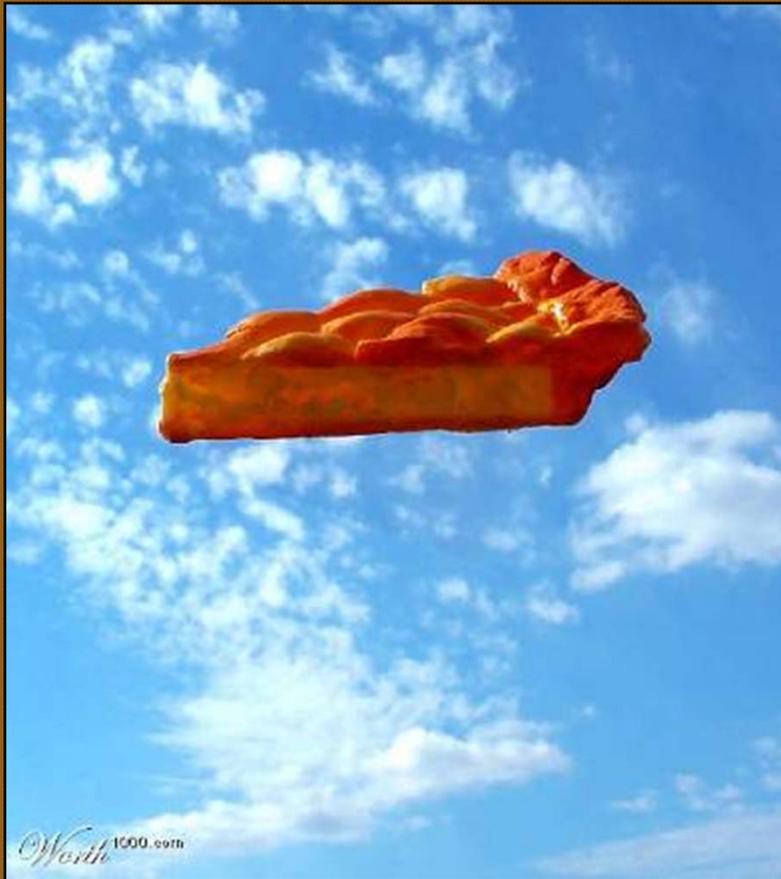




Nebraska  
Forest  
Service



UNIVERSITY OF  
**Nebraska**



# PEGSMOR

Tree Management  
System

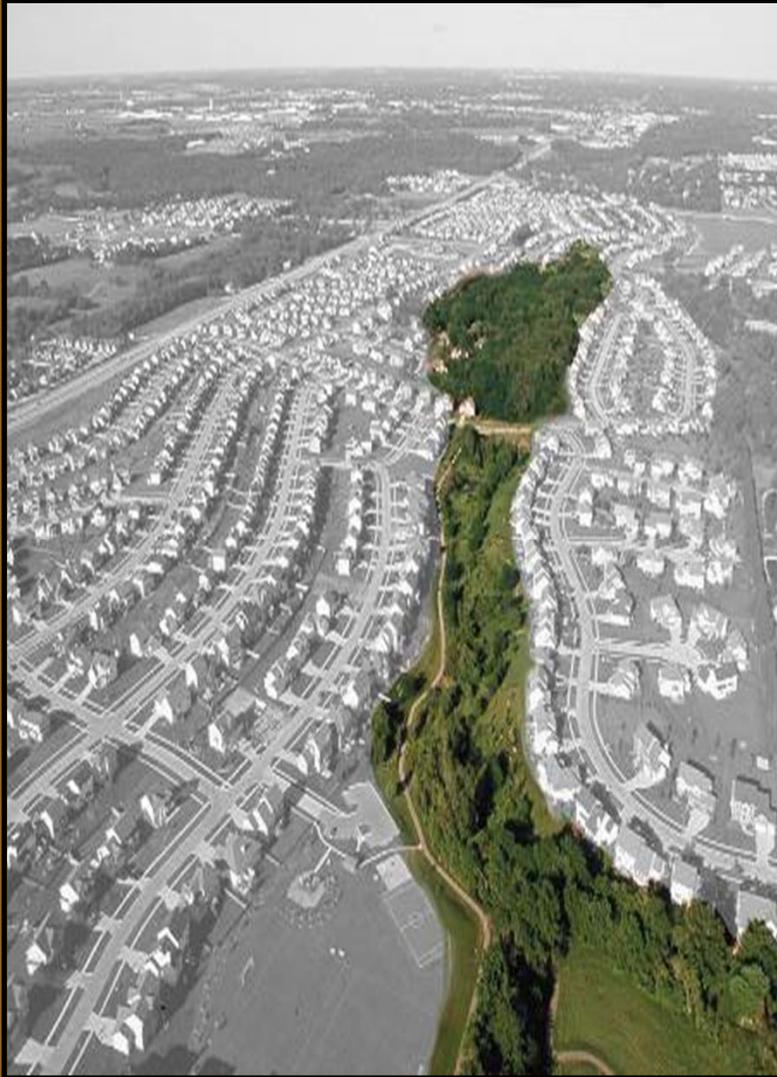
Eric Berg, Community Forestry Program Leader, Nebraska Forest Service  
402-472-6511    Eberg2@unl.edu

# Life Stages of Trees:

1. Overview
2. Function
3. Form
4. Pruning
5. Planting
6. PEGSMOR
7. Summary



# Master of our Domain?



# Application of Arboriculture:

- Science and art of tree care
  - Selection
  - Planting
  - Management
  - Removal



