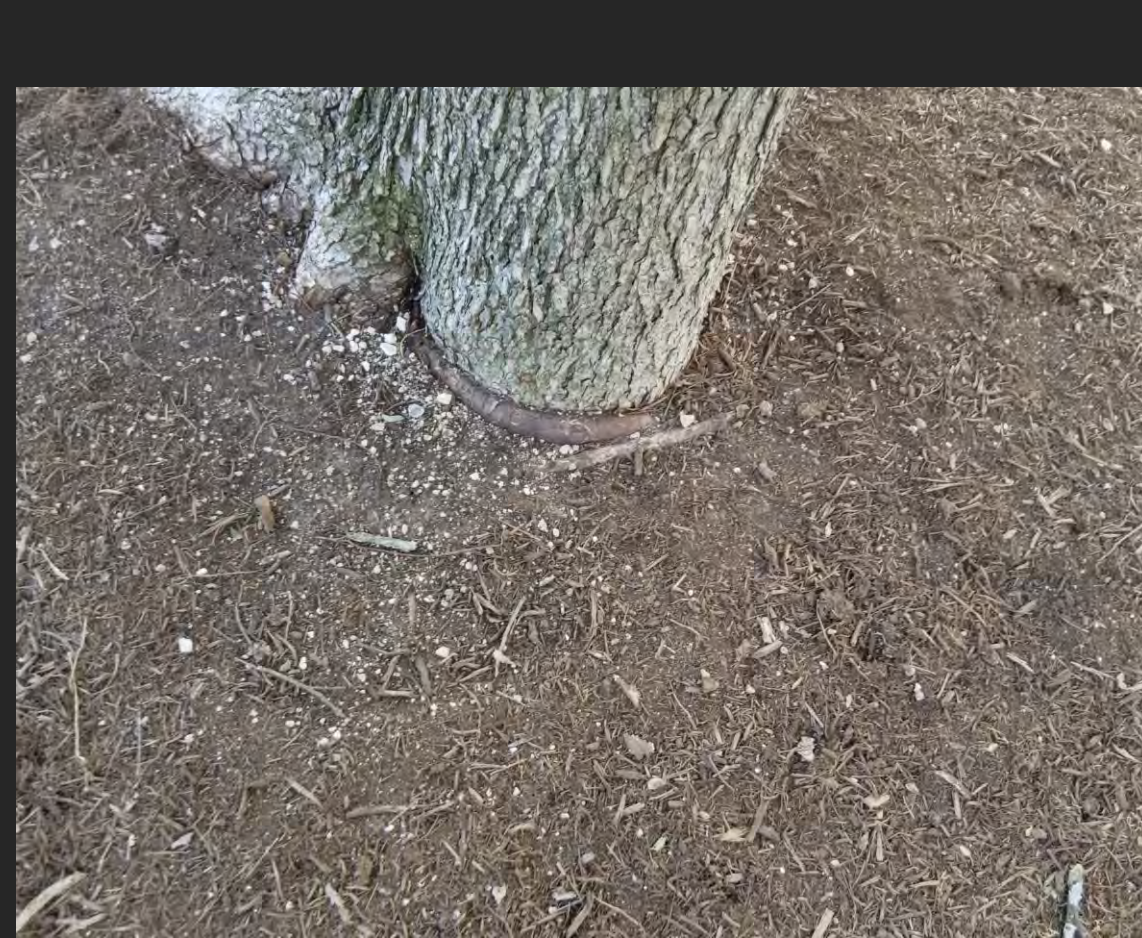


October – Mid March Is Best Time To Plant

- Better Survival
 - Cooler Temperatures
 - Adequate Moisture
- Increased Growth
- Palms are the exception – April and May are great.

Proper Planting

- Planting hole vs. burial pit



Prepare Site

- Call 811 to locate utilities
- Remove grass
- Dig hole **at least** 2-3x larger than root ball of tree
- Dig hole no deeper than root ball is deep
- The key is wide and shallow



Planting Trees

- Do not add gravel, sand or soft soil to the bottom of the hole. (Capillarity)
- Limit backfill amendments
- Do not add fertilizer.
- Mycorrhizae should only be used with trees grown in conditions unexposed to inoculum and planted on new sites where native inoculum may not be present.



Establishment

- Proper planting is only half the battle. Trees suffering from transplant shock need adequate early care to increase the chances of survival.
- Generally, it will take one year per inch of caliper for a tree to recover from planting. Bigger trees are not necessarily better.

Establishment -- Watering

- Watering schedule is highly dependent upon the soil type – capillarity
- Rule of thumb is one inch per week during the growing season
- Overwatering is one of the leading causes of transplant death – the signs of overwatering are very similar to the signs of too little watering, pay attention to the soil!

