

# “Trees 101”

Tidewater Appalachian Trail Club - April 10, 2024

**Lori Heymann**  
**Landscape Sense**  
**Tree Steward (Roanoke)**



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**Tree Hugger**  
**TATC – 2019**



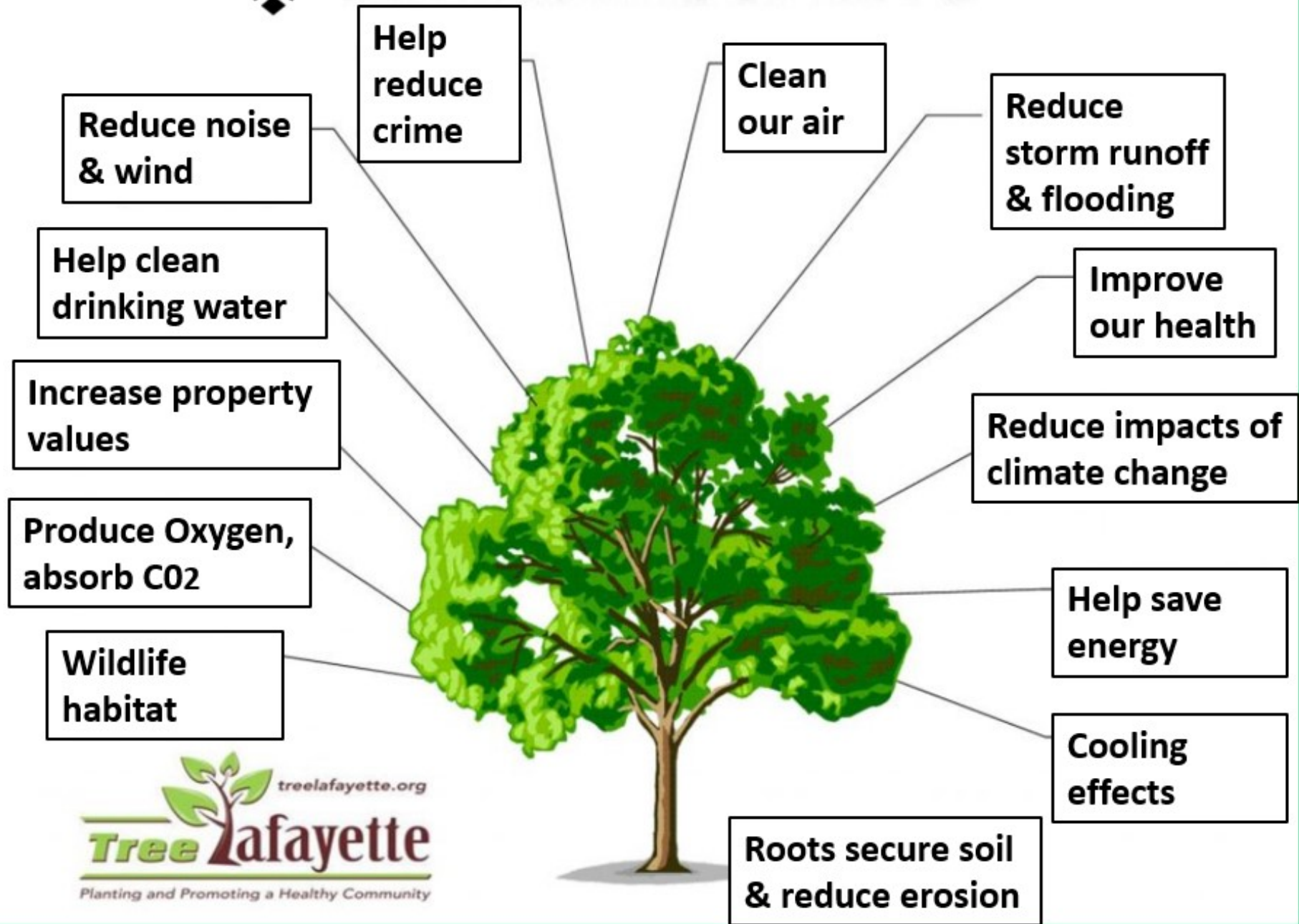
**Seen along Cape  
Henry Trail**

# Agenda

- ❖ Benefits of Trees
- ❖ Learning resource
- ❖ Trees – how they grow
- ❖ Tree Structure
- ❖ Tree Maintenance & Pruning
- ❖ Tree Planting



# THE BENEFITS OF TREES





## **Excellent Learning Resource:**

**Arboriculture Video Series**

**(51 videos for your viewing pleasure)**

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**Dr. Ed Gilman, Professor Emeritus,  
Environmental Horticulture Department,  
University of Florida**

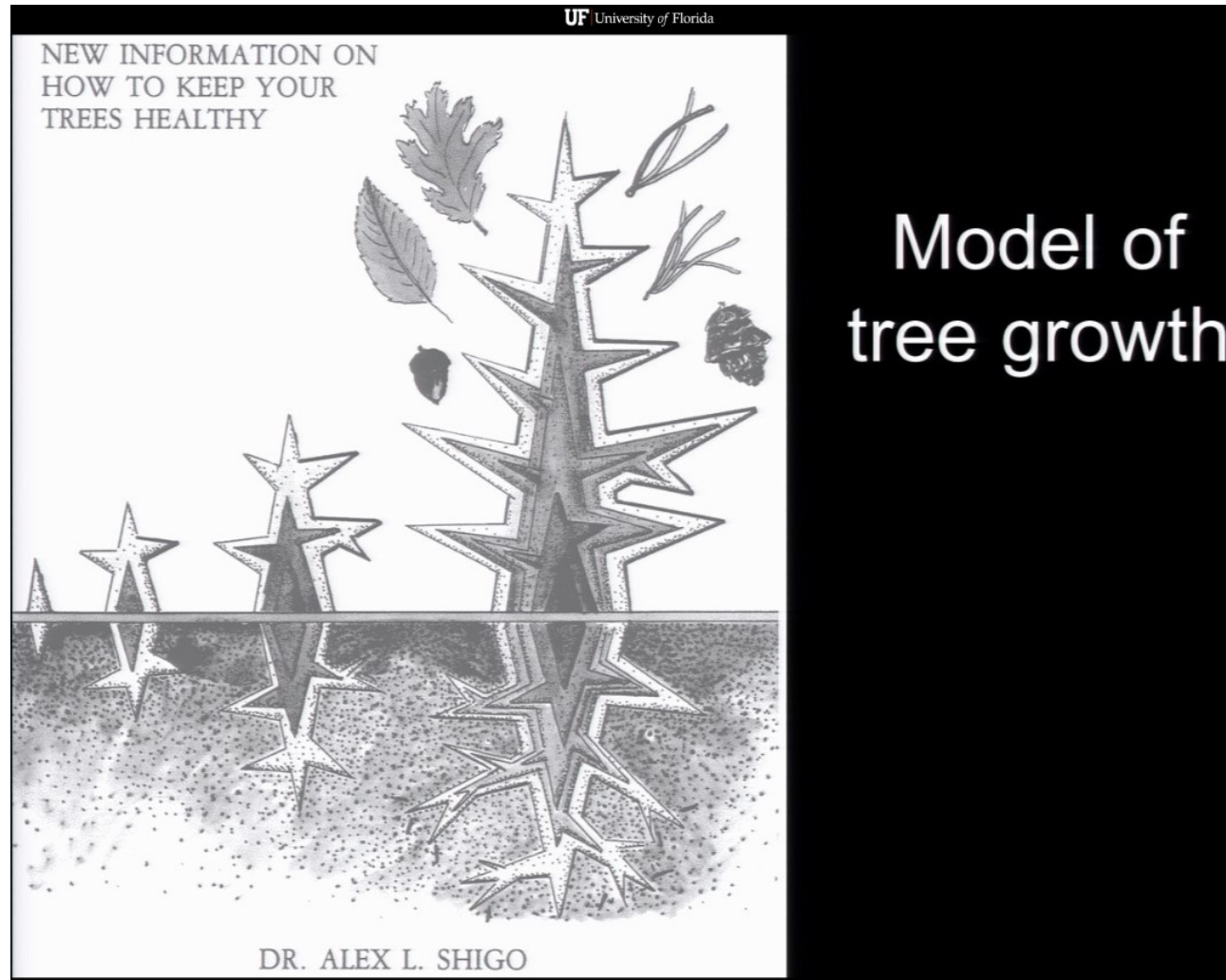
**<https://hort.ifas.ufl.edu/woody/instructional-videos.shtml>**

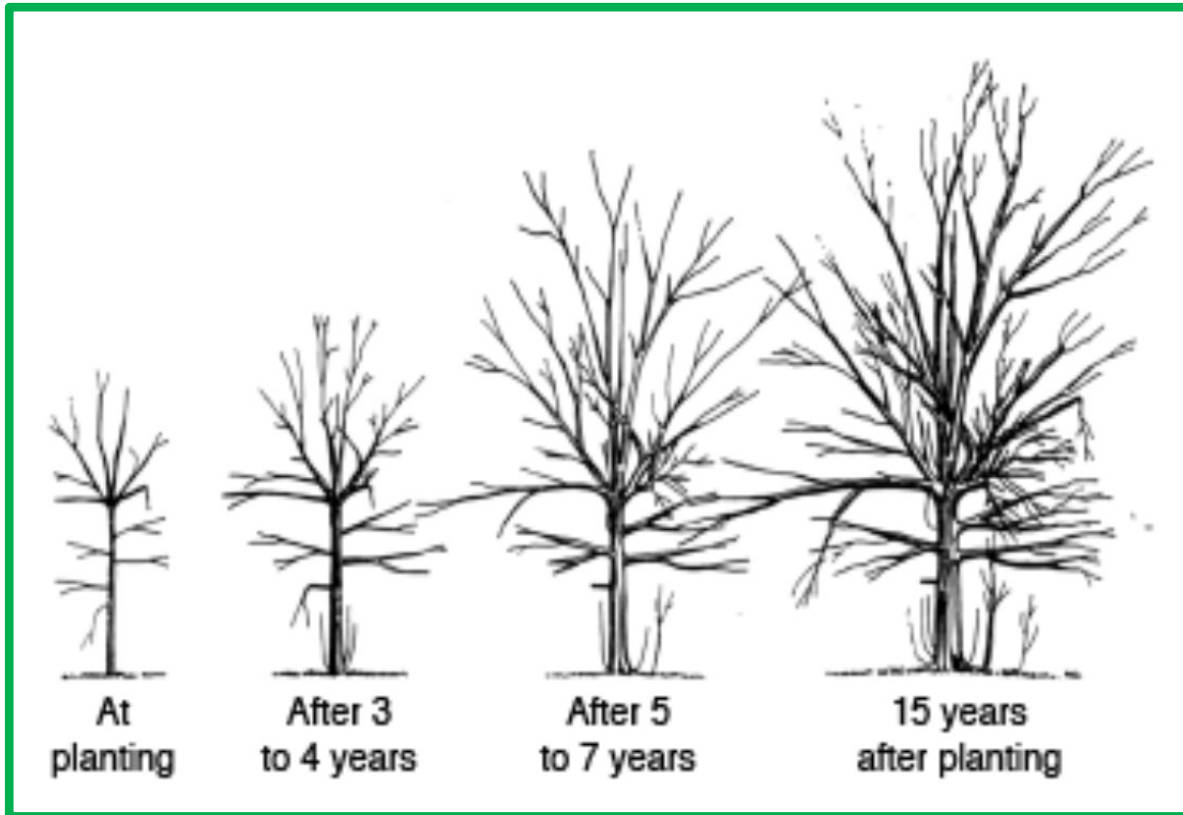
**Illustrations, PowerPoints or Photos by Edward F. Gilman, Professor,  
Environmental Horticulture Department, IFAS, University of Florida.**



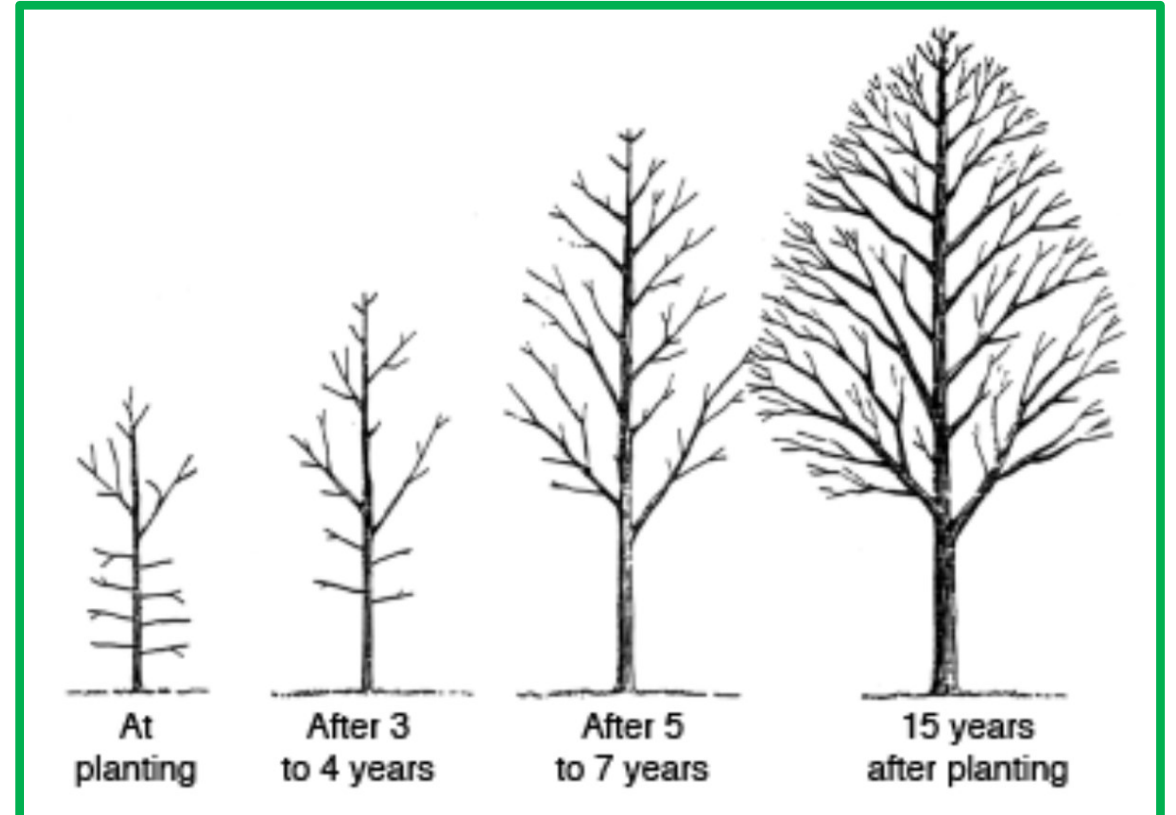


# Trees – how they grow





**A tree not pruned when young may grow into an unattractive tree.**



**A tree pruned when young grows into a strong attractive tree.**

## What's Underground?

- Roots are generally not as deep as you might think
- Deep roots are typically under the trunk and under the canopy
- Majority of roots are in **top two feet** of soil
- Roots are typically above water table and above any hardpan
- Many of the small diameter roots are in the top 12 inches

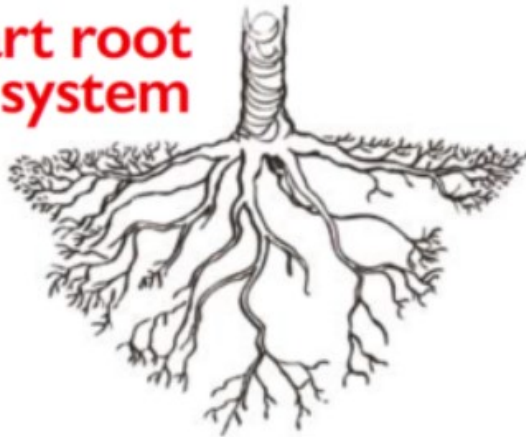


lateral root system



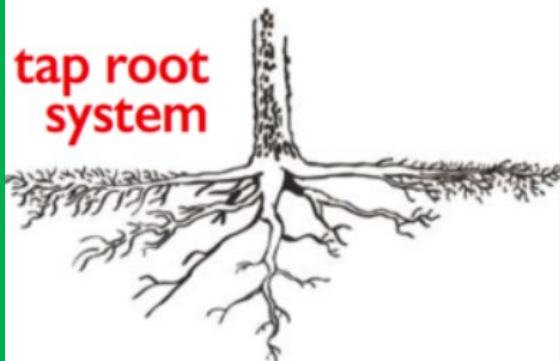
- **80% of trees have lateral root system**
- Width provides tree stability
- *Birch, maple, ash*

heart root system



- **Stability from root mass & soil resistance**
- Oblique roots
- Can fail in wet soils when windy
- *Red oak, sycamore*