# There is a big difference . . .

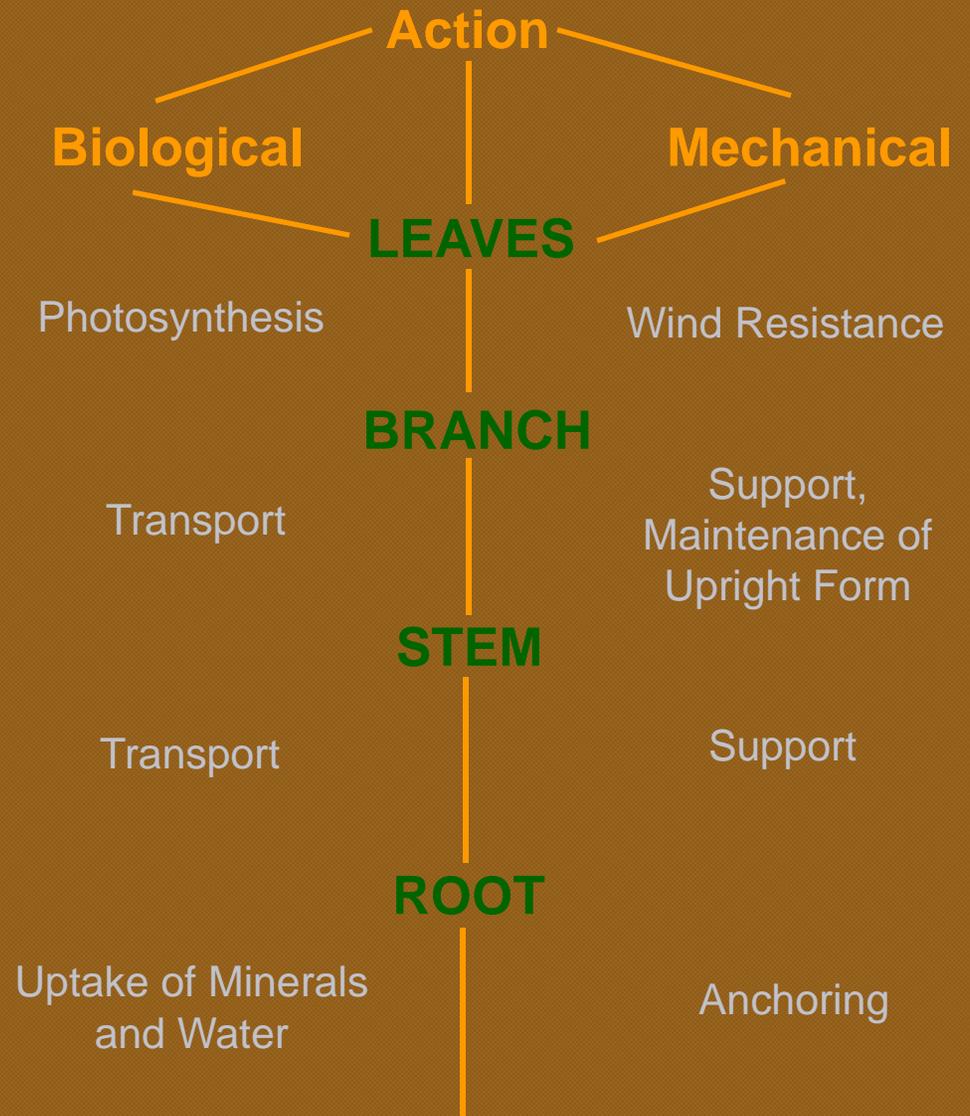


**Natural Forest**

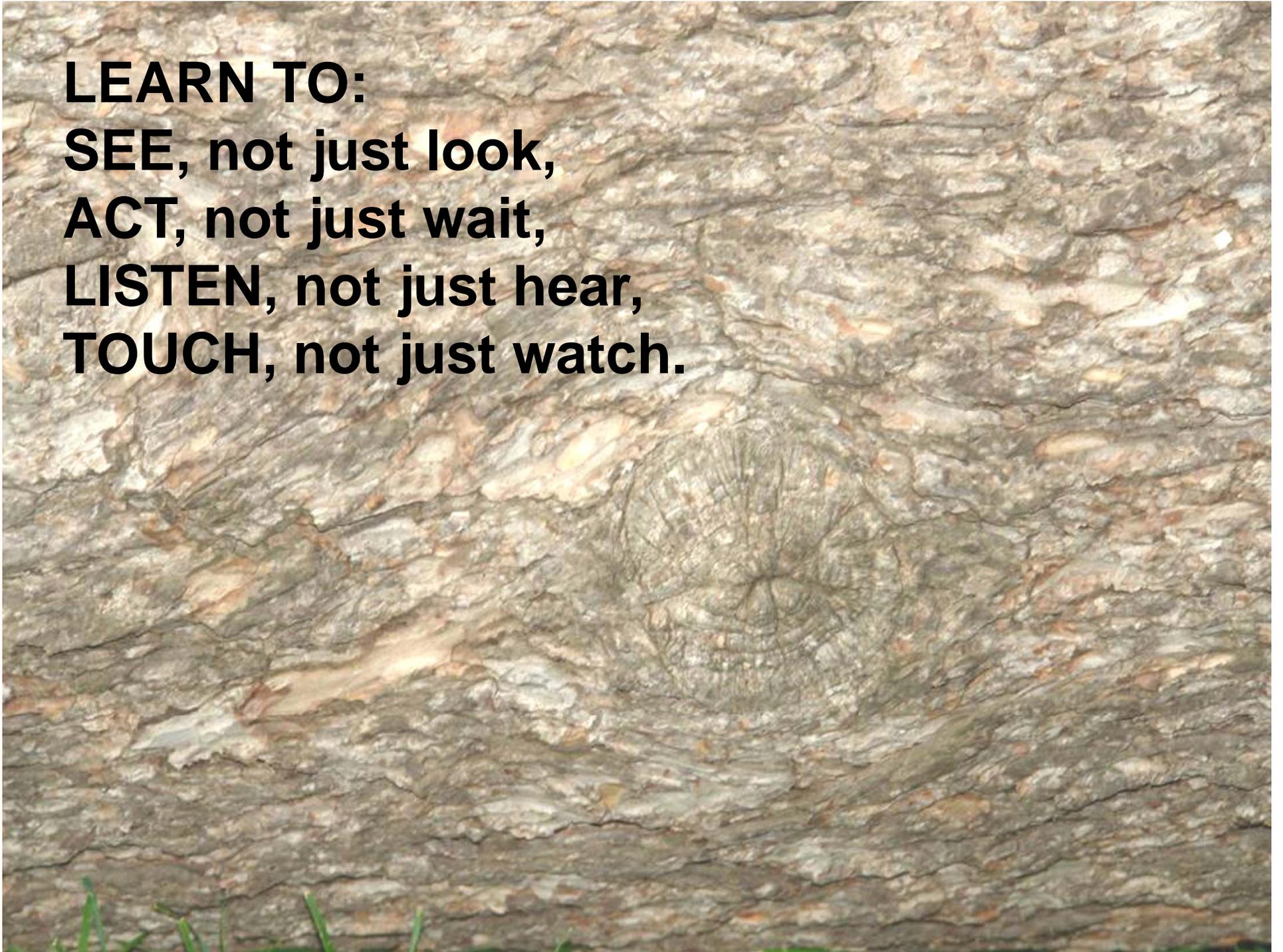


**Community Forest**

# PEGSMOR & Understanding Trees:



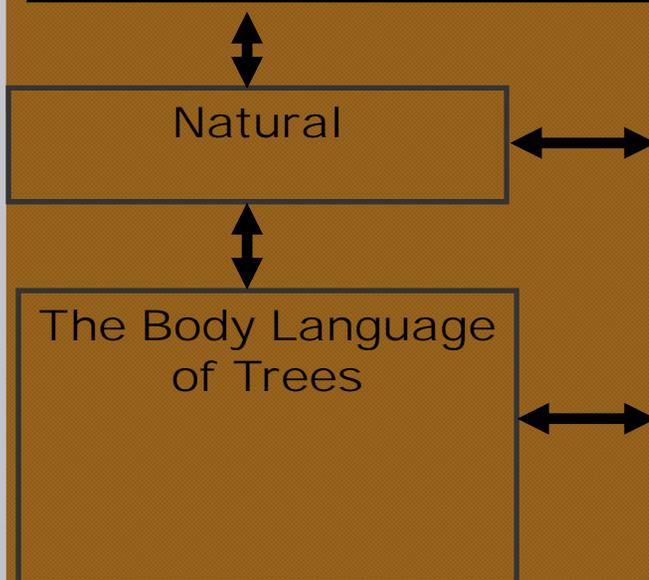
**LEARN TO:  
SEE, not just look,  
ACT, not just wait,  
LISTEN, not just hear,  
TOUCH, not just watch.**