Watering New Trees



Fertilization

- Over fertilizing can cause water stress (fertilizer burn)
- Fertilization is almost never necessary the first year. If you must fertilize, use a slow release nitrogen.

A top dressing of compost or coffee grounds works well.



Mulch

Mulching is one of the most beneficial things you can do for a new tree

- Reduces water loss
- Reduces competition from weeds
- Improves soil structure



Grass

Mulch



Mulch

- Many types of mulch available – generally comes down to personal choice.
- Organic mulches (tree bark, wood chips, straw, etc) will break down over time which releases essential nutrients and improves the soil structure, but will need to be replenished from time to time.
- Inorganic mulches (stone, pulverized rubber, fabric, etc) will not break down and won't need to be replenished.

Mulch

- Mulch should be 1-2 inches deep
- Do not volcano mulch

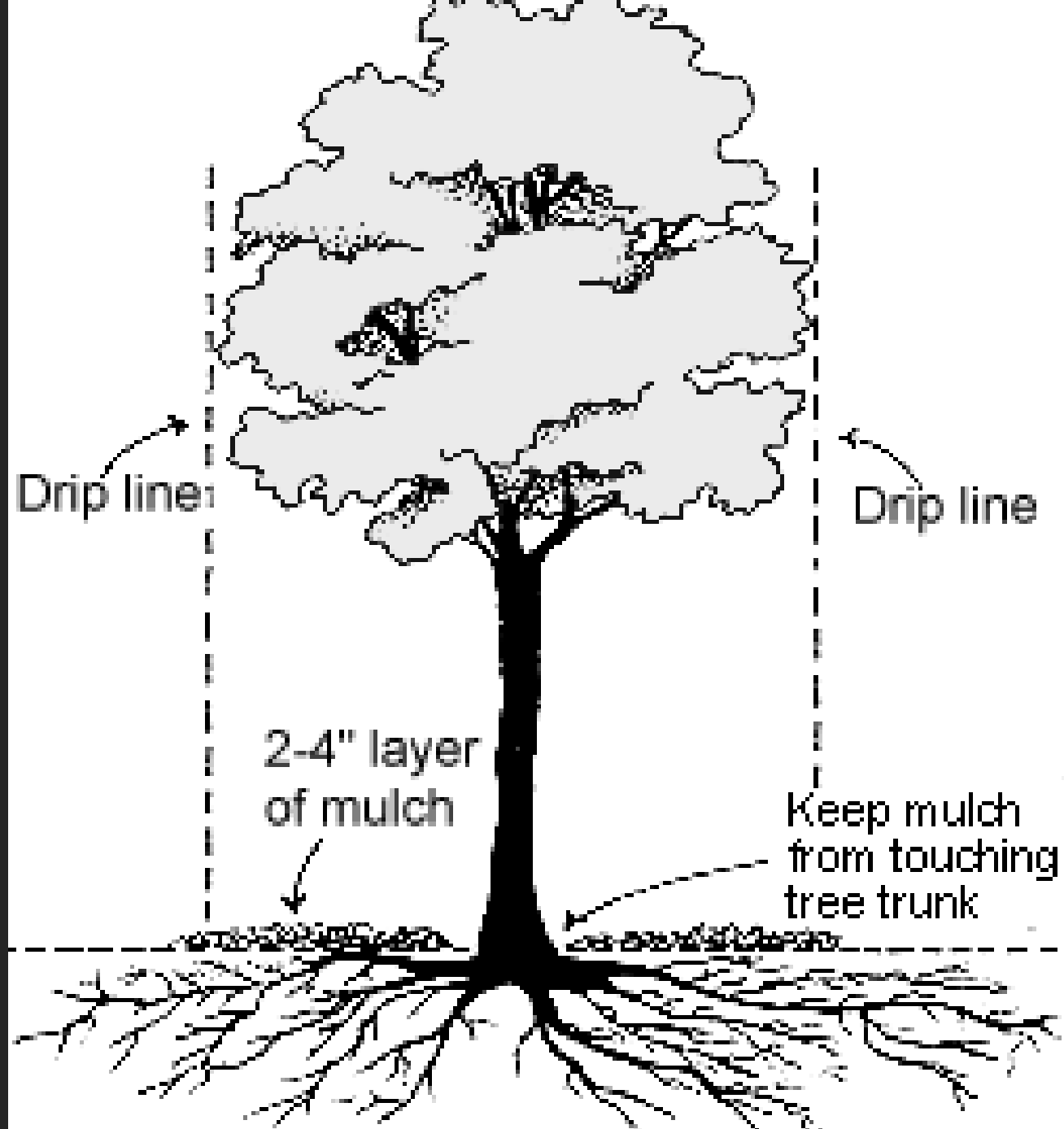
mulch against the trunk can cause infections, adventitious roots, rodent feedings and encourage insects.