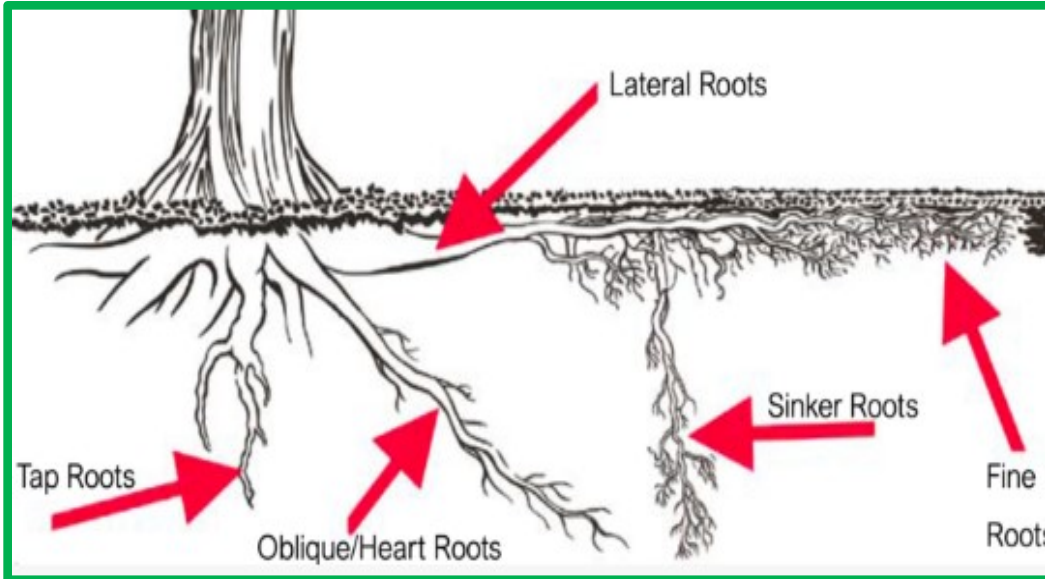
tap root system



- **Stable, but very rare in mature trees**
- *Some oaks & pines, sweet gum, walnut*



## Types of tree roots and function



- Tap roots: trees start with a tap root. Root slows, since deep soils lack oxygen & nutrients.
- Lateral roots grow outwards under soil surface. Anchor tree, absorb water and nutrients.
- Oblique roots grow at a diagonal.
- Sinker roots grow downwards from lateral roots. Water, nutrients, stability.
- Fine roots absorb water and nutrients.
- Fine roots house mycorrhizae: a fungal partnership that helps root absorb nutrients.



**❖ Tree Structure:  
The good, the bad and the ugly!**

**Structure affects  
tree health & safety**

## **Tree Structure topics:**

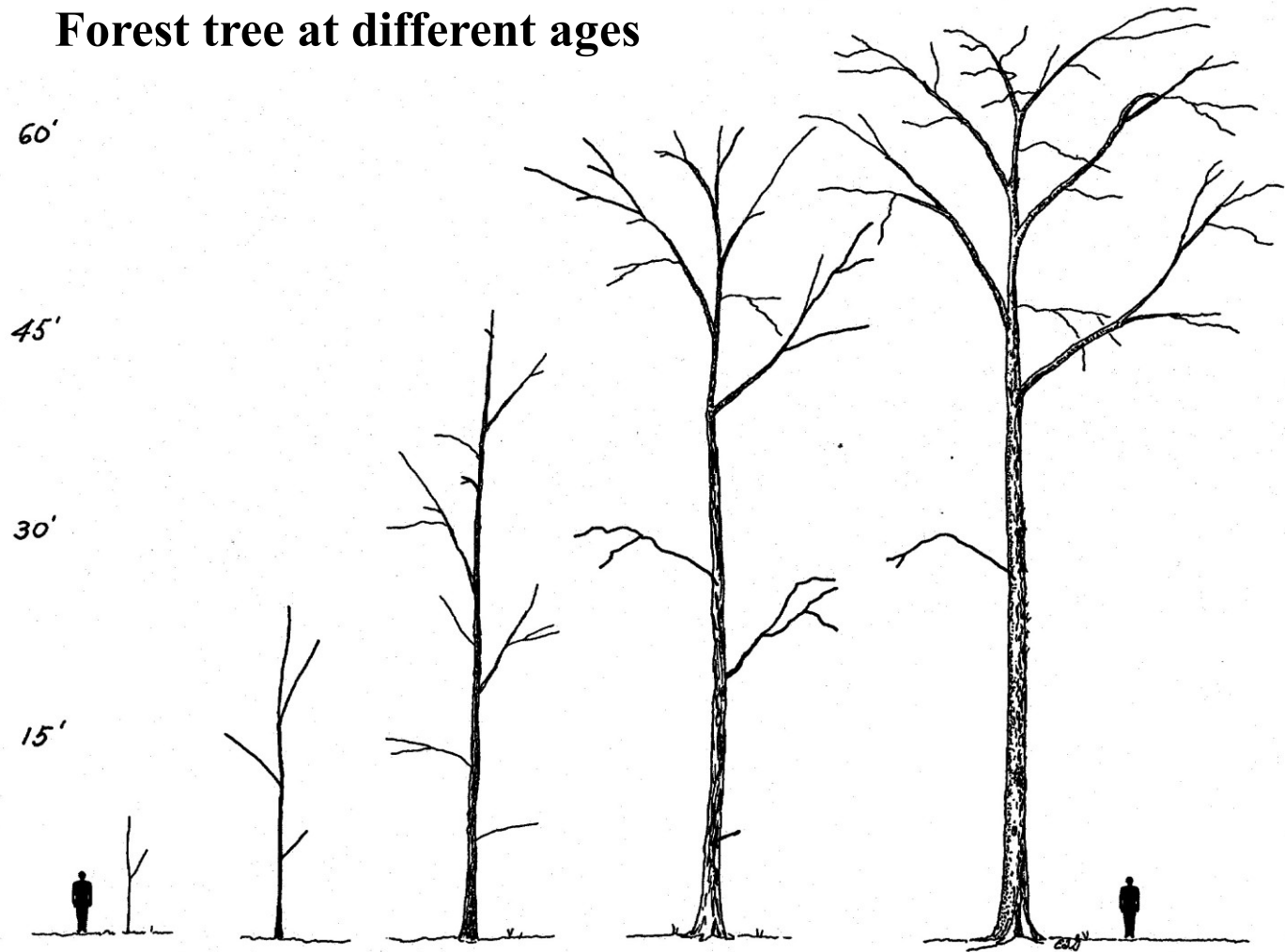
- Forest grown vs. open grown tree**
- Codominant stems**
- Good branch attachment**
- Structurally sound tree**

*(Edited from) Dr. Edward F. Gilman, University of Florida*

## □ Forest grown



## Forest tree at different ages



**Forest trees grow with one trunk, with codominant stems at top. They compete with neighbors for light. Lower branches get shaded out, die, and shed, leaving a clear trunk.**



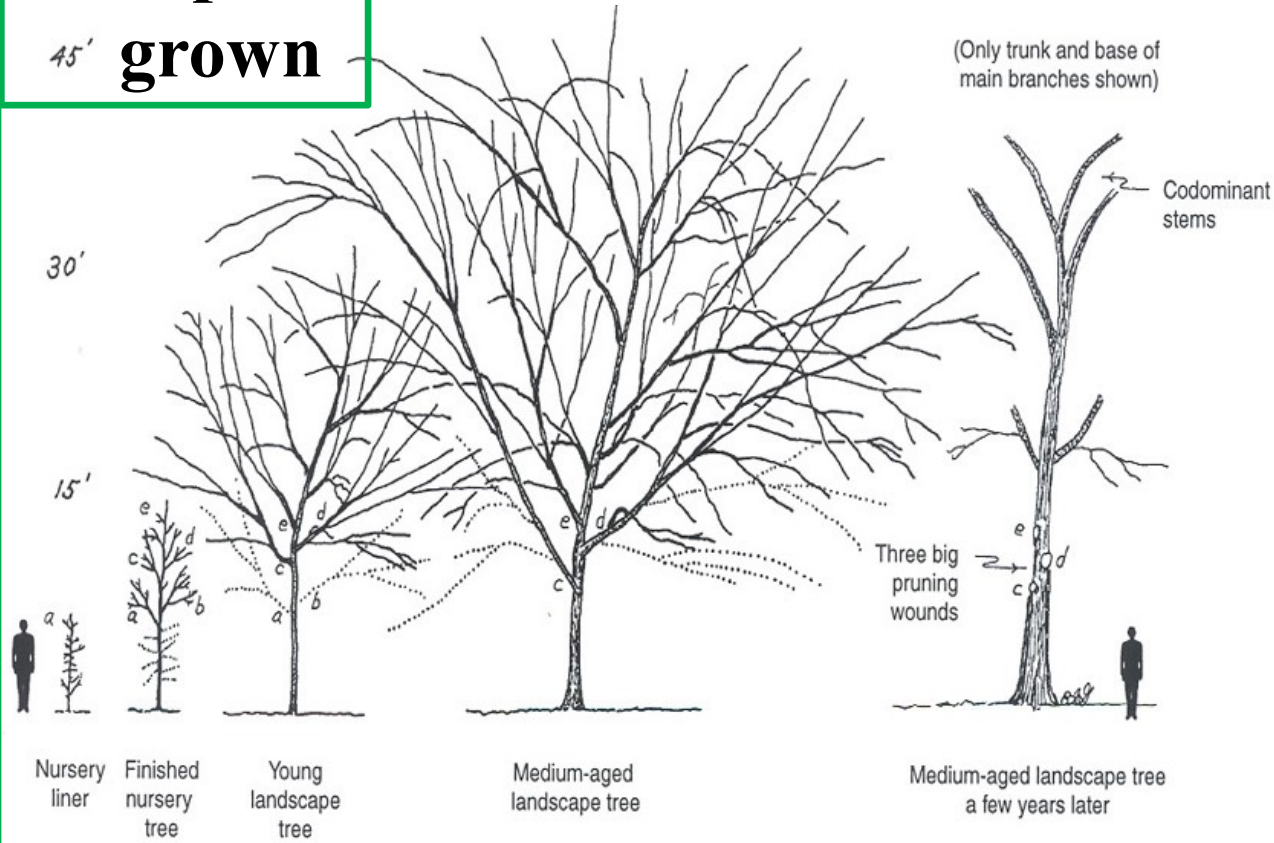
**Open  
grown**

**Landscape tree at different ages**

45'

30'

15'



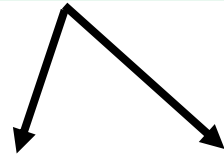
**Lots of open sun?  
Lots of branches!**



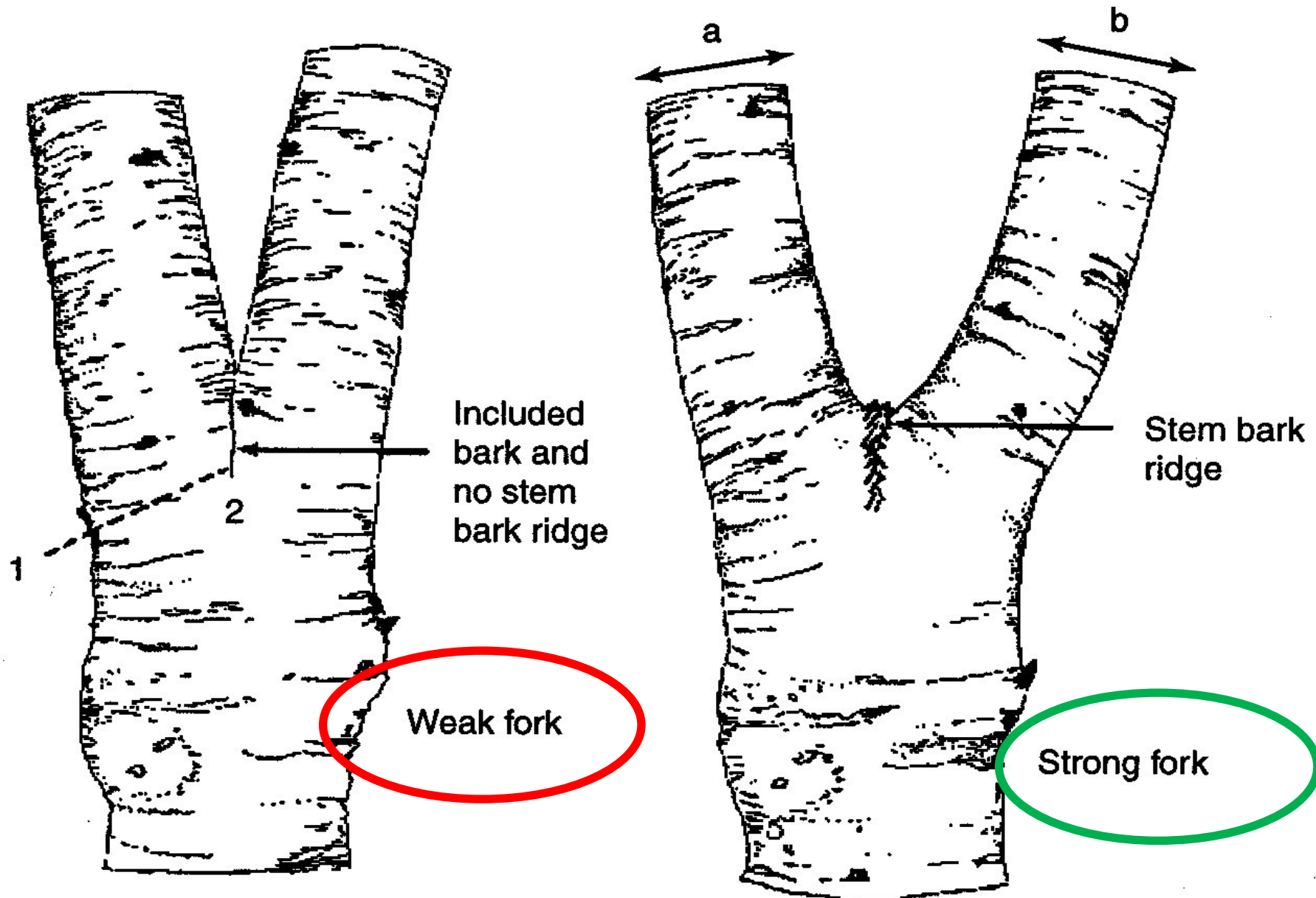
- **It's all about access to sunlight!**
- **Canopy develops low on trunk, and spreads wide.**

**Codominant stems**

**Stems similar diameter**



## Two codominant stems





**Bark inclusion**

**Decay and discoloration from self wounding**





# Bark inclusion (Not codominant stem!)



**Closure crack, acute branch angle, and developing “elephant ears” indicate weak structure.**





# Stems too close together

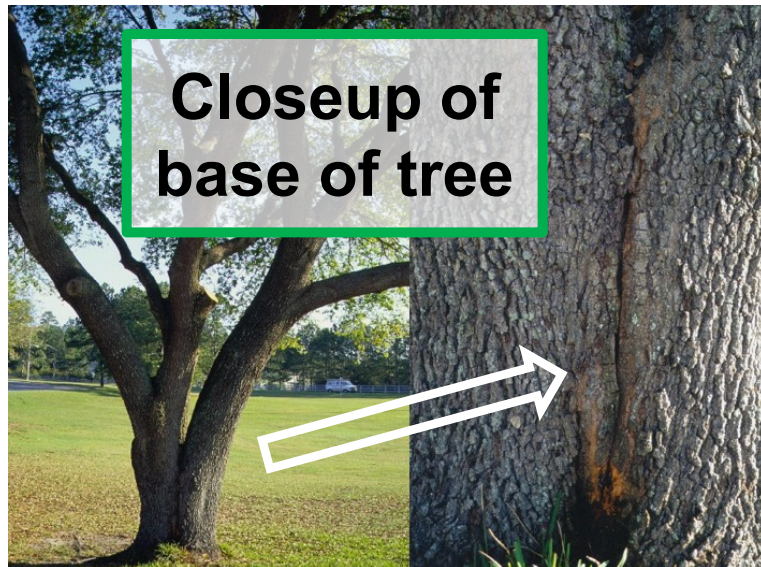




Appears to be a nice tree, but....