PEGSMOR – Basics of Good Management





# We all have a role to play:



nt



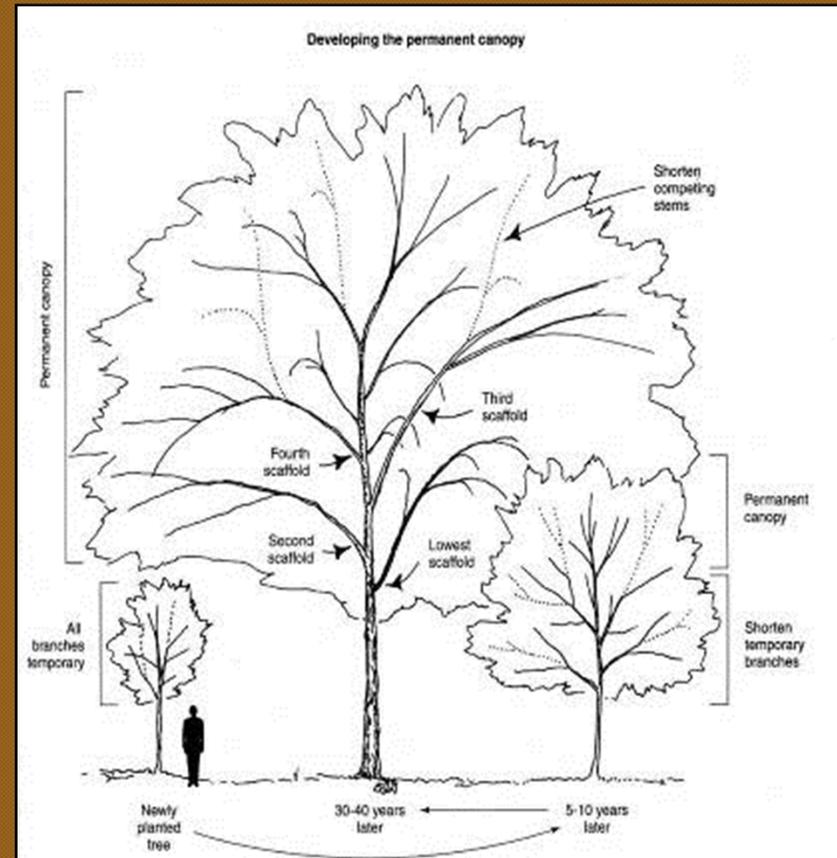


PI



# PEGSMOR

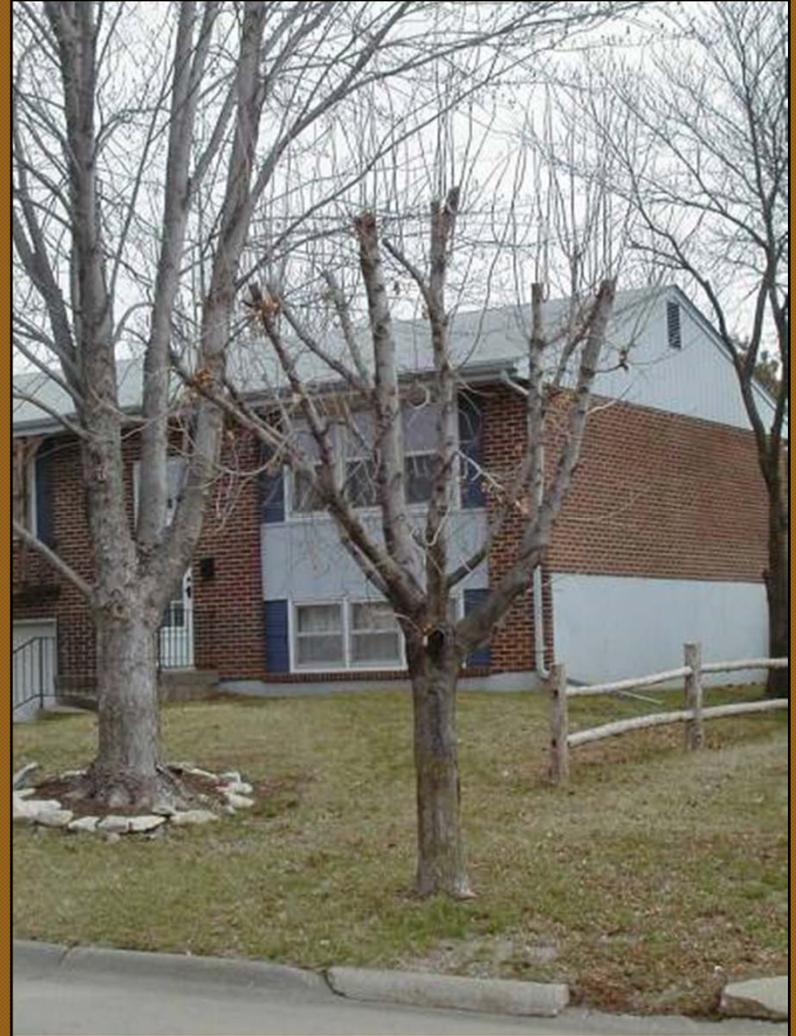
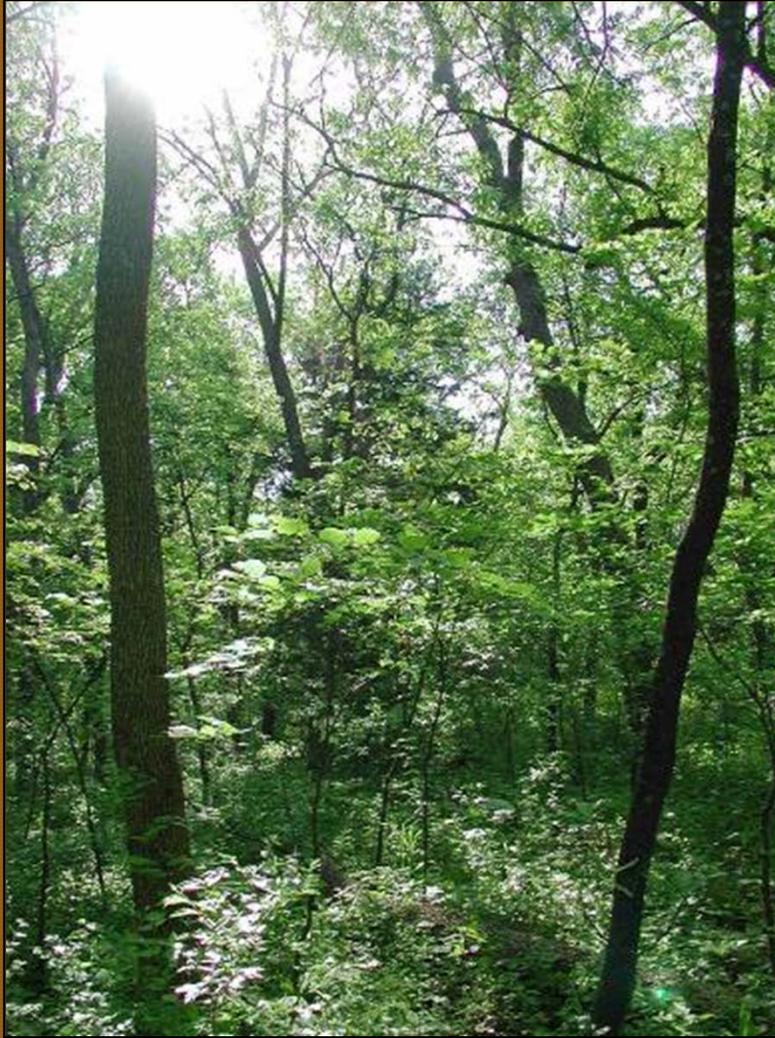
- Plant
- Establishment
- Growth
- Structure
- Mature
- Over-Mature
- Replace

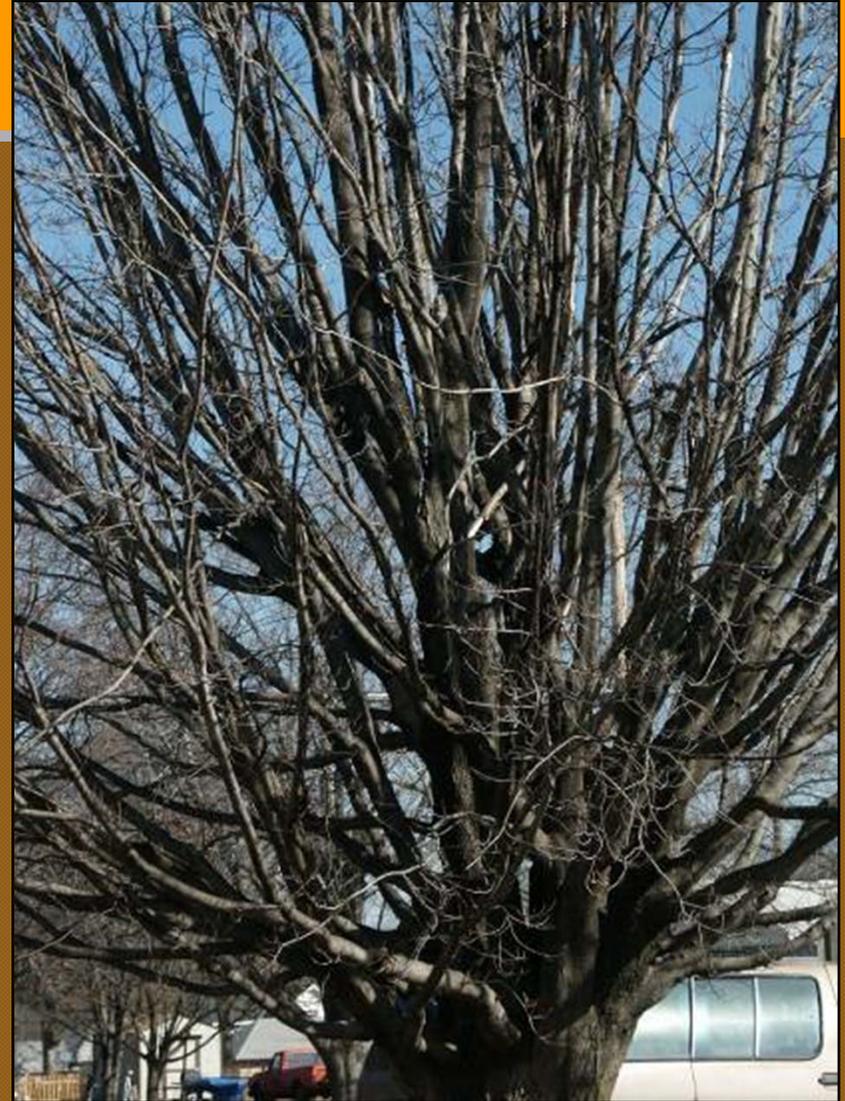


# PEGSMOR - “The System”

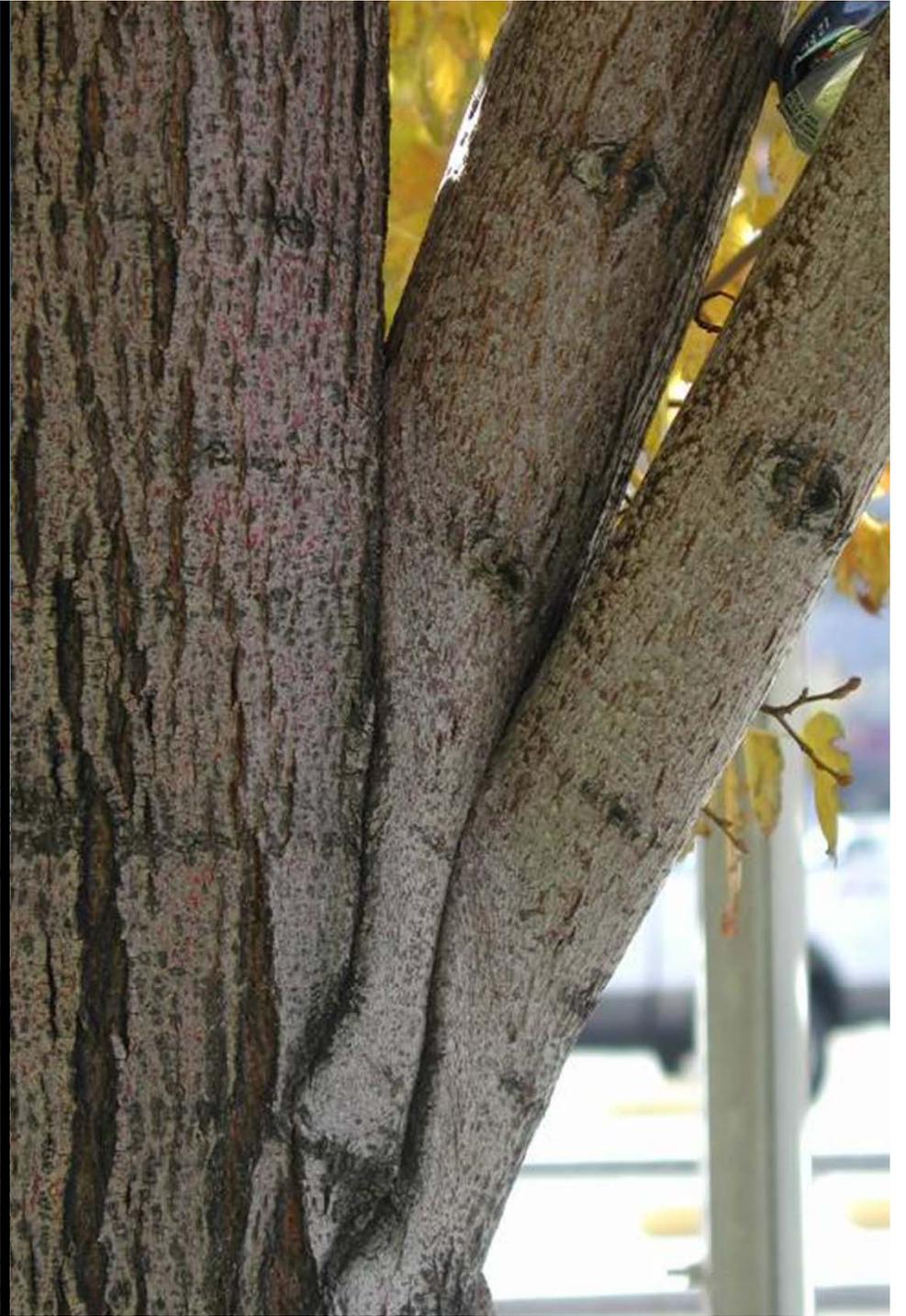


# Nature vs. the Natural





Very few tree species are adapted for “open” growing conditions, and will have a tendency for poor branching structure