Mulch

- The broader the mulch circle the better – generally for a tree 1-2 inches in caliper, the mulch circle should be at least 6 feet in diameter.
- Don't use black plastic – it will restrict water movement and reduce oxygen availability.





Staking/Guying Guidelines

- Use only when necessary and only for as long as necessary – remove after the first year. If left in place for more than 2 years, it can reduce the ability of the tree to support itself and increase the risk of girdling.



Staking/Guying Guidelines

- Do not attach ties to the tree so high that the top portion of the tree is not allowed to move freely. (usually 1/2 – 2/3 of total height)
- Use caution with the materials you choose to be in contact with the trees!
- Stakes for guy wires should be inline with direction of the wire.



Staking/Guying Guidelines

- Often not necessary but ...
 - Can protect against equipment damage and reduce vandalism and theft.
- Do not stake too tightly – trees need to move to develop proper taper.
- Be careful to drive the stakes outside the root ball – don't damage the roots.



Tree Wraps and Guards

- Current research indicates that tree wraps can actually cause more damage than not wrapping:
 - Increased temperature differentials
 - Hold moisture against trunk
 - Insects can burrow between wrap and trunk

Tree Wraps and Guards

- Tree guards of plastic or metal can be placed around the trunks of trees to ...
 - Help minimize damage from mowers and string trimmers
 - Minimize animal feeding damage



Pruning at Planting

- Prune broken branches and major structural problems only.
- Heavy pruning should be avoided until the tree is established.
- Structural/Training pruning should be done while tree is young.



Pruning Mature Trees – Know your Goals

The kind of pruning you choose is dictated by your goals.

Less is ALWAYS more.



Safety

- Think head to toes
 - Hard hat
 - Eye protection
 - Ear protection
 - Long sleeves
 - Gloves
 - Long pants
 - Chainsaw chaps
 - Boots
 - Hard toe
- Don't forget
 - Hydration
 - Before, during, and after
 - Sunscreen
 - 30 minutes ahead
 - Stretch/warm up



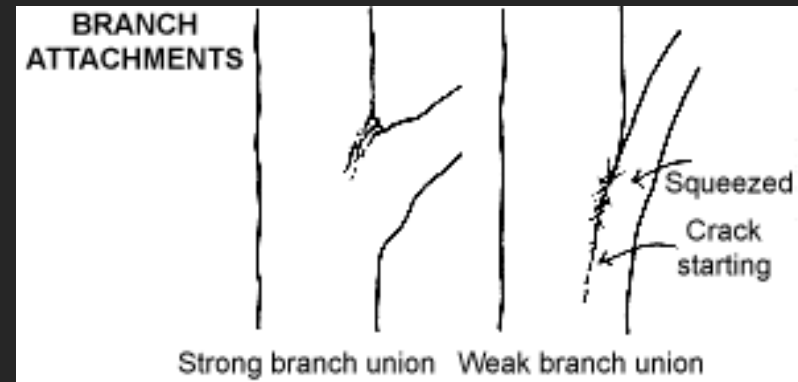
What are your goals when pruning?

- Better form
- Improve safety
- Improve health
- Improve aesthetics
- Provide clearance



Structural - Training

- Start young
- Improve form by proper spacing between branches and around the tree



POOR FORM

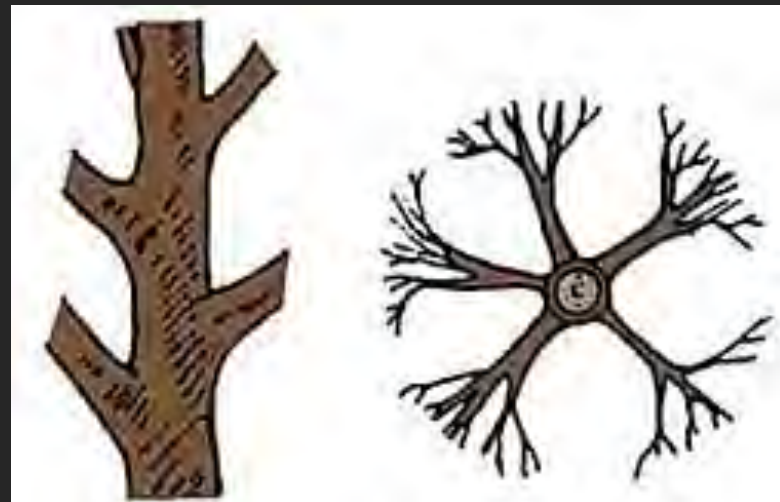
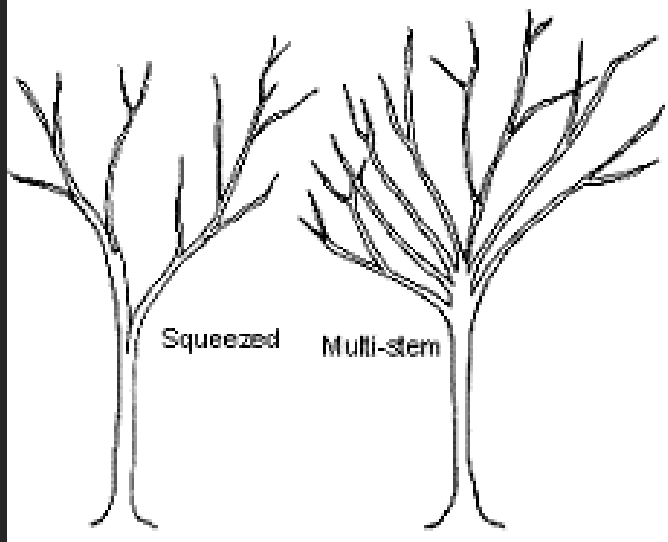