- Open sunlit location caused:  
large low branches to develop,  
with included bark between trunks



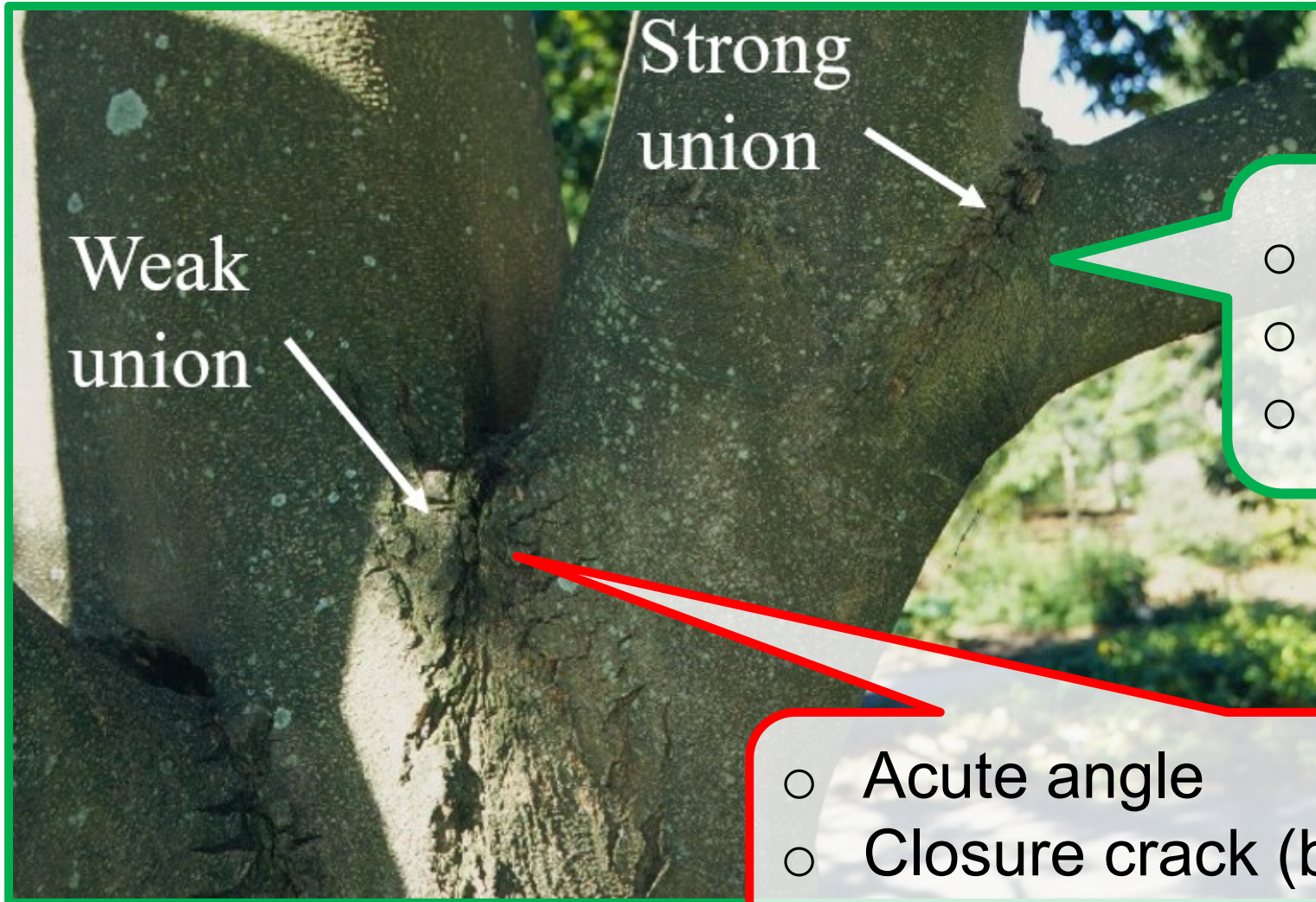
Closeup of  
base of tree



....this can be the result!



## ❑ Good branch attachment



Weak  
union

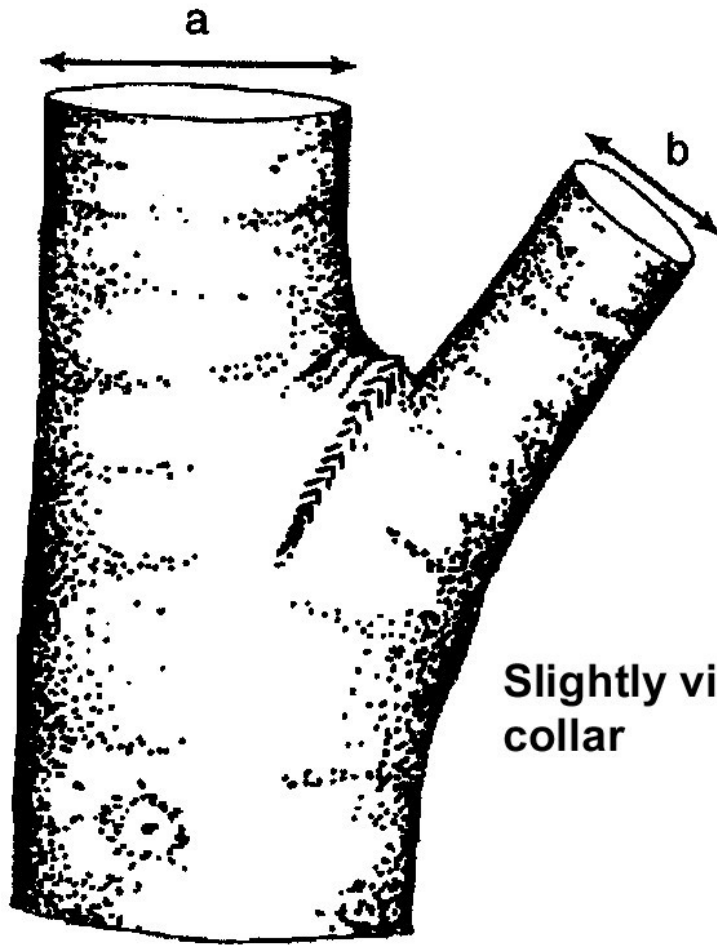
Strong  
union

- Broad angle
- Bark ridge on top
- Aspect ratio  $< 0.5$

- Acute angle
- Closure crack (bark inclusion)
- Large “aspect ratio”  $> 0.75$

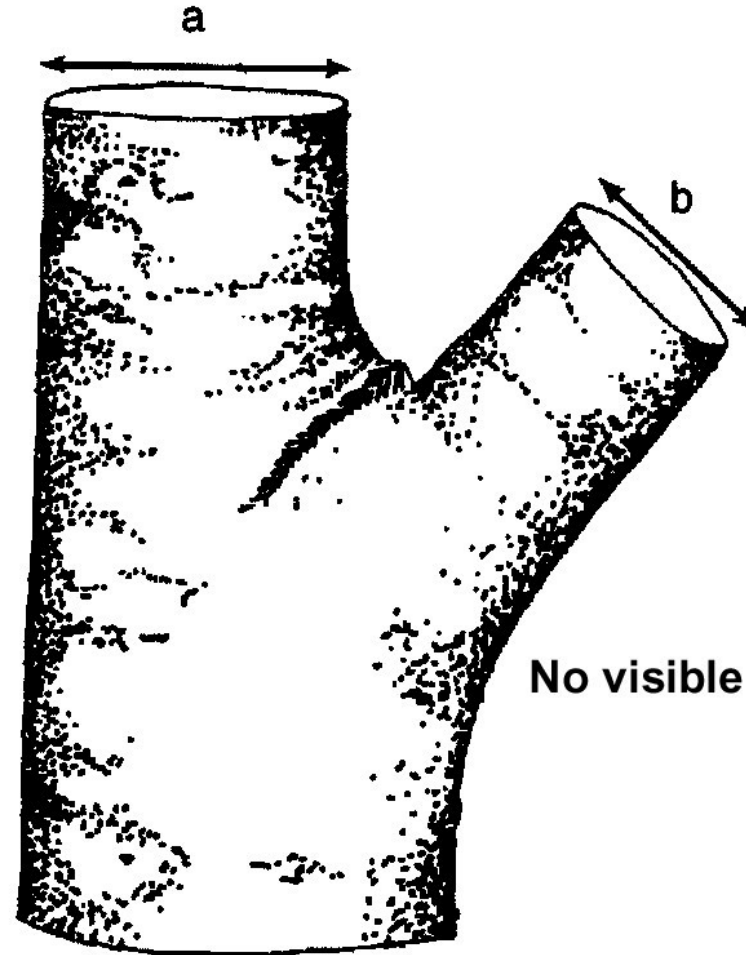


# Desirable branch sizes



Slightly visible collar

Most preferred branch size:  
 $b < .5a$

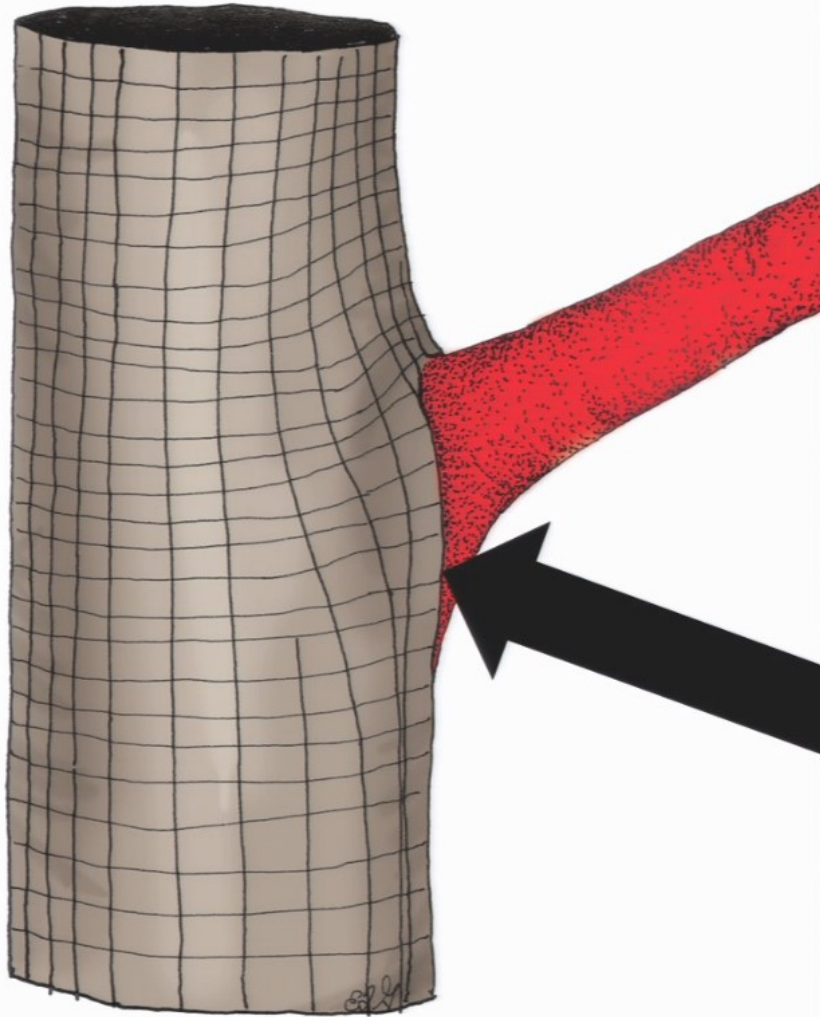


No visible collar

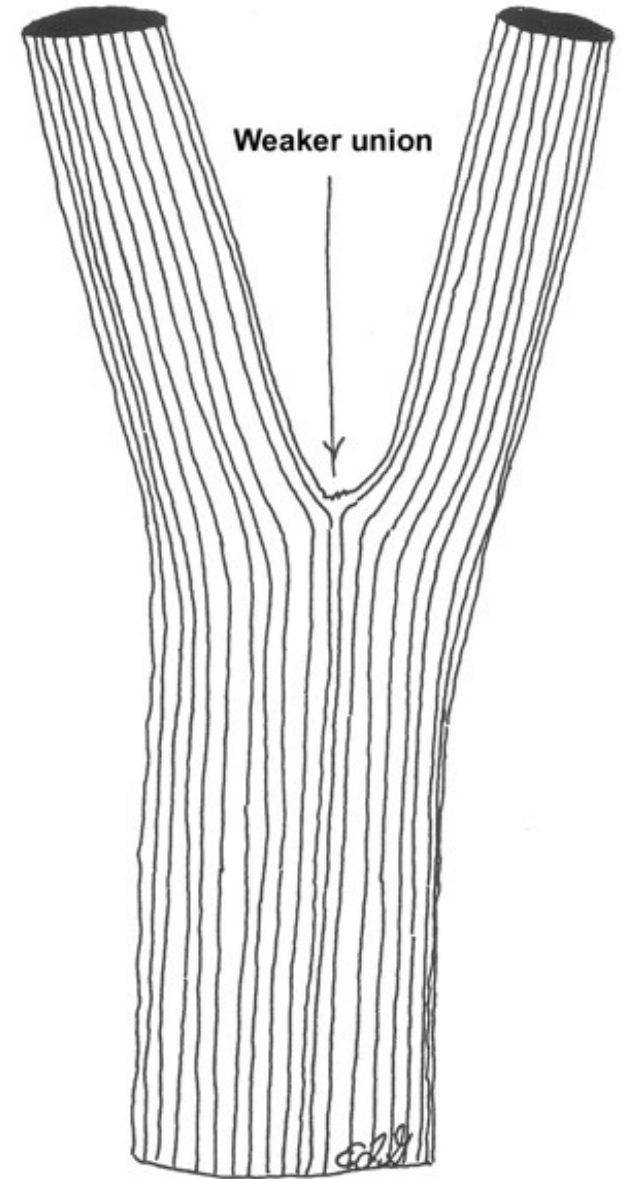
Preferred branch size:  
 $b = .5 \text{ to } .75a$

# What's under the bark?

UF University of Florida

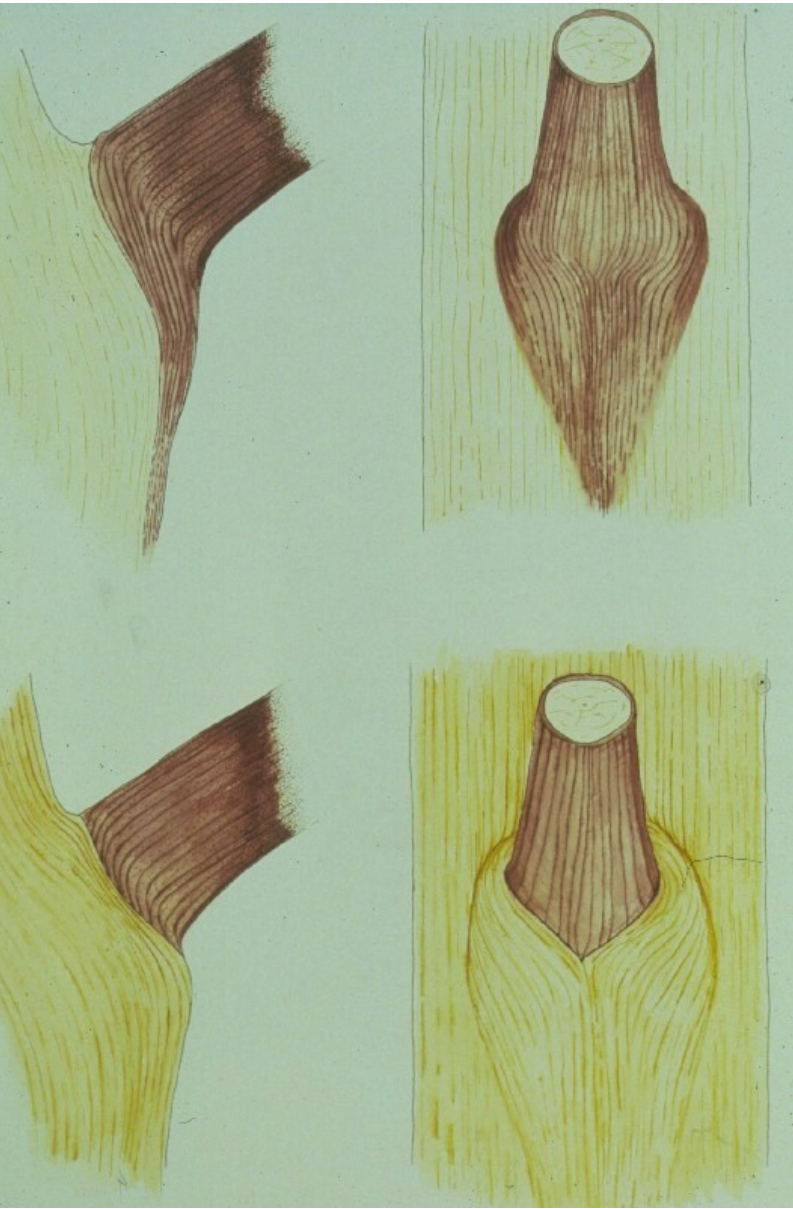


With a small aspect ratio, overlapping wood prevents stress from migrating to the structurally weak rays in the union.