## Our Challenge:

- In nature pruning and structure develops naturally – those that don't produce are "cut off".
- In communities what we are effectively doing is trying to produce / maintain a vigorous tree with good structure, the whole time periodically removing a percentage of a trees ability to produce food (*to maintain vigor – this just does not make sense.*)

# Parts of a Tree

- Highly organized structure:
  - cells=tissues=organs=organism
- Trees have 3 main organs:
  - Leaves
  - Roots
  - Stem



# Function of Leaves

“Capture”  
sunlight &  
manufacturing  
food

Photosynthesis



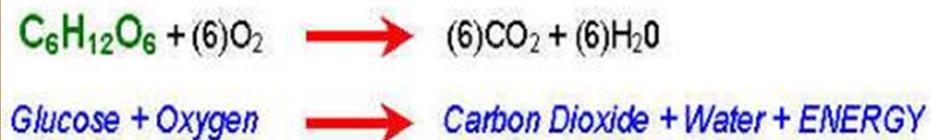
*Carbon Dioxide + Water + ENERGY* → *Glucose + Oxygen*



# Function of Roots

- Support & Anchorage
- Absorption mineral nutrients & water
- Storage

## Respiration



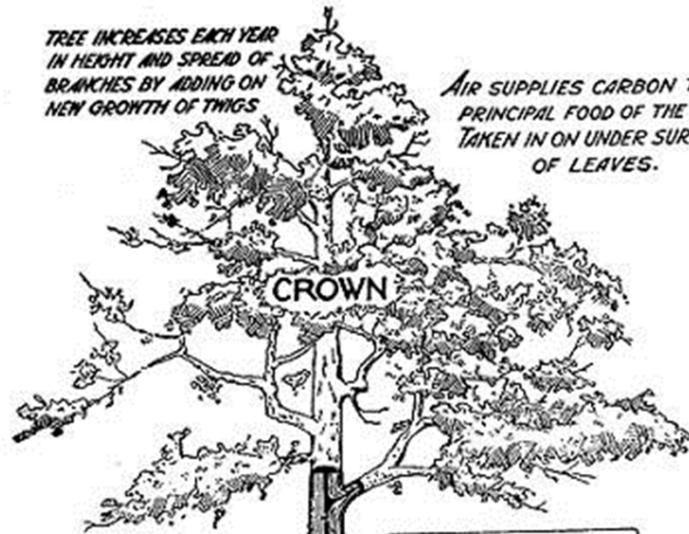
# Function of Stem

- Connector of SHOOTS & ROOTS
- Carriers (xylem) of water and nutrients roots – leaves
- Carriers (phloem) of food from leaves – all parts of the tree
- Support and structure



TREE INCREASES EACH YEAR  
IN HEIGHT AND SPREAD OF  
BRANCHES BY ADDING ON  
NEW GROWTH OF TWIGS

AIR SUPPLIES CARBON THE  
PRINCIPAL FOOD OF THE TREE  
TAKEN IN ON UNDER SURFACE  
OF LEAVES.



CROWN

LEAVES PREPARE THE FOOD  
OBTAINED FROM AIR AND SOIL  
AND GIVE OFF MOISTURE BY  
TRANSPIRATION. LIGHT AND HEAT  
ARE NECESSARY FOR THE  
CHEMICAL CHANGES

TRUNK

HEARTWOOD (INACTIVE)  
GIVES STRENGTH

SAPWOOD CARRIES SAP  
FROM ROOT TO LEAVES

CAMBIUM (MICROSCOPIC)  
BUILDS THE CELLS

INNER BARK CARRIES  
PREPARED FOOD FROM  
LEAVES TO CAMBIUM LAYER

OUTER BARK PROTECTS  
TREE FROM INJURIES

SURFACE ROOTS

THE BREATHING PORES OF THE  
ENTIRE TREE, -ON LEAVES,  
TWIGS, BRANCHES, TRUNK  
AND ROOTS TAKE IN OXYGEN  
FLOODING, POISONOUS GASES,  
OR SMOKE MAY KILL A TREE