Figure 7. Scaffold branches of trees should have proper vertical and radial spacing on the trunk

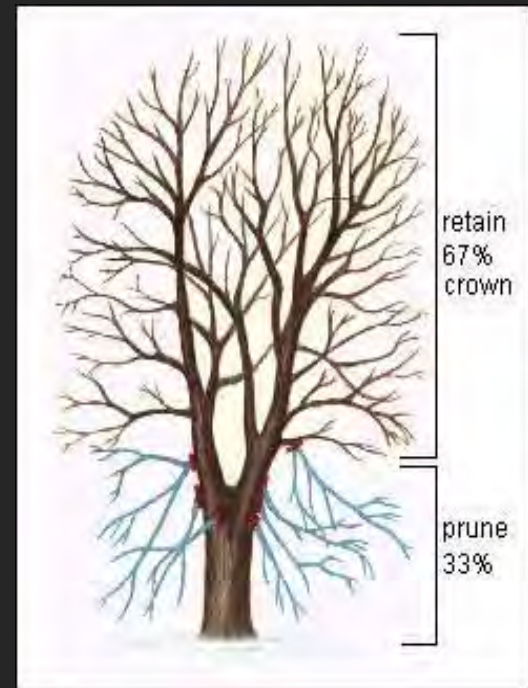
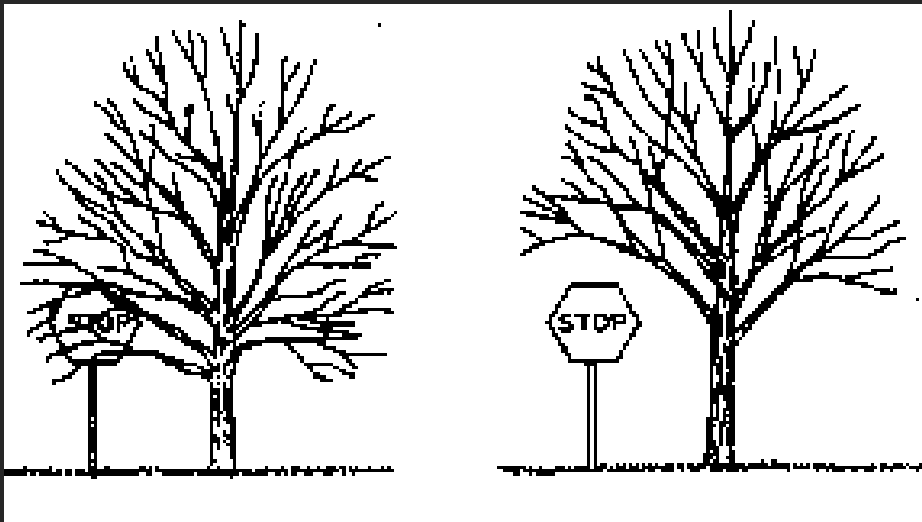
Crown thinning

- Believed to reduce “wind sail” and make the tree more stable in areas with lots of wind and/or shallow soils
- Easy to remove too much and end up with “lions’ tailing”
- Outdated practice now and will no longer be in the ANSI A300 standards



Crown Raising

- 8 feet over sidewalks, 14 feet over streets



Outside the branch collar



Three Cut Method



Cut 1 – Undercut





Cut 2 – Through-cut

Cut 3 – Final cut



- Trees respond to pruning cuts by forming wound wood





- Flush cuts create more surface area than the tree can easily cover, the tree will often grow sprouts for increased energy.



Thank You !

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