Codominant stems





## Branch union detail

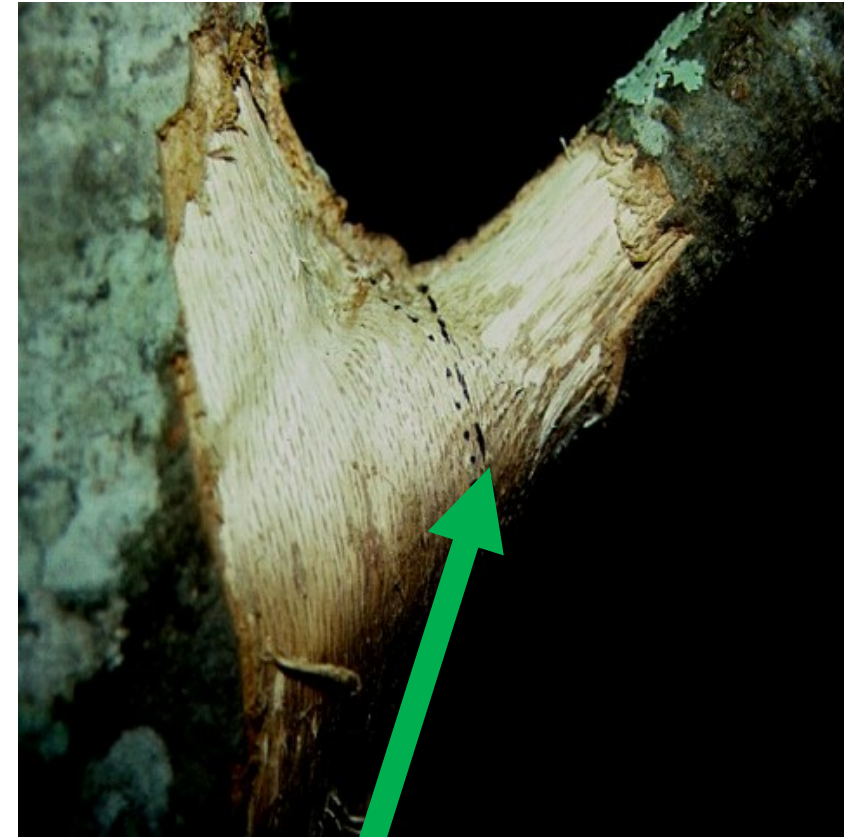
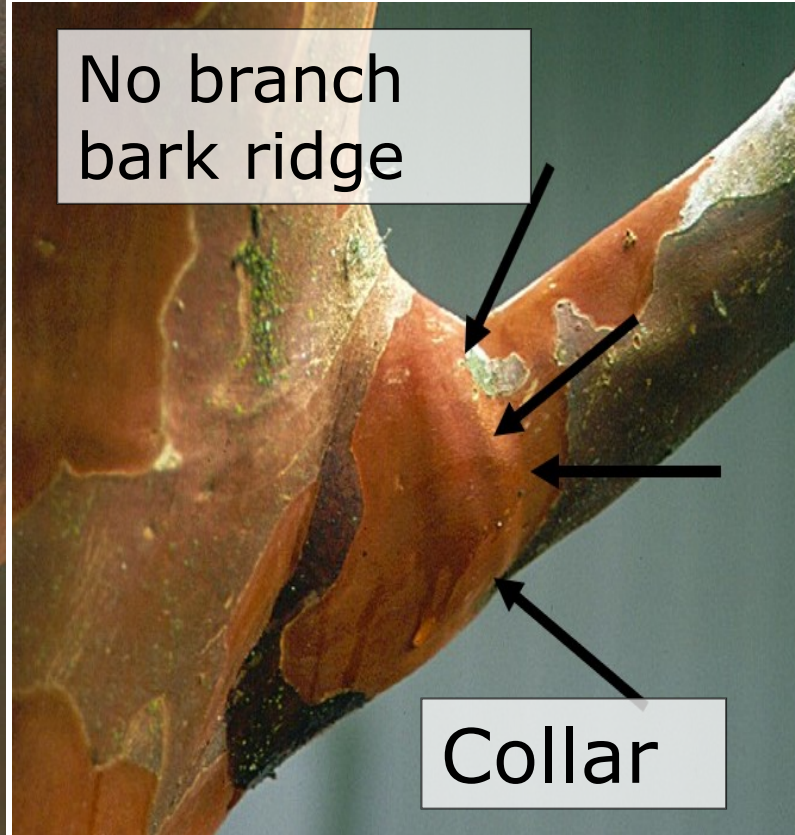
- **Brown (branch) grows first in Spring**
- **Trunk wood layer grows later and overlaps branch wood**
- **Alternating layers form strong union**



# Branch unions



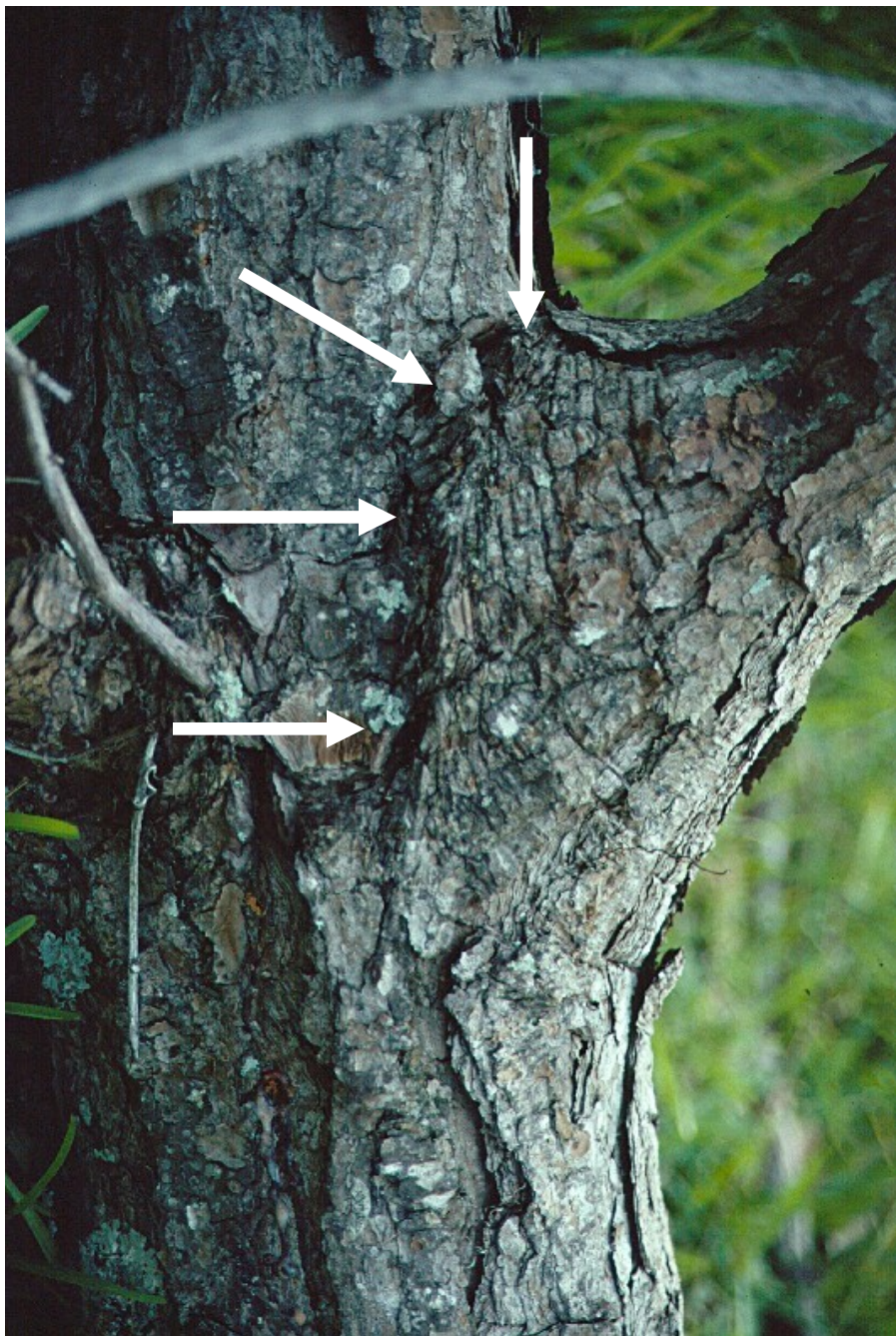
**Visible bark branch ridge**  
**New growth of branch / trunk union**  
**No inclusion between branch & trunk**



**Note how trunk wood grows out onto the base of branch (dotted line is edge of trunk wood)**



## Pine union



- **Collar: visible swelling at base of branch**
- **Branch bark ridge: dark, rough bark region on top and sides of union (White arrows)**



## ☐ Structurally Sound Trees

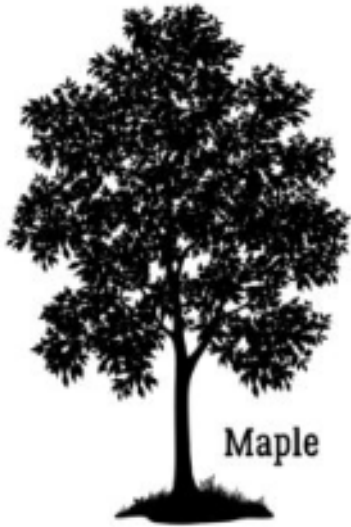
- Scaffold branches spaced evenly
  - Vertical spacing
  - Radial spacing
- 60% Live Crown Ratio



**Good structure –  
dominant leader**



Magnolia



Maple



Lilac



Castor



Acacia

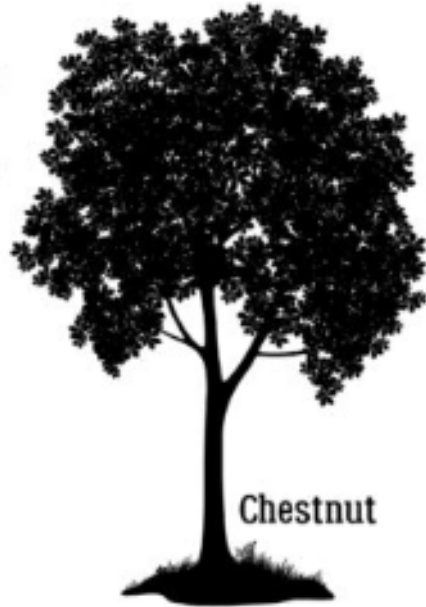


Fir tree

## Idealized shapes by species



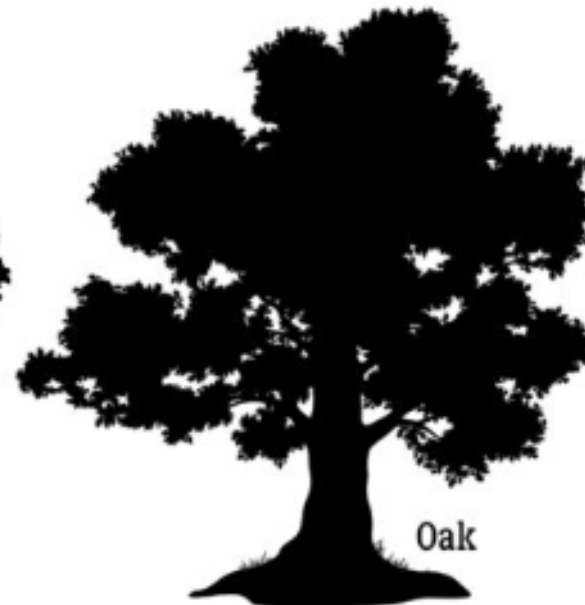
Pine



Chestnut



Maple



Oak



# ❖ **Tree Maintenance**

- **Above ground**
- **Below ground**
- **Arborists**



# Tree Maintenance

Plant in location that allows full growth at maturity

Monitor diseases and pests. Use proper controls.

Remove waterspouts, weak / crossing branches

Water slowly and deeply

Mulch properly

Avoid digging in root zone

Feed only as directed by arborist

Prune to direct growth. Remove competing leaders when young.