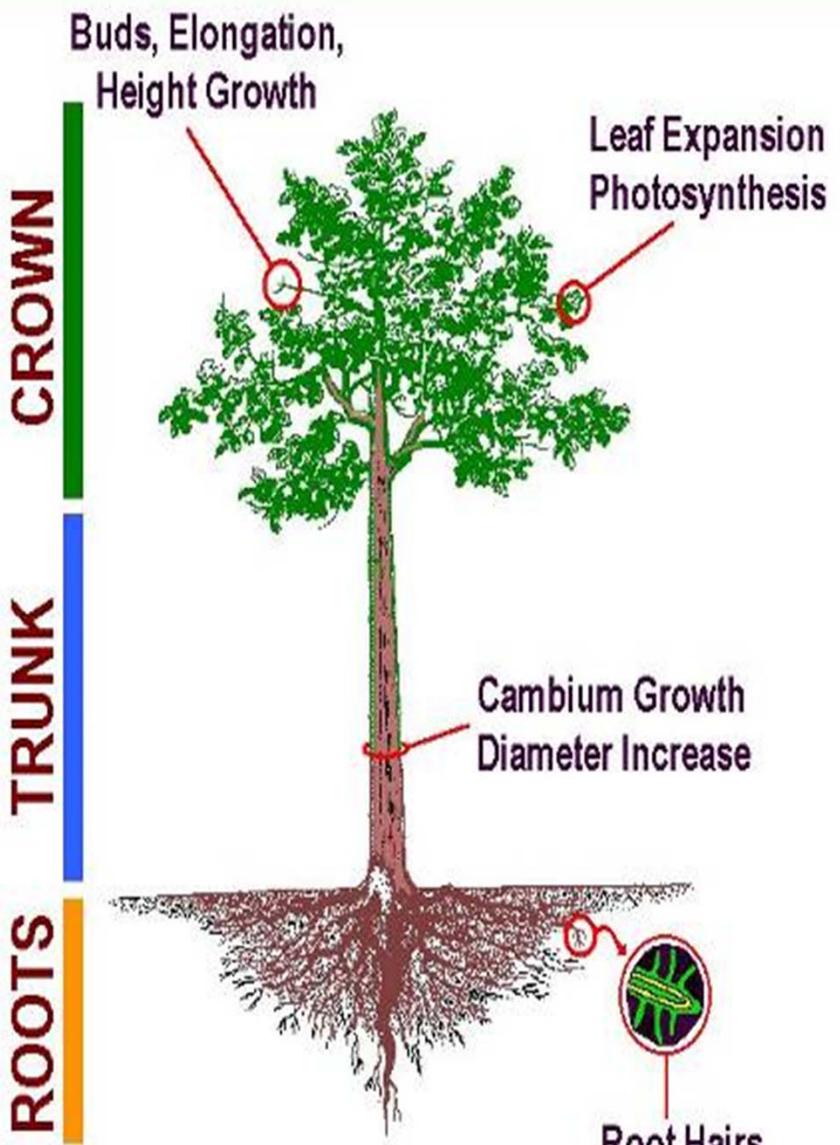
SURFACE  
ROOTS

ROOTS

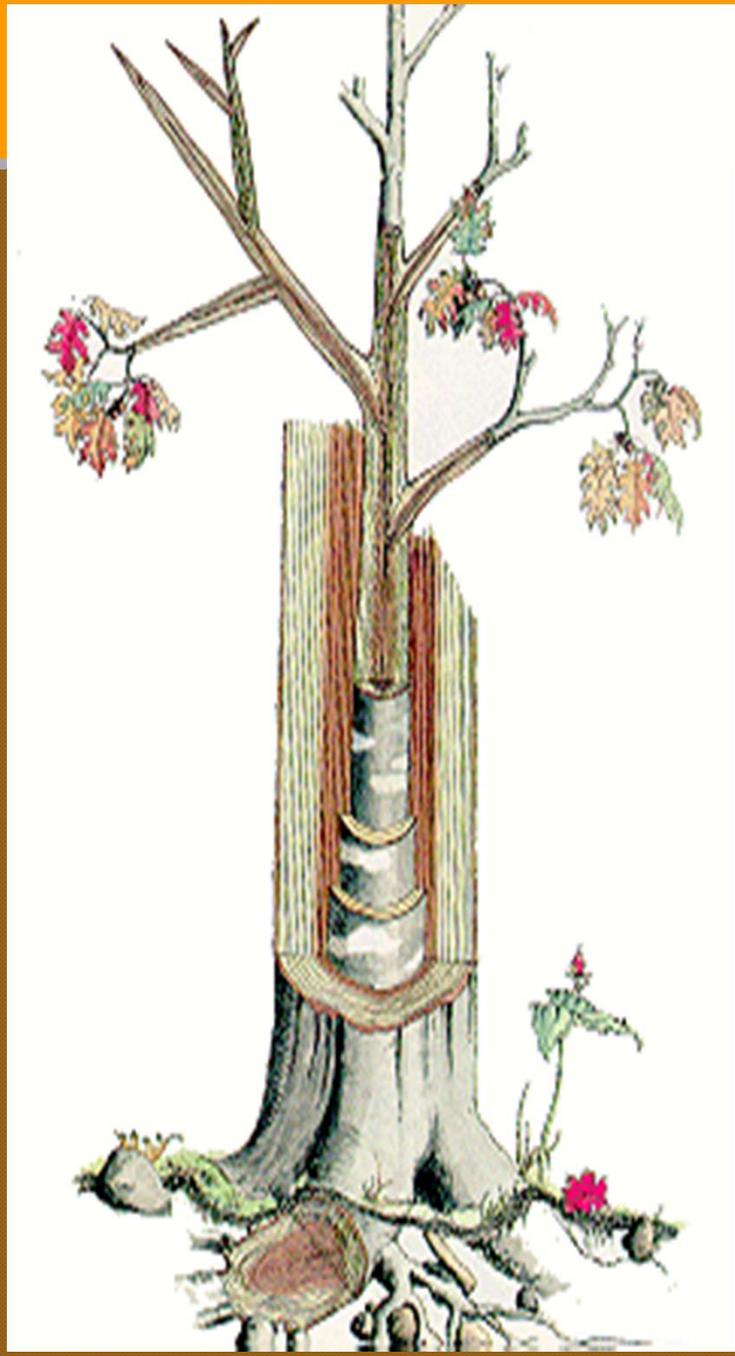
TAPROOT

ROOT TIPS OR ROOT HAIRS  
TAKE UP WATER CONTAINING  
SMALL QUANTITY OF MINERALS  
IN SOLUTION

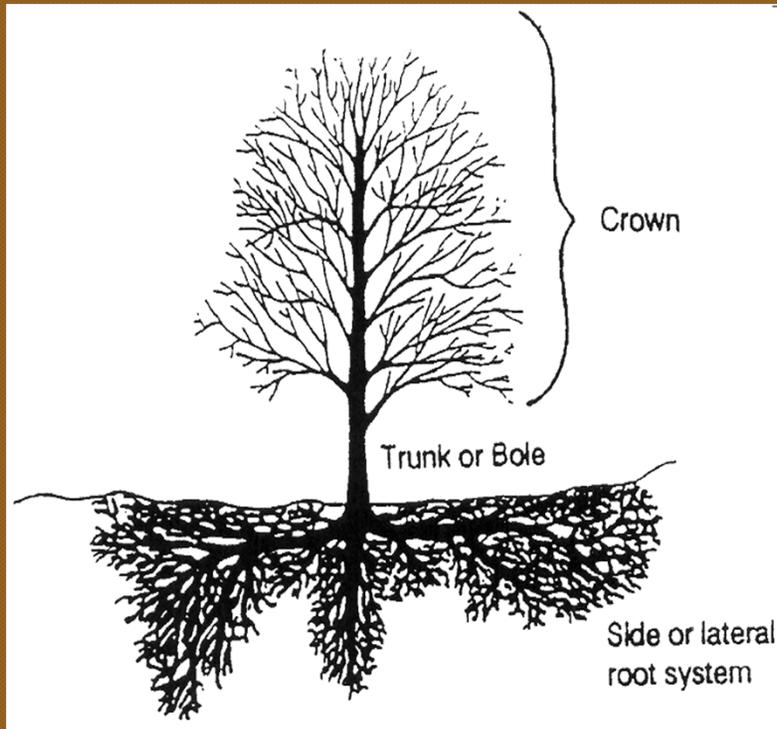




**TREE GROWTH ZONES**



# Gross Morphology (mass)



- 5% = leaves
- 15% = branches
- 60% = trunk
- 15% = woody root
- 5% = non-woody root

**10% of the mass of a tree drives 100% of the growth process**



# Pruning definition:

- The purposeful wounding of a tree to meet a management objective
- “Capture” sunlight & manufacturing food



Carbon Dioxide + Water + ENERGY  $\rightarrow$  Glucose + Oxygen

## CODIT – Alex Shigo

- Pruning is purposeful wounding of a tree
- How do trees survive?

Trees have developed natural defenses to wall off and seal out decay

*“Trees don’t heal – they seal”*

# Pruning Your Tree

- To improve form and function
- To improve aesthetics
- To improve visibility and safety



# Objectives of pruning:

- Crown management
  - Cleaning
  - Thinning
  - Reduction
  - Restoration
  - Raising



# General Pruning Guidelines

- Allow the tree to develop its natural shape
- Establish alternate branches, do not remove the central leader on trees
- Leave limbs which have strong, wide angles
- Use the 3 cut method when removing large limbs (over 2" diameter)
- Do not top trees
- Do not over-prune mature trees

# Assessment: The First Step in Pruning

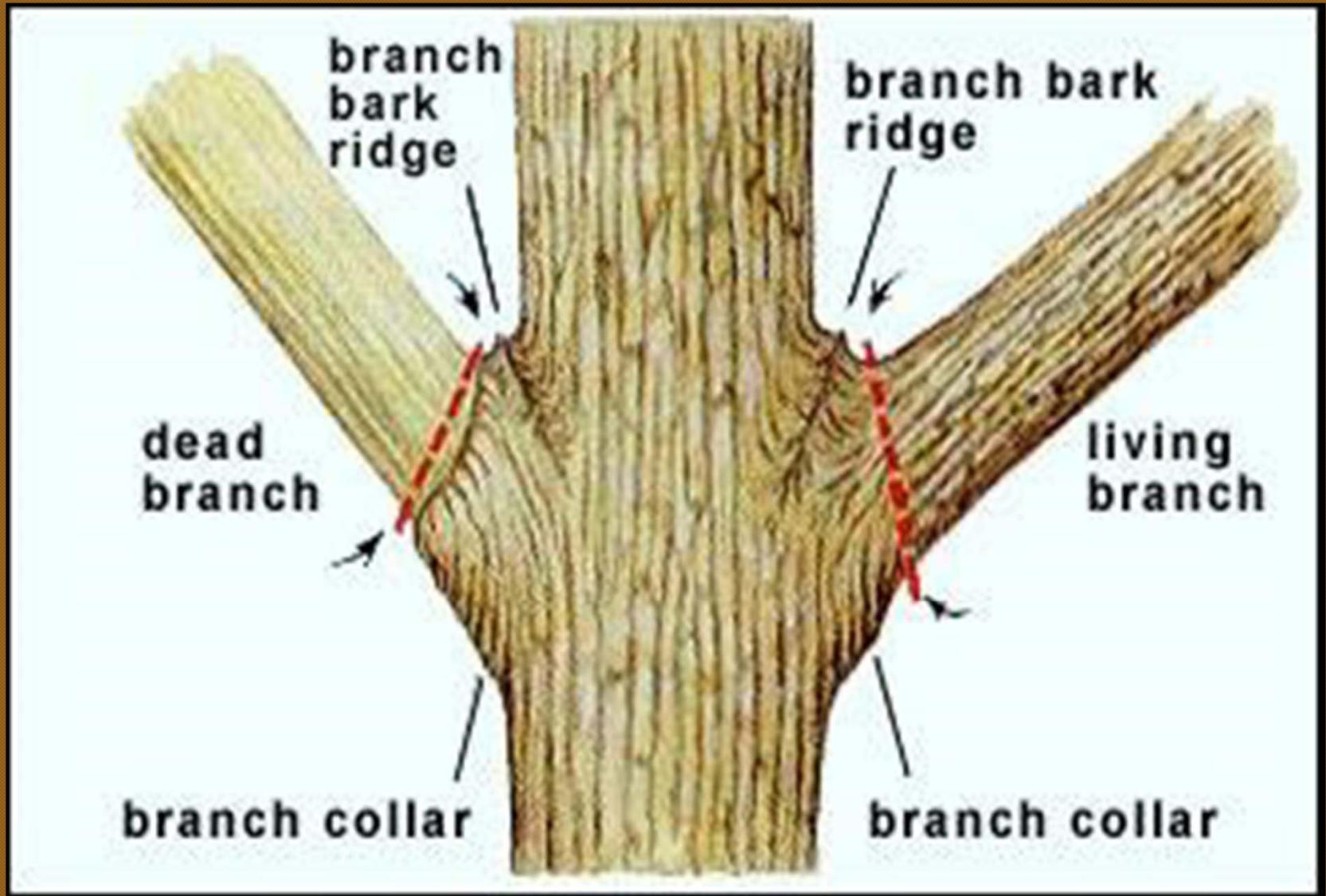
- Determine tree type and form
- Review where and why the tree needs pruning
- Determine the lowest branches you want at maturity, in 10 to 20 years
- Select sequence of branches to remove over the next 10 years