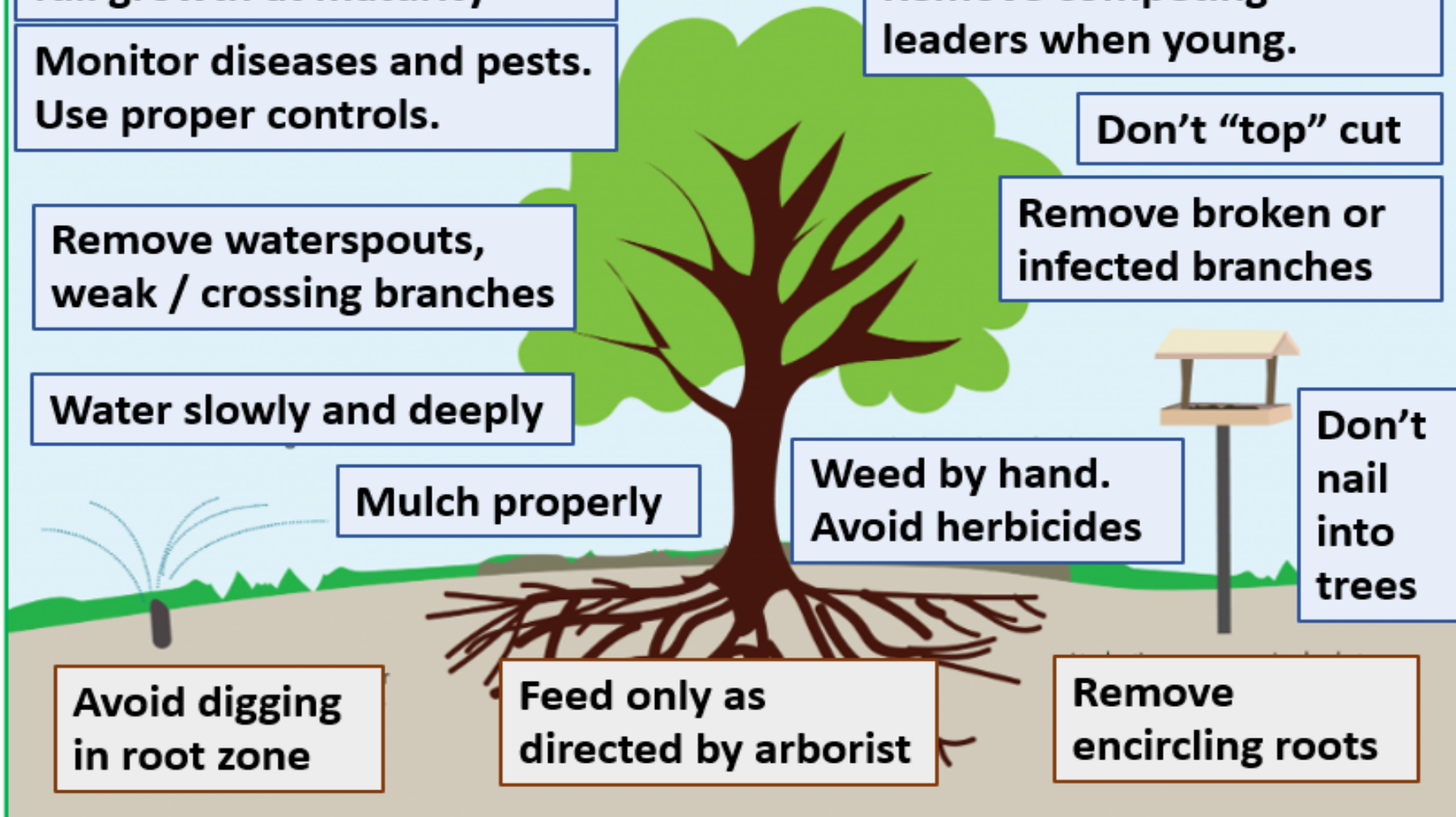
Don't "top" cut

Remove broken or infected branches

Weed by hand. Avoid herbicides

Don't nail into trees

Remove encircling roots



## Objective: **Maintain tree health**



**Clean crown, especially in medium-aged & mature trees.  
Remove dead, diseased, and rubbing branches, including young trees.**

# Proper mulching helps trees!

- Adds nutrients to soil as it decays
- Protects roots, retains moisture
- Apply even layer 2-4" deep
- Don't cover the root flare
- Arborist chips may be available free
- Ground cover can be added, once mulch has aided topsoil regeneration

## No "Mulch Volcanoes!"

### *Volcanoes:*

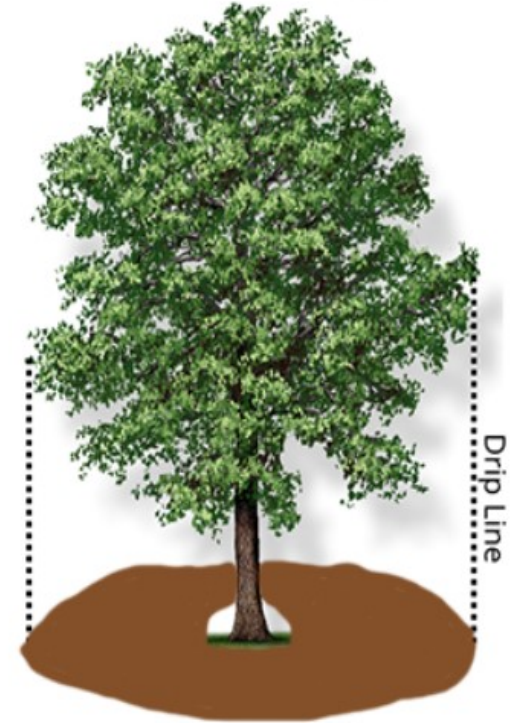
- *Encourage improper root growth*
- *Harbor disease and bark-eating pests*
- *Block moisture / air from roots*

## Incorrect Mulching



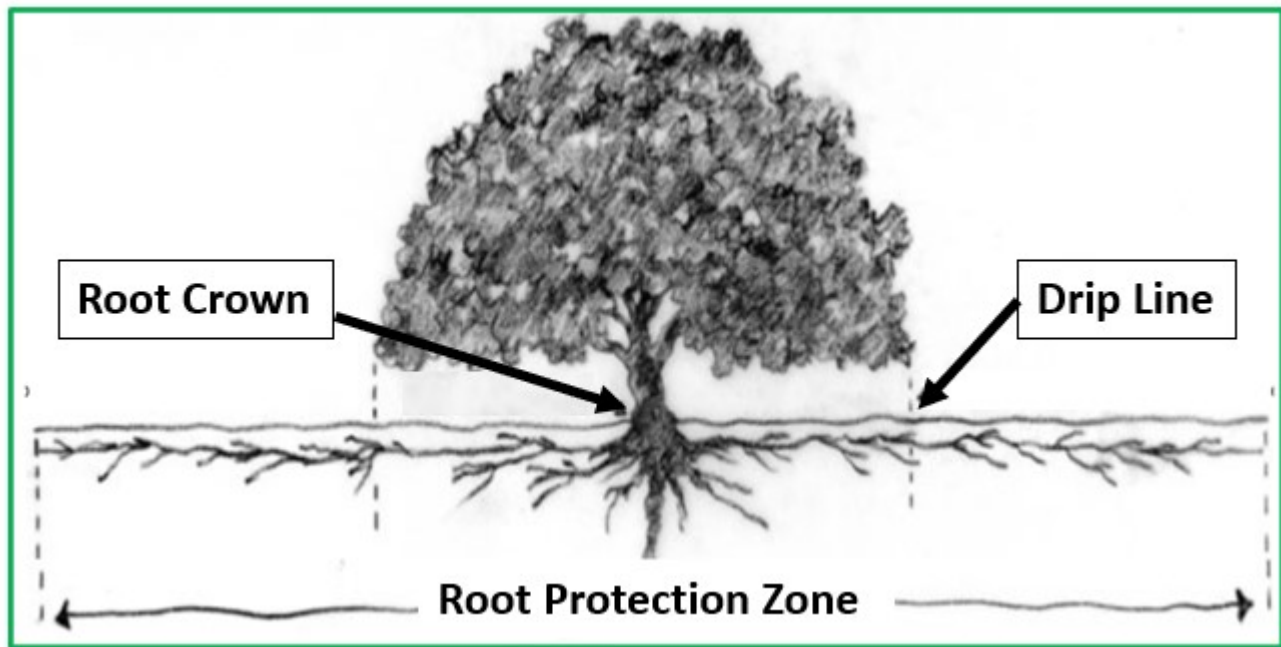
- ✗ Tree is not visible at base
- ✗ Mulch Volcano: Mulch is piled up too high
- ✗ Mulch doesn't extend to drip line

## Correct Mulching



- ✓ Tree is visible at base
- ✓ Mulch is evenly spread at a depth of 2 to 4 inches
- ✓ Mulch extends to drip line





## Root Care:

- Proper mulching, away from root flare, out to drip line
- Don't drive over roots with vehicles and lawn equipment
- Don't apply harmful herbicides near tree's root zone!
- Protect during construction with wood mats, extra mulch or barriers
- Use horizontal or directional boring for excavation, where possible.

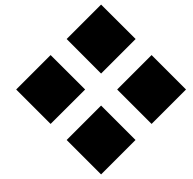
## **Arborist Tree Care**

- **Risk Assessment**
- **Proper pruning**
- **Cabling or bracing**
- **Root and soil treatments**
- **Lightning Protection**
- **Tree removal (dead or dying)**

## **Arborist Selection**

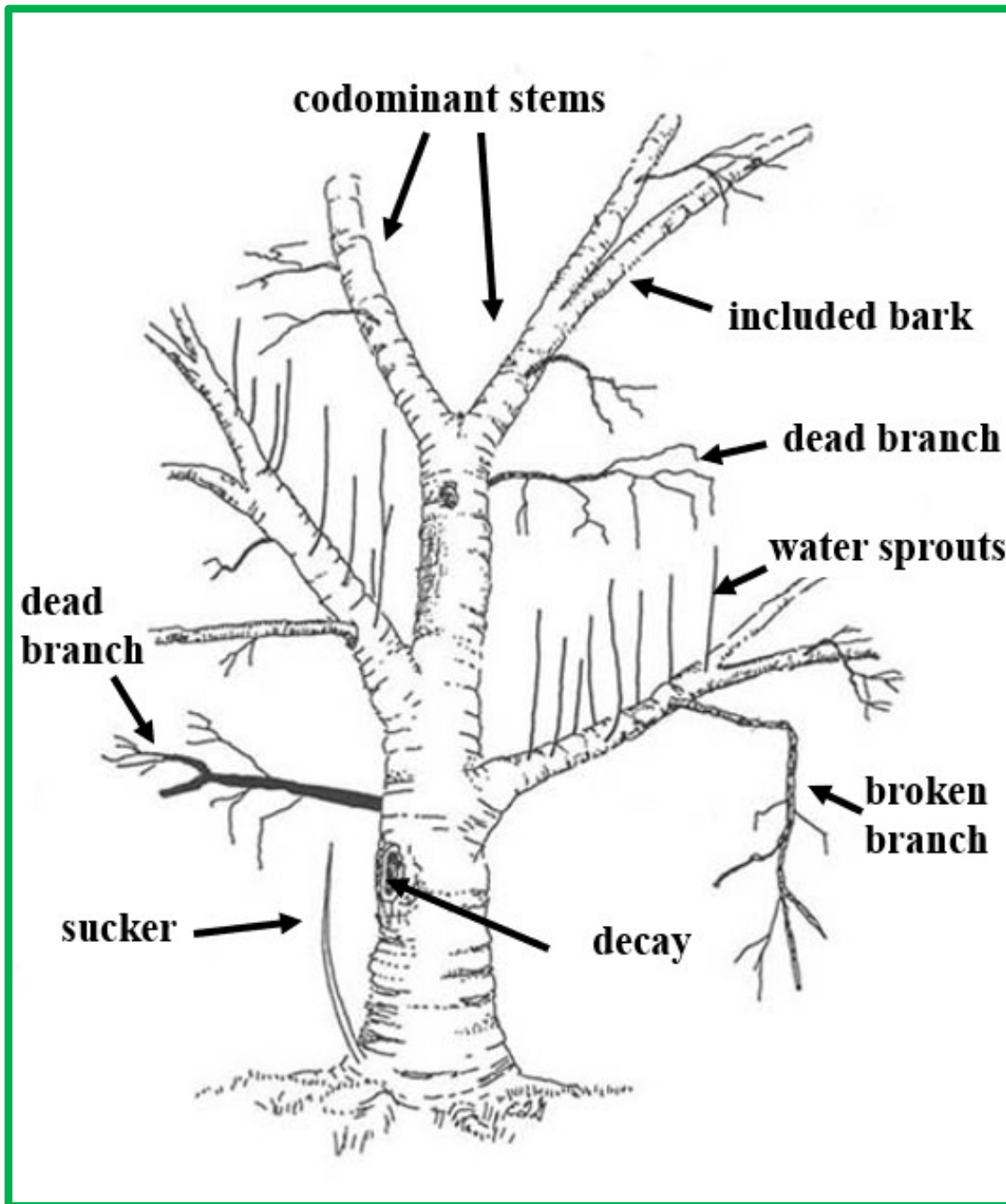
- **Certified arborist on site**
- **Insurance / Workman's Comp**
- **Safety gear**
- **No spikes when climbing**
- **Root protection**
- **Correct season to prune**





# Tree Pruning

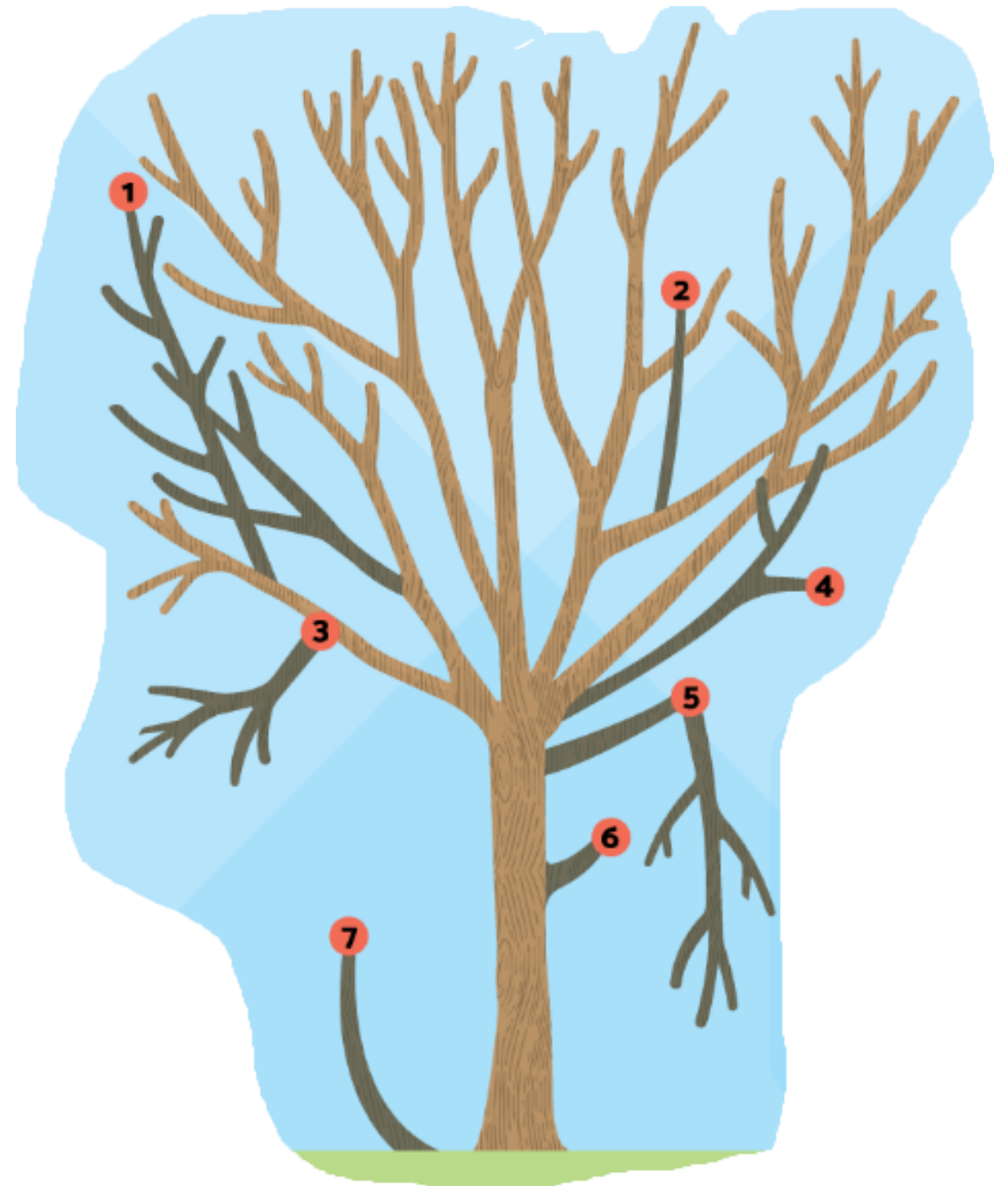
# Common problems of mature trees





# Each tree is different

- 1 Crossing Branches
- 2 Water Spouts
- 3 Hanging Branches
- 4 Closely Spaced Branch
- 5 Broken Limbs
- 6 Branch Stubs
- 7 Sucker Growth



## ❖ Tree Pruning



Before pruning



Thinning



Raising



Reduction

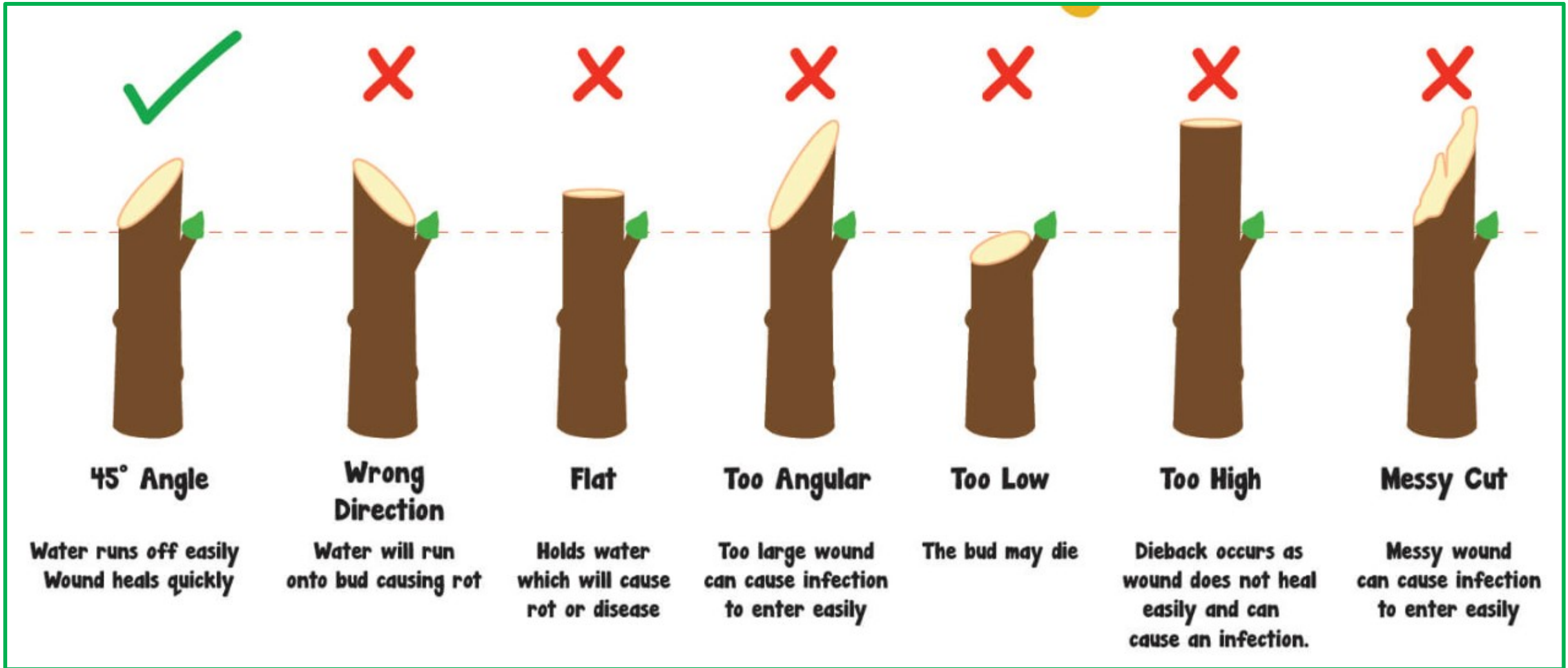


Cleaning

- ✓ **Thinning:** Removes branches throughout, for better light access. Best for young trees.
- ✓ **Raising:** Removes branches from base of a tree to provide more overhead clearance. Used if tree has many low-hanging branches.
- ✓ **Reduction:** Remove branches at top of tree to reduce height. Difficult task; employ only when necessary. (Not “tree topping”, which chops off branch ends and ruins structure).
- ✓ **Cleaning:** Remove dead or dying branches to preserve overall tree health.



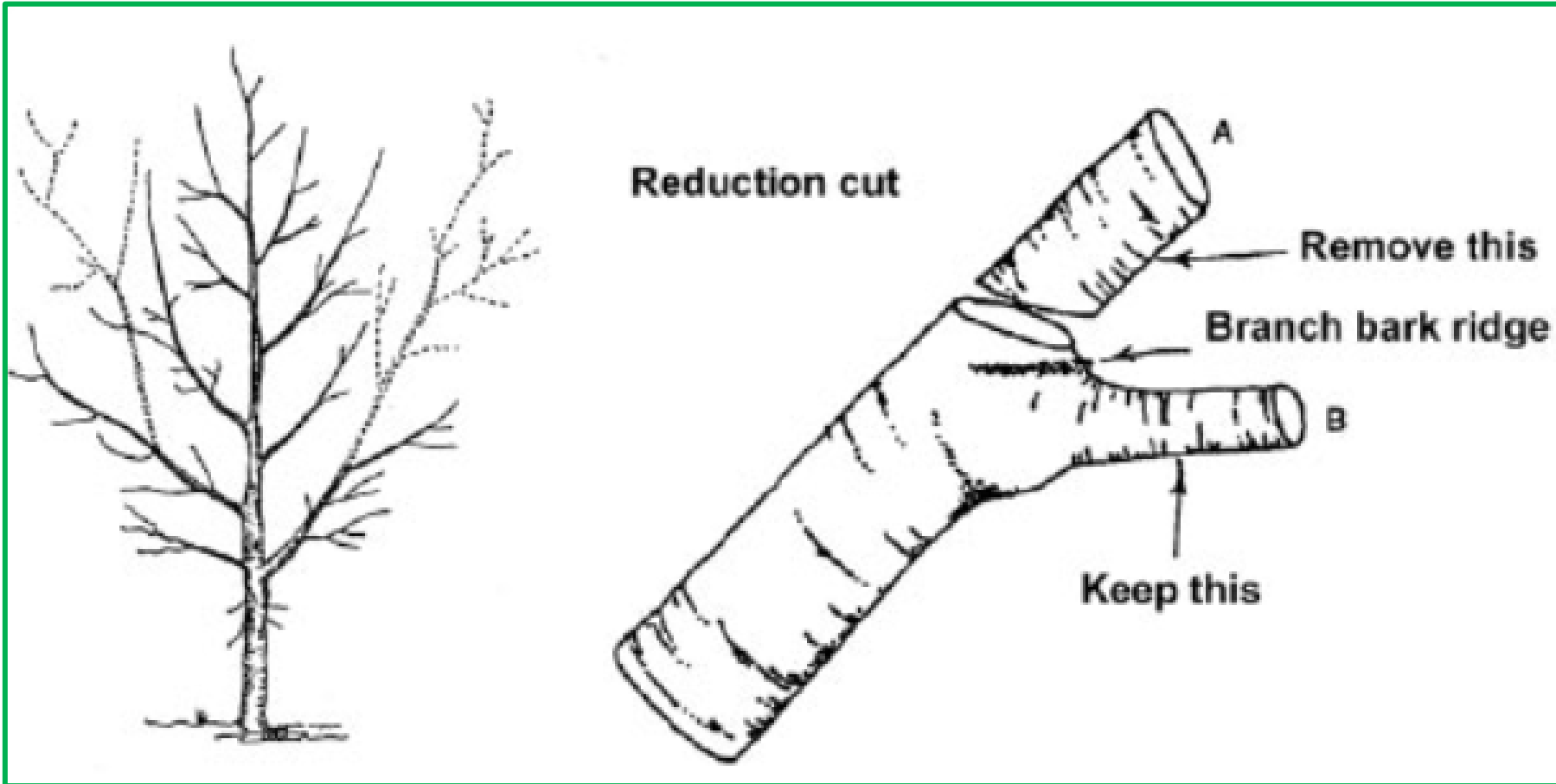
# *Proper cut helps branch heal and grow properly*



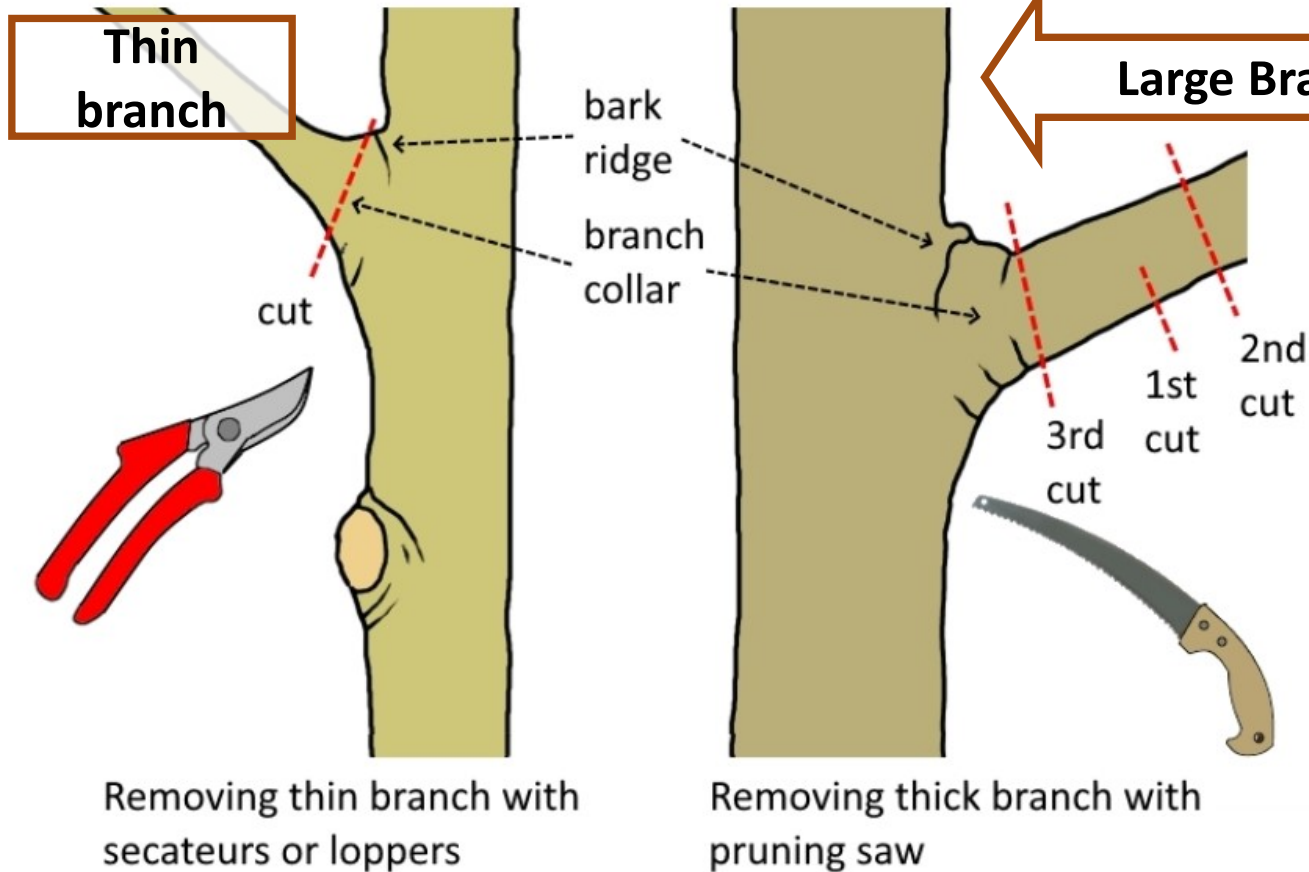
*Using a clean sharp tool helps cut heal more quickly*

***Reduction cut subordinates a branch.***

***This encourages tree to send more nutrients into a desired branch or to the dominant leader***



Pruning Off Branches Correctly - Don't Cut Into the Branch Collar



Removing thin branch with secateurs or loppers

Removing thick branch with pruning saw

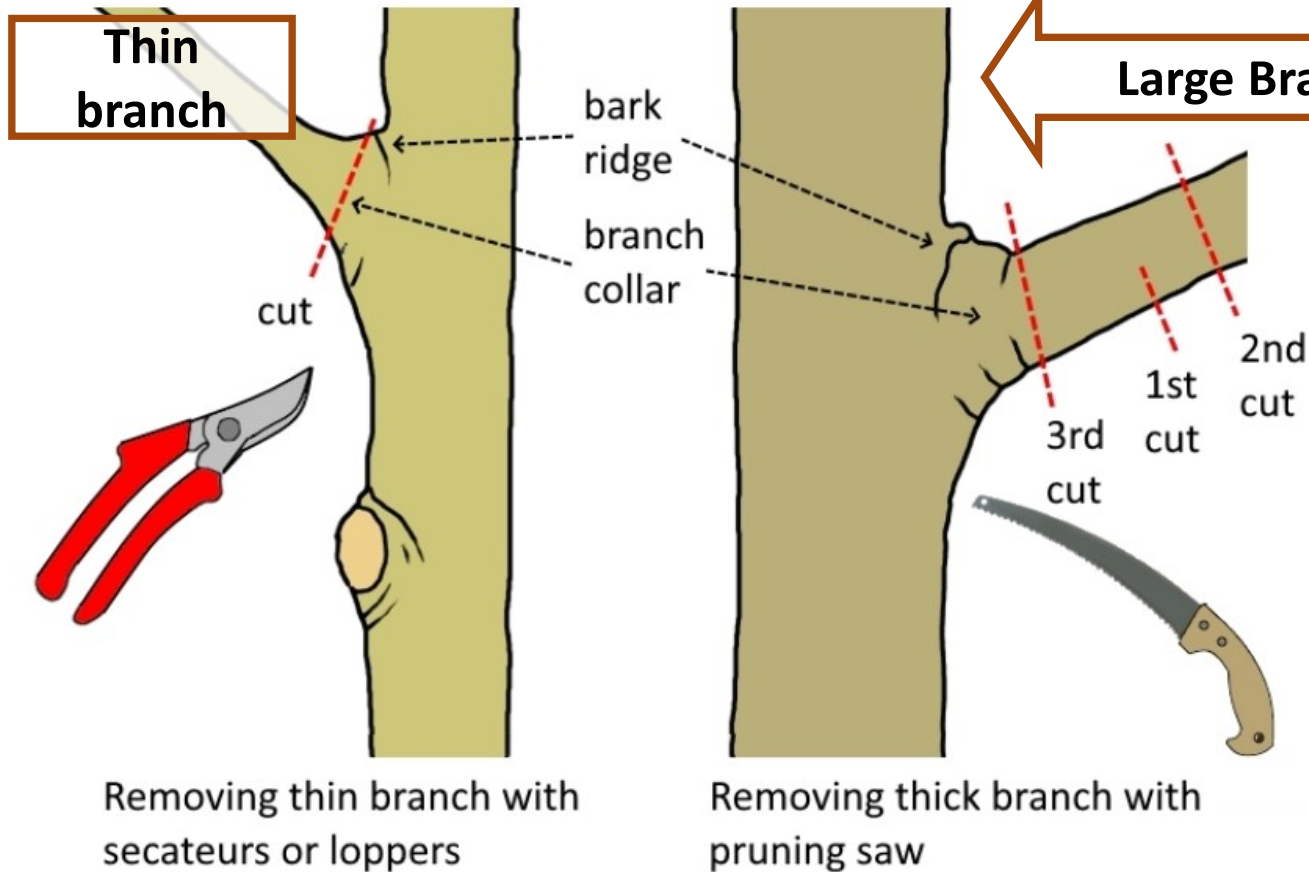
1. Notch Cut on underside prevents bark stripping
2. Relief Cut removes most of branch weight, leaving a short stub
3. Final Cut prunes stub to just above branch collar

*"A correctly-made cut with a sharp tool leaves the branch collar intact and undamaged. This promotes wound healing."*

***At the base of every branch is a bulge where it connects to the trunk or an older branch. The branch collar has interlocking layers of cells of the branch and the trunk. Collar seals pruning wound, reducing decay and entry of disease pathogens.***



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## Large branch removal cuts