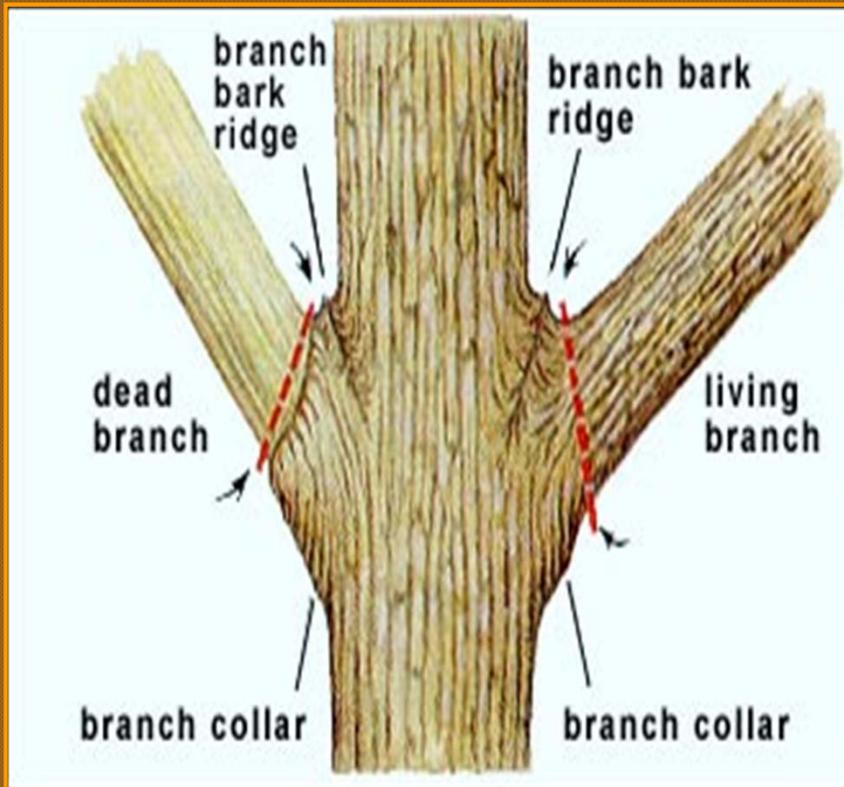
# Basics of Pruning



# Know Your Tree Anatomy

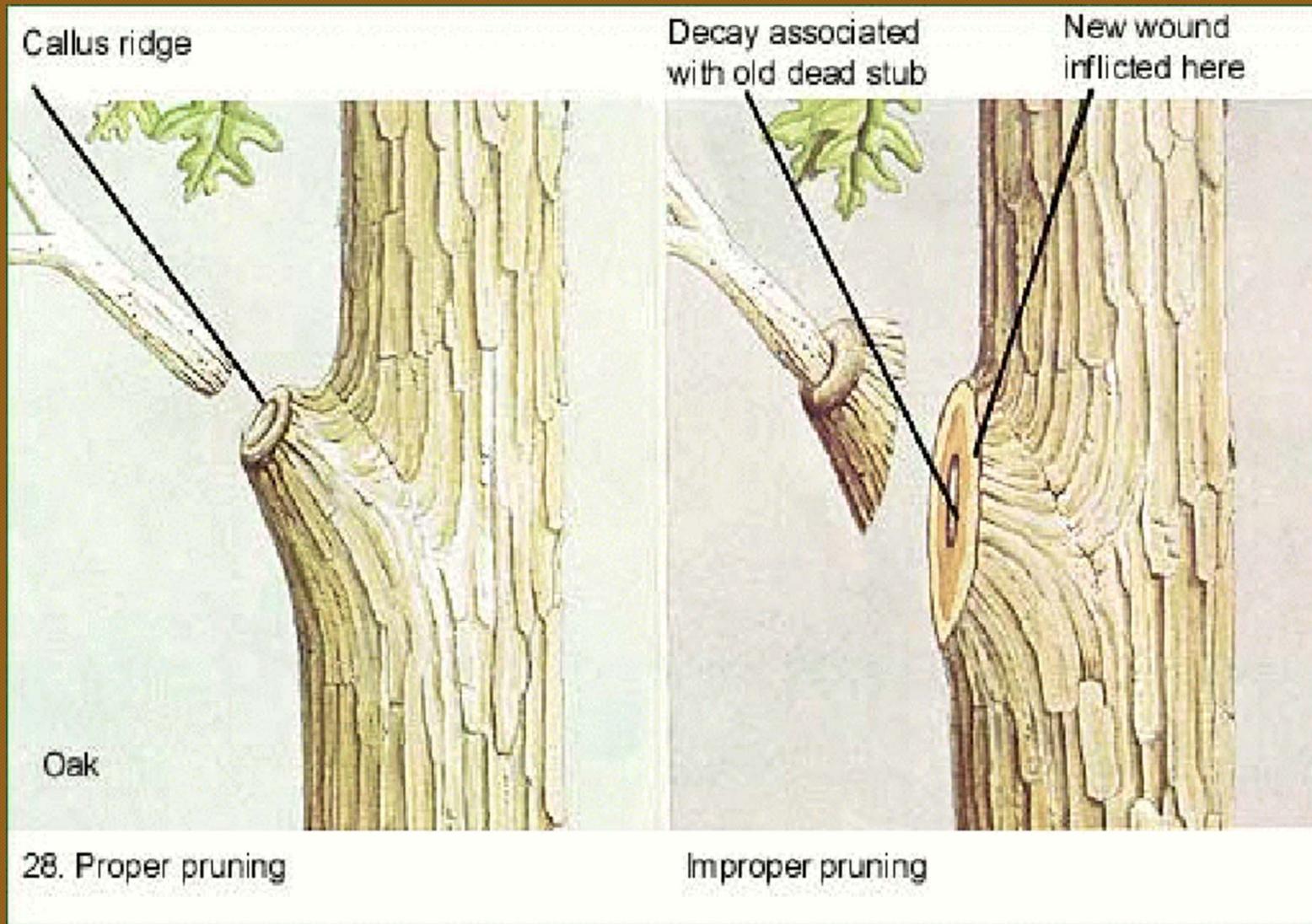


# Where to Prune?



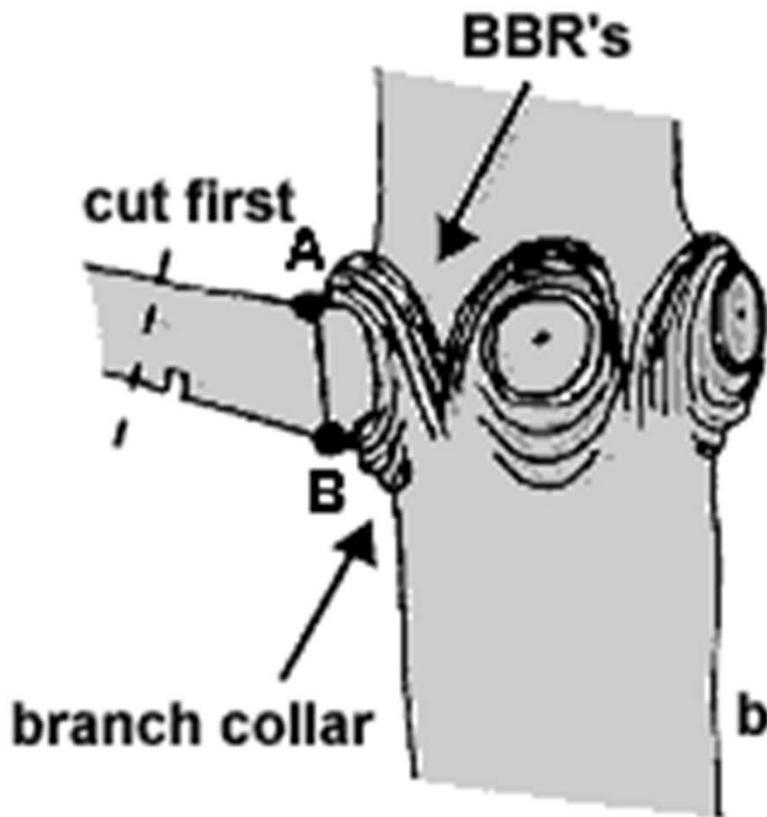
- First identify branch bark ridge and branch collar
- Cut just outside branch bark ridge and angle down and away from stem. Do not dig into branch collar.
- A proper cut does not damage branch bark ridge or branch collar.

# Example:



### Conifers

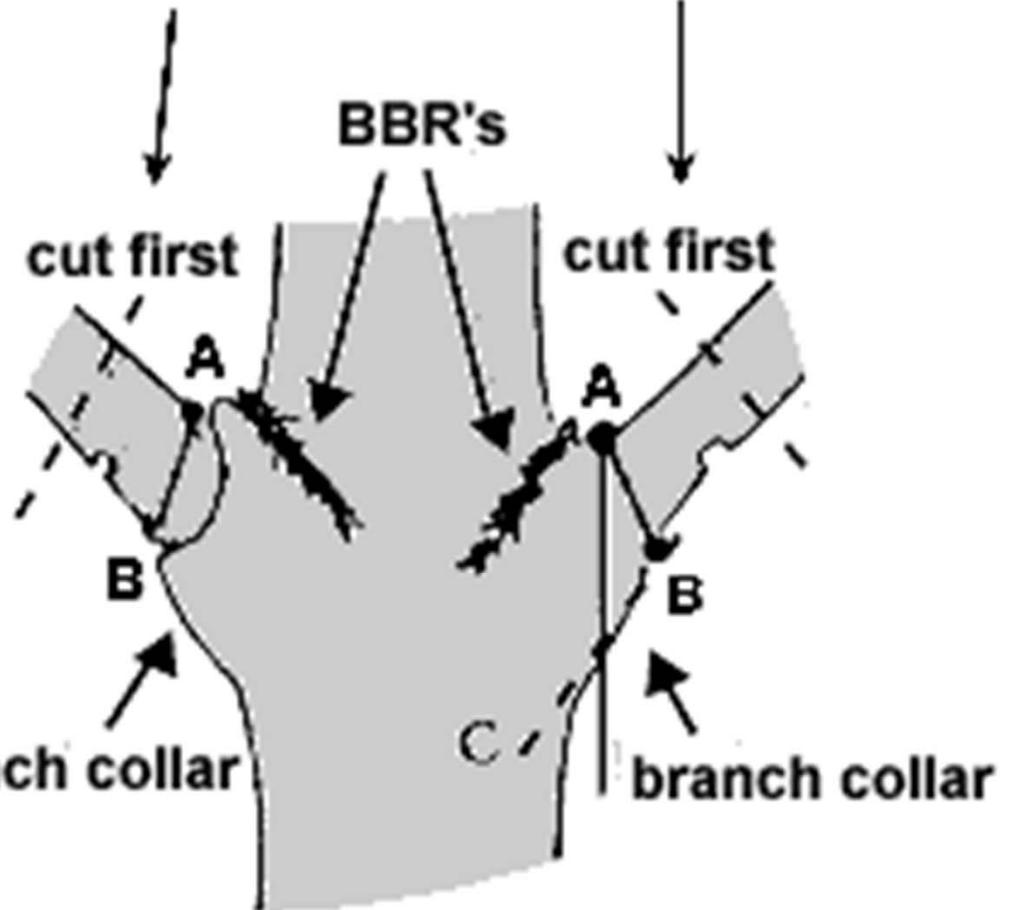
living or dead branches



### Hardwoods

dead branch

live branch



# Pruning Larger Branches



The 3-cut method removes the weight of the branch and allows for a closer cut that will not damage the branch collar or trunk