**If possible, lower heavy end with rope to avoid damage to other limbs**





***Some examples of what “not” to do!***

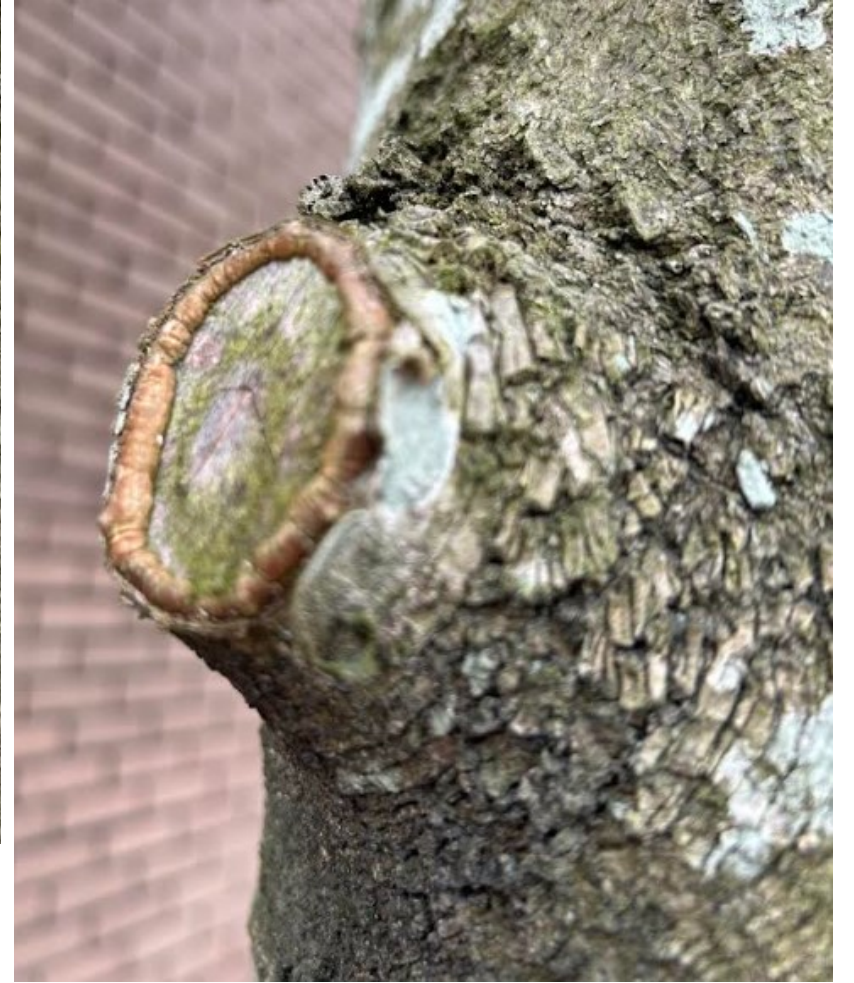




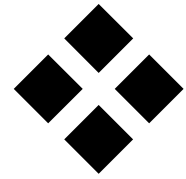
***Top - no healing  
Bottom - healing***



***Broken branch:  
slow to heal.  
Tree vulnerable to  
disease and rot***



***Good or bad cut?***



# Tree Planting

## Resource:

[hort.ifas.ufl.edu/woody/powerpoints/rootsinplanting.ppt](http://hort.ifas.ufl.edu/woody/powerpoints/rootsinplanting.ppt)



## ***Ten steps for proper tree planting***

- 1. Look up for wires / lights**
- 2. Dig shallow / wide hole**
- 3. Find the top-most root and treat root defects**
- 4. Place tree in hole**
- 5. Position top root 1-2 inches above landscape soil**
- 6. Straighten tree**
- 7. Remove synthetic materials**
- 8. Add backfill soil and firm the root ball. Water**
- 9. Add mulch**
- 10. Stake and prune if needed**



***University of Florida***

***Dr. Edward F. Gilman and Traci Partin***

***<https://hort.ifas.ufl.edu/woody/powerpoints.shtml>***



## 1. Look up!

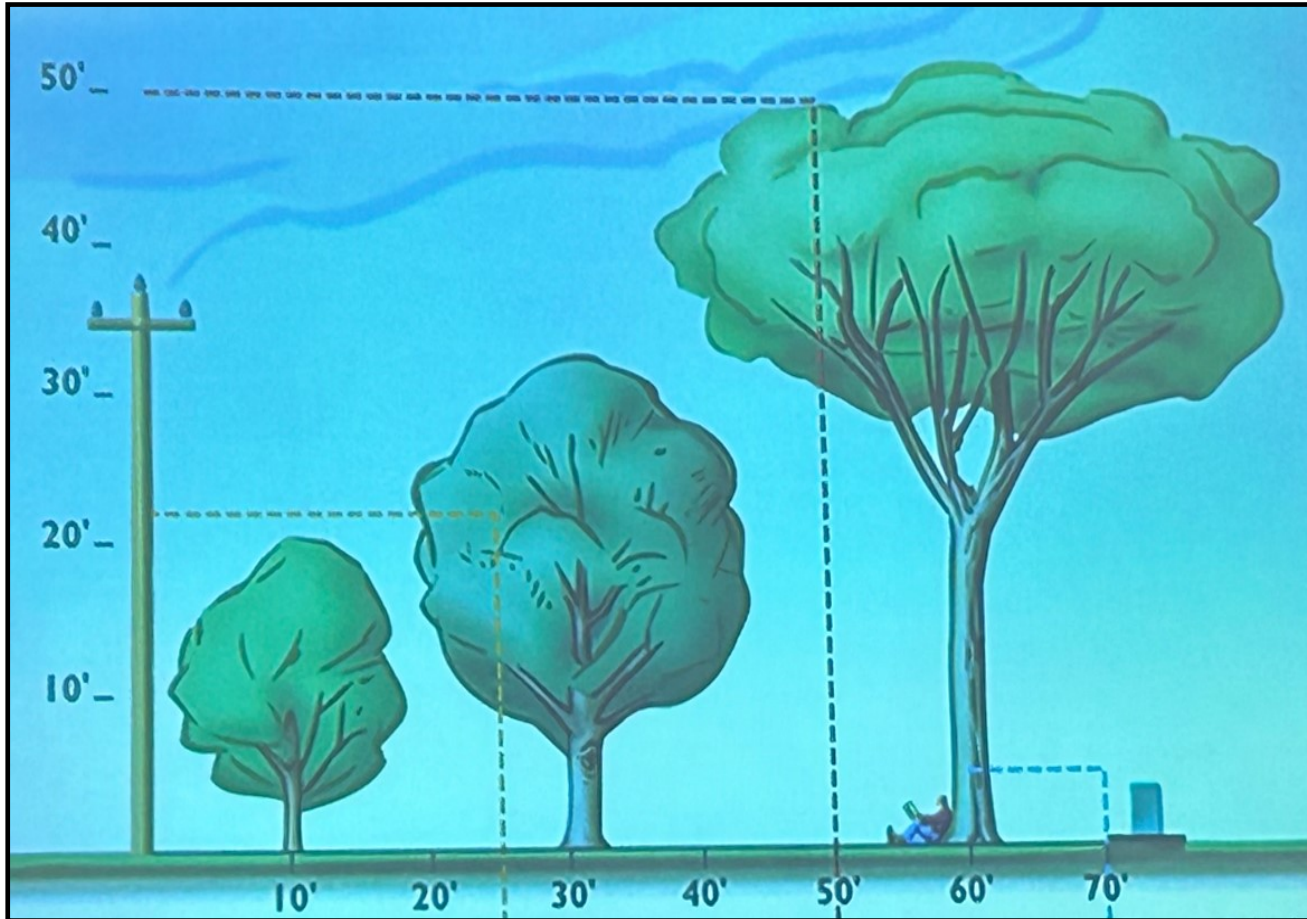


**Last chance for:  
“Right Tree - Right Place”**

**Wire, light pole, or building nearby?**

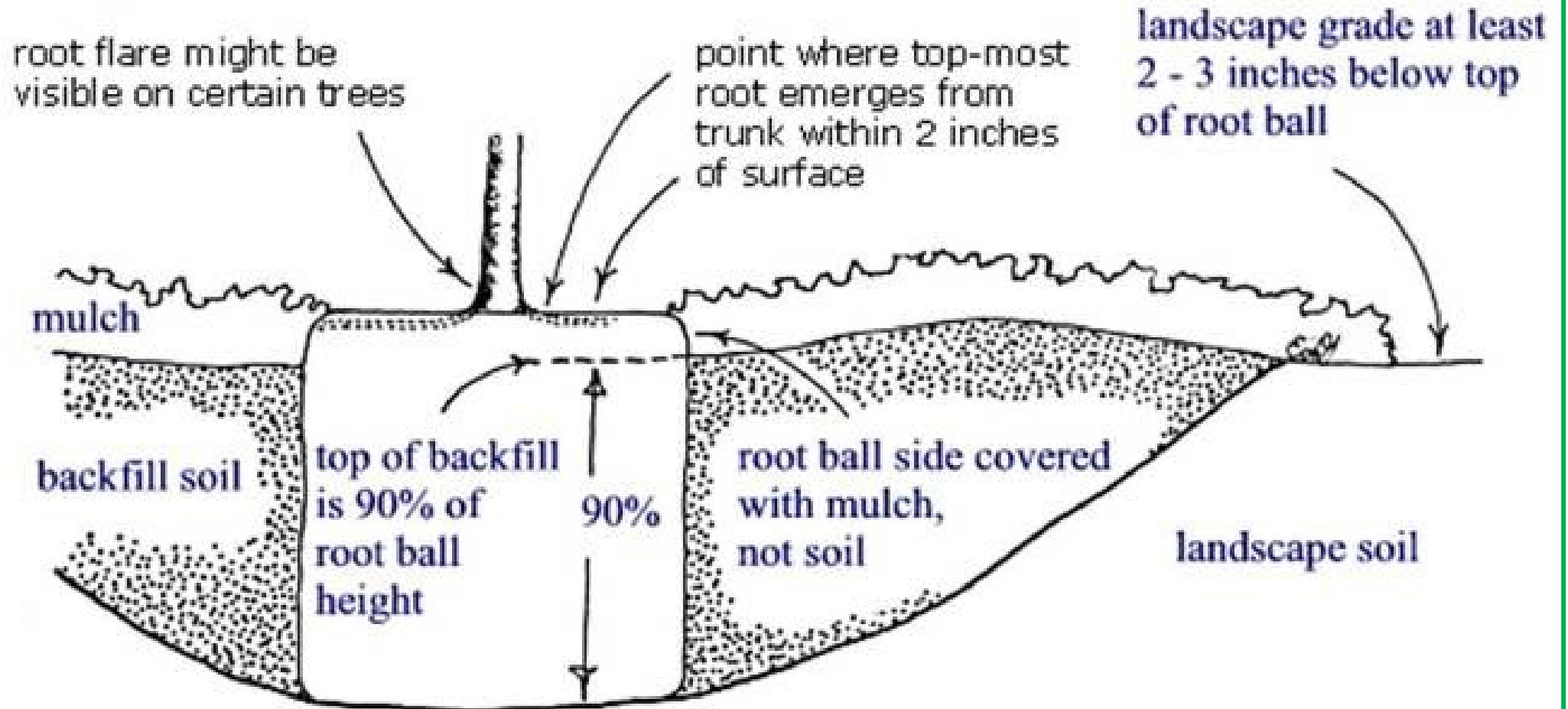
- **Plant elsewhere, or**
- **Plant a smaller maturing tree**

## Look up!



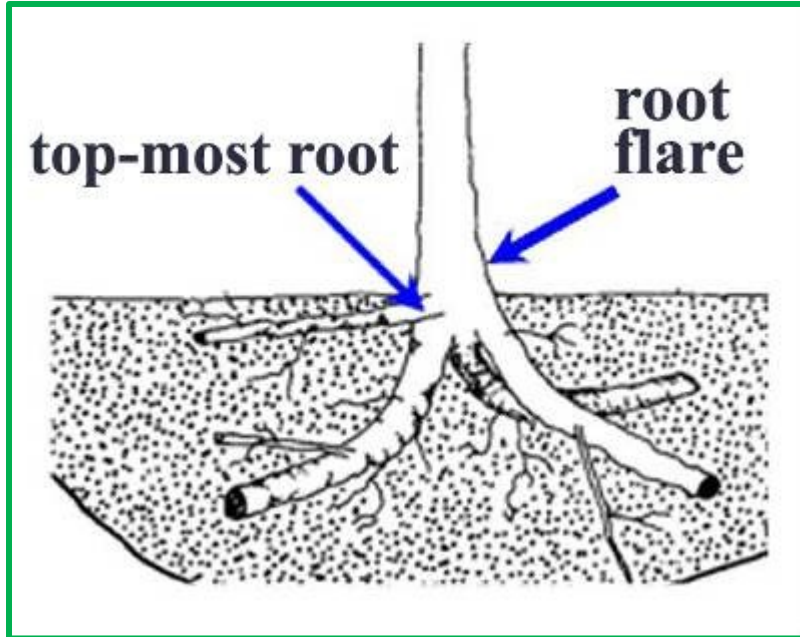
- Small trees (under 25') when adjacent to power lines
- Medium trees (25' – 35') at least 25 feet from power lines
- Large trees (over 35') at least 50 feet from power lines
- Trees / shrubs: 10 feet from ground transformers

## 2. Dig the planting hole as wide as possible



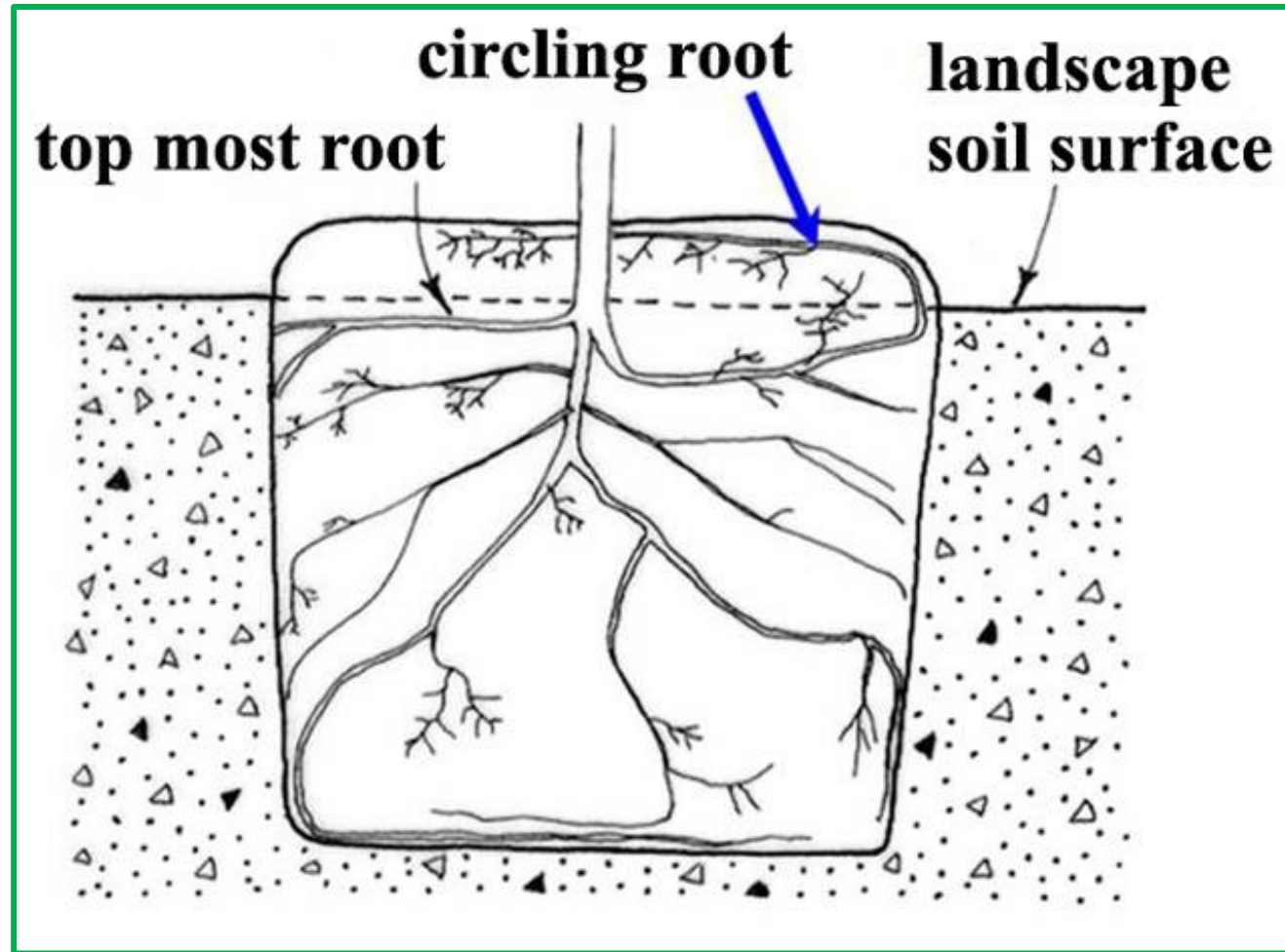


### 3. Find the top-most root



- The point where the top-most root meets the trunk of the tree should be no more than 2 inches deep in the root ball.