## PEGSMOR – Basics of Good Management



## PEGSMOR – Basics of Good Management



## PEGSMOR – Basics of Good Management





## PEGSMOR – Basics of Good Management



# Good Cuts End Up Like Donuts

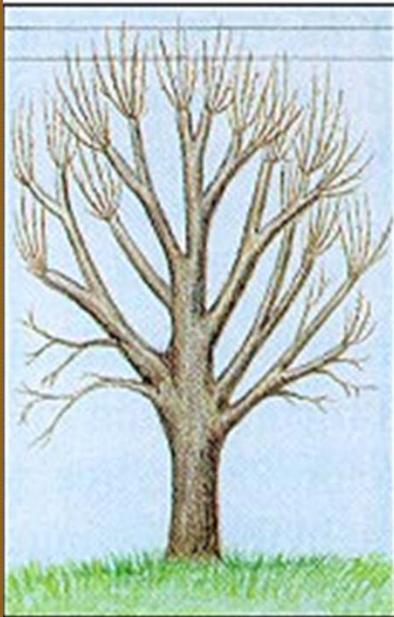




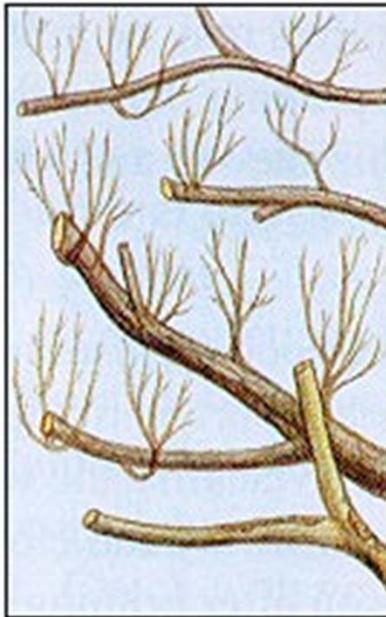
## Example (good and bad)



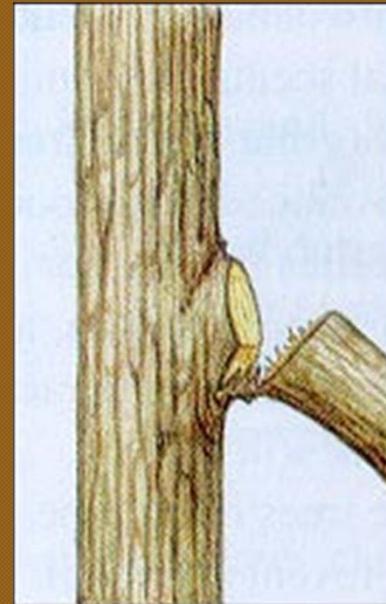
# Harmful Pruning Practices



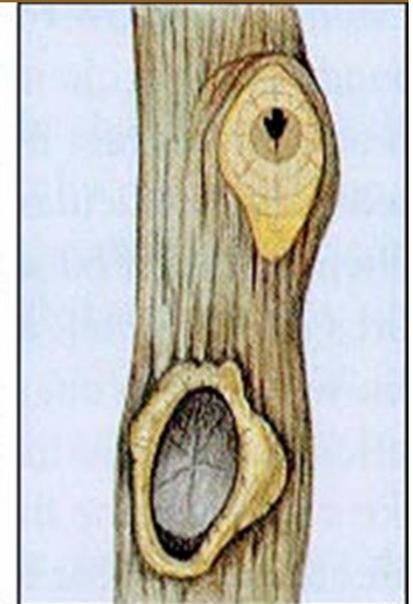
**A. Topping**



**B. Tipping**

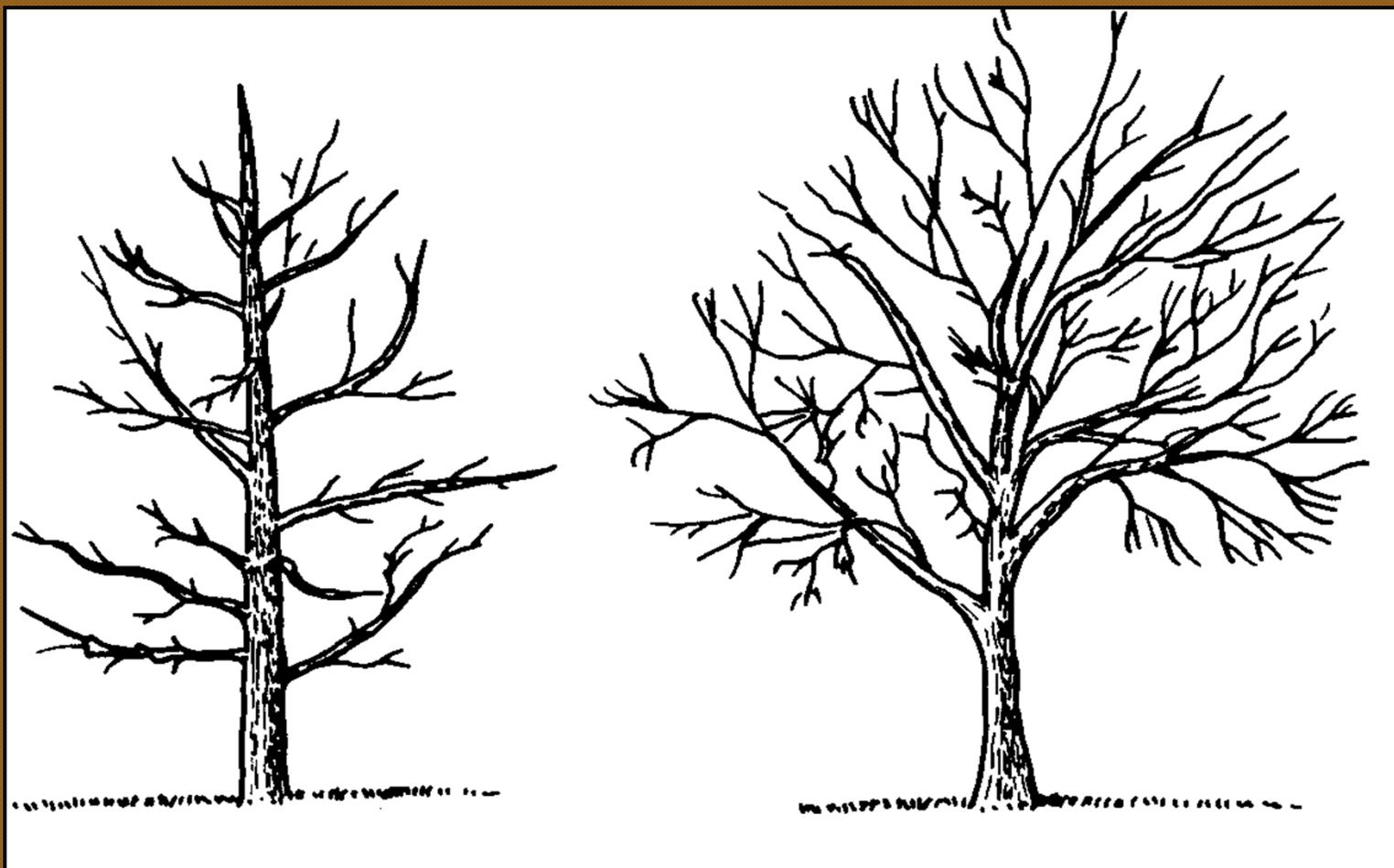


**C. Bark ripping**



**D. Flush cutting**

# Know Your Tree's Form

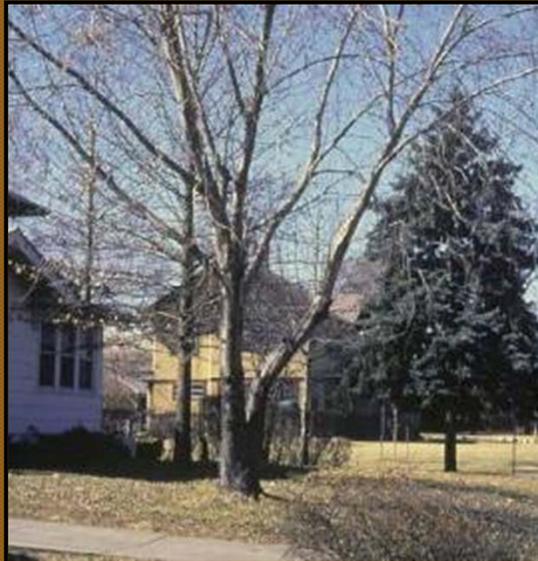


**Excurrent Tree**  
(linden, red oak, pine)

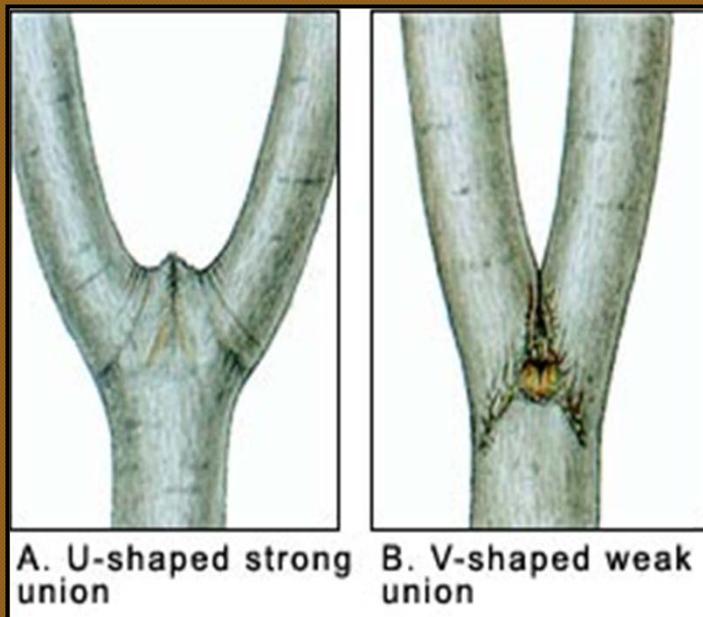
**Decurrent Tree**  
(elm, hackberry, maple, white oak)