### 3. Treating root defects



- Cut or spread out any circling or kinked roots growing up above the top-most root.



## Defects can be inside root ball



- Look for circling roots.
- Grew when tree in smaller container
- Hidden in interior of ball.
- More difficult to treat / cut



### 3. Defects at top of ball



- Remove media from top of root ball and cut circling and crossed roots



### 3. Cut circling roots



- New roots will grow quickly into backfill soil following cutting and stem girdling roots are less likely to form.



**4. Place tree in hole**

**5. Position top root 1-2 inches above landscape soil**



This tree is planted too deeply



This tree is planted at correct depth



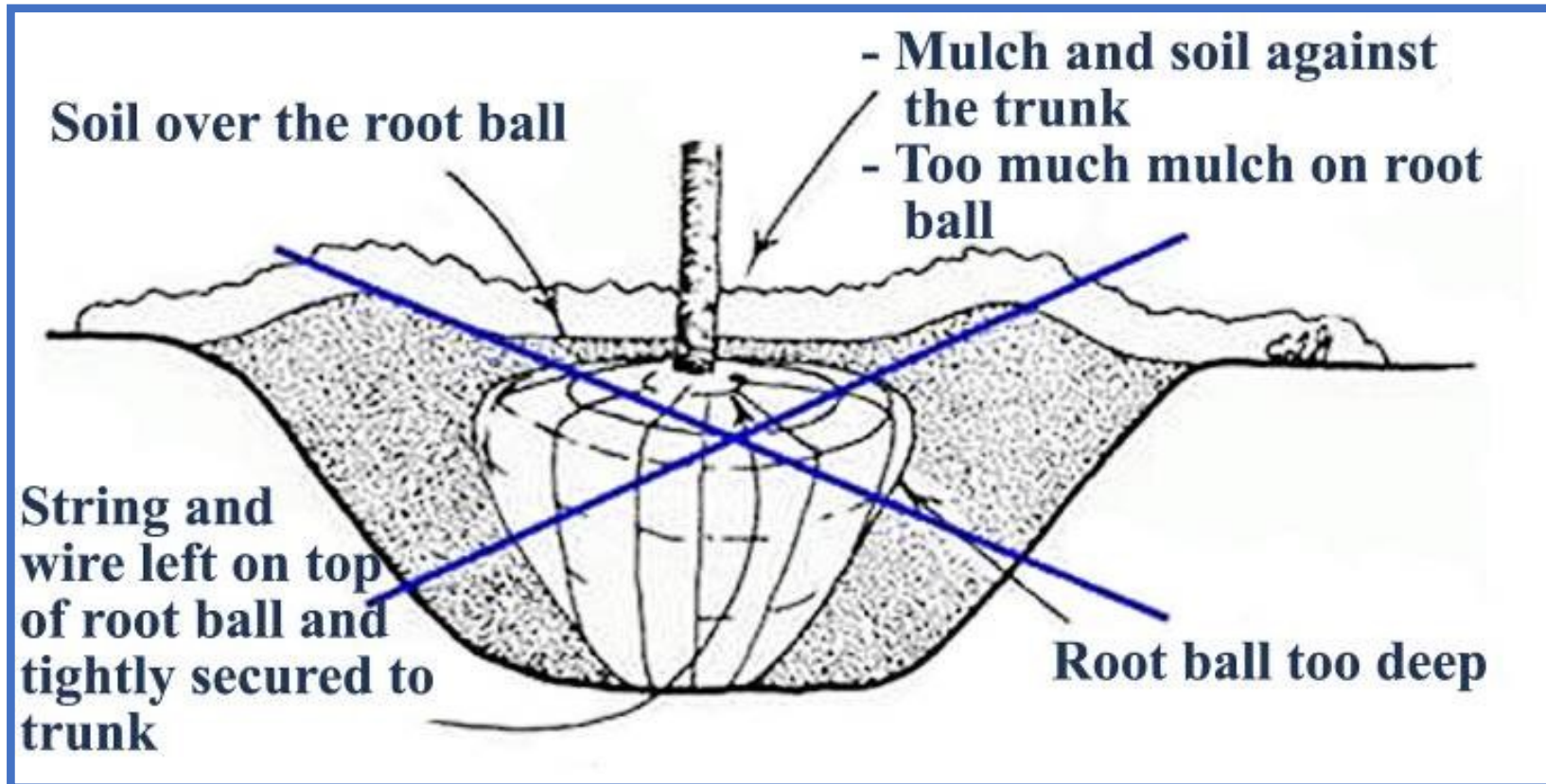
## **5. Too Deep! - Add soil to bottom of hole**



**Vertical ruler shows tree is about 6 inches too deep.**

**Remove root ball and add soil to bottom of hole.**

## 5. Effect of planting depth on stress after planting





## 6. Straighten the tree



- Before adding backfill, check that tree is straight by looking at it from two perpendicular directions.
- This is probably not the time to drink a beer.



## 7. Remove all synthetic materials (wire, plastic)



- **Synthetic burlap melts when lit; real burlap flames and turns to ash**
- **Remove synthetic burlap with pruner, knife or other sharp blade.**
- **OK to remove regular burlap, also**

## 8. Moderately pack backfill soil



- **Loosen sides of hole to about 18 inches. Roots will grow into this zone.**
- **Don't place soil over root ball.**
- **Moderately pack backfill soil so root ball does not move.**
- **Do not over tamp soil, especially when wet.**



## 8. Water the backfill to settle



- **Add water to root ball and backfill soil**
- **Fill in holes or depressions with additional backfill soil**
- **Do not overpack backfill soil. Avoid excess soil compaction.**
- **Small air pockets allow air to reach roots**

**This might be a better time to drink that beer!**





# 9. Mulching



- Apply a 3” thick layer of mulch, out to drip line
- 1” layer over root ball (if needed for moisture)
- Keep mulch at least 10” from trunk
- Expand mulched area, so tree roots grow without competition from turf roots.



**“Arborist chips” may be available for free!**



## 9. Improper mulching



**Turf and weeds rob trees of moisture and nutrients**

**Lawn mowing equipment damages trunk**

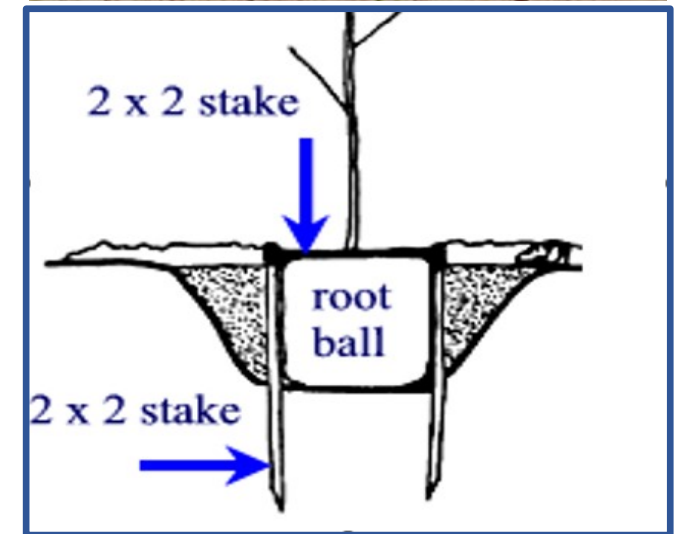
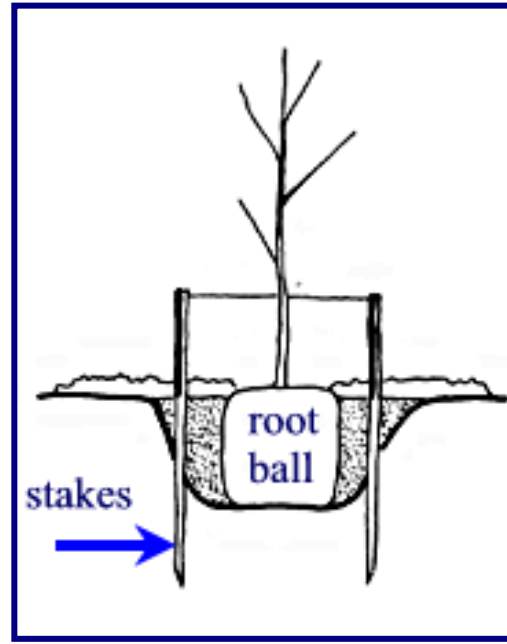
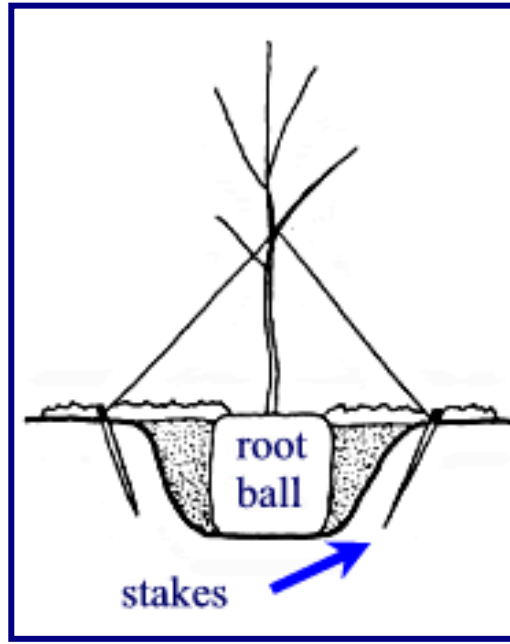
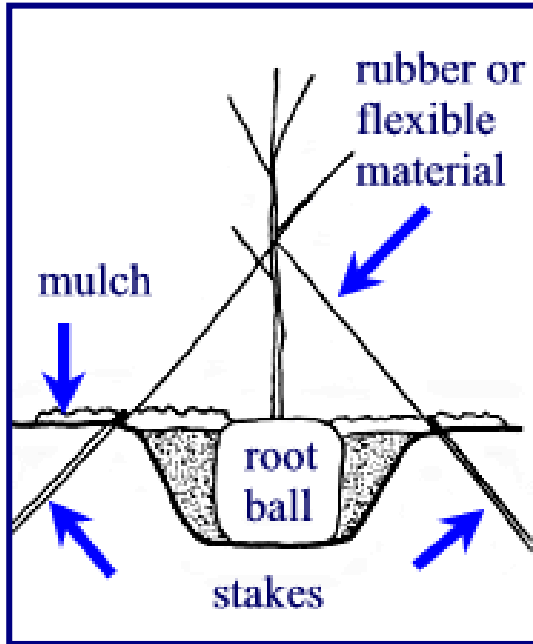


**Don't pile mulch against trunk!**

**Volcanoes can rot trunk, cut off oxygen, shed rain water, keep soil too wet in clay soil.**

**Stem girdling roots can form inside mulch pile**

## 10. Stake and prune if needed



**Traditional staking methods  
Remove within one year of planting.**

**Alternate staking system  
decays in a few years**



## 10. Prune to finish the job

- **Remove broken branches.**
- **Perform structural pruning if needed.**
- **Do not prune to compensate for root loss.**

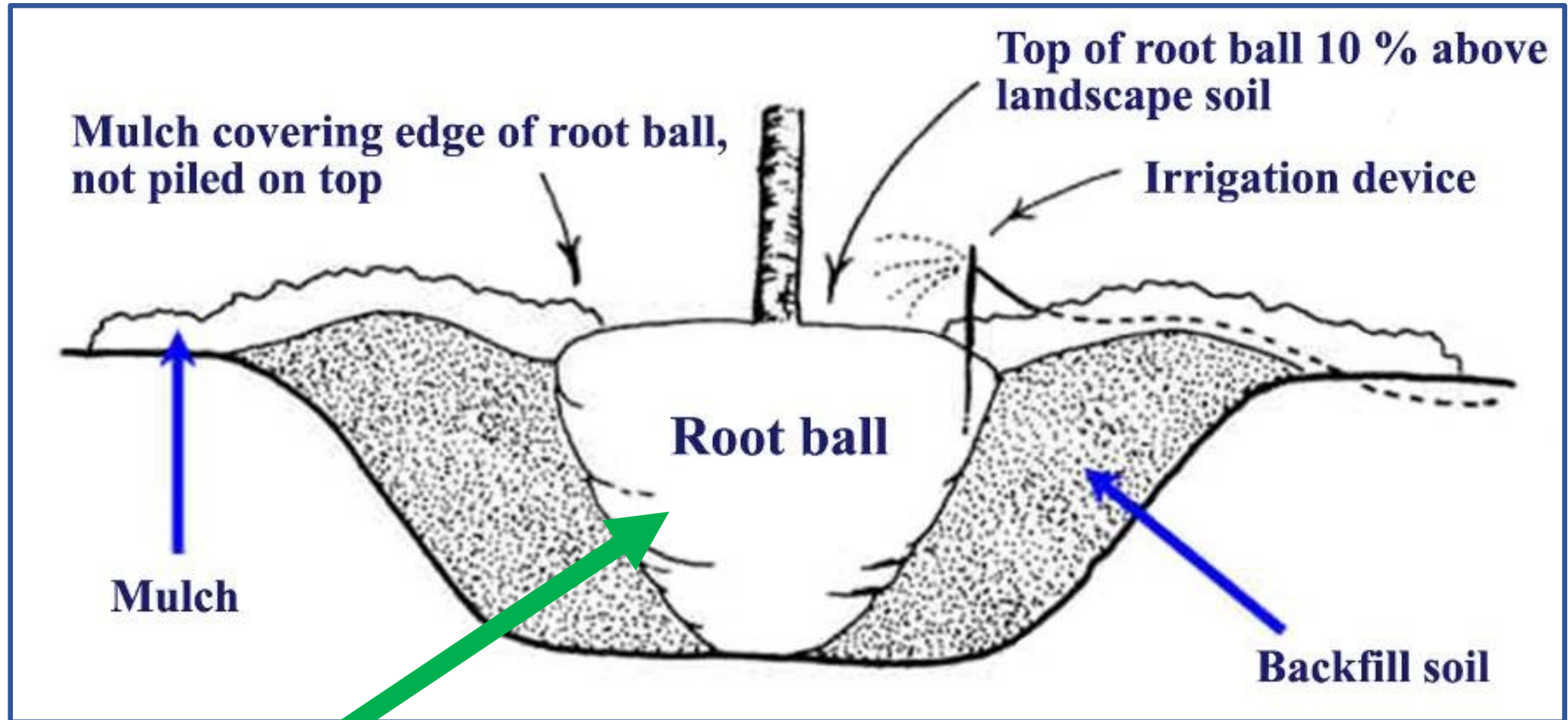


## During establishment

- **Irrigate**
  - 2 – 3 times weekly until established
  - 2 gallons per inch of trunk caliper on root ball
- **Mulch**
  - Control weeds
  - Increase mulch diameter over time to keep pace with root growth
- Minimize soil compaction
- Remove stakes, protect lower trunk



# Summary of proper planting



**Root defects treated as needed**

<http://treesandhurricanes.ifas.ufl.edu>

I ASKED AROUND AND  
NOBODY HEARD ANYTHING