# Small Trees Get BIG!

- Prune branches while they are small (1-2 inches)
- Year 3 is a good time to begin pruning



## Prune Early to Maintain Tree Health



- Weak V-shaped unions
- Damaged branches
- Sprouts/suckers
- Competing leaders
- Forks
- Rubbing branches
- Unevenly spaced branches
- Insect & disease problems
- Low, co-dominant stems
- Deformed branches

PEGSMOR – Basics of Good Management



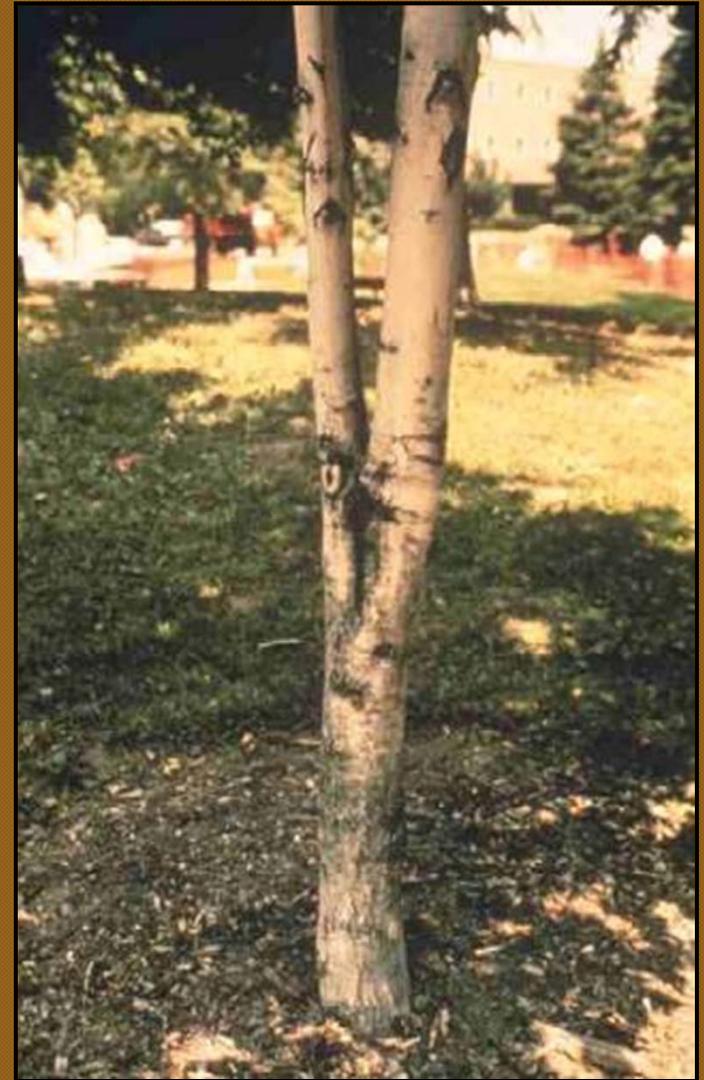
PEGSMOR – Basics of Good Management



# Stem and Branches

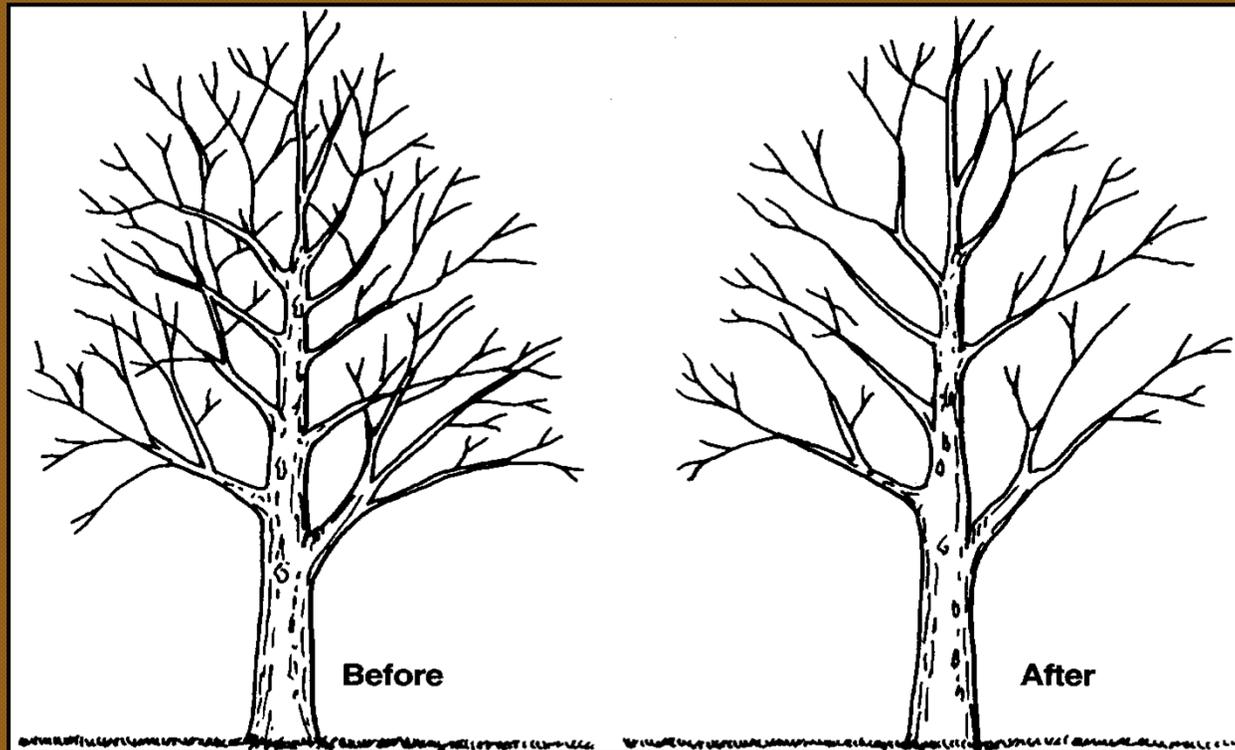


# Prune to Improve Form

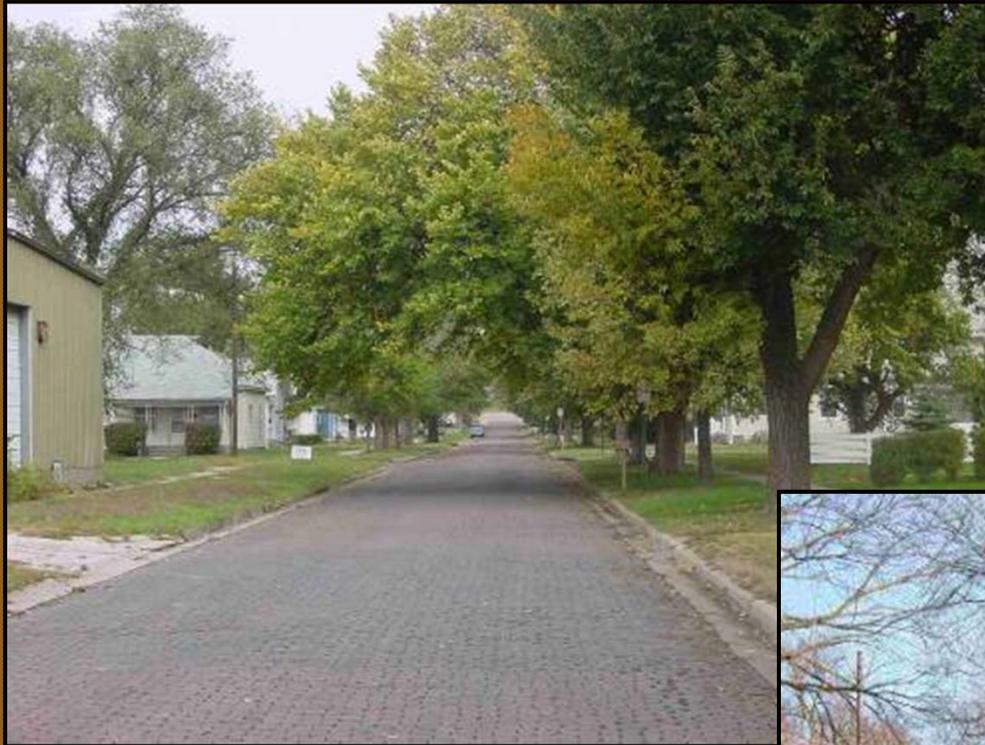


# Prune to Improve Aesthetics

- Sprouts
- Damaged, diseased branches
- Formal appearance
- Form and health



## Prune to Improve Visibility or Safety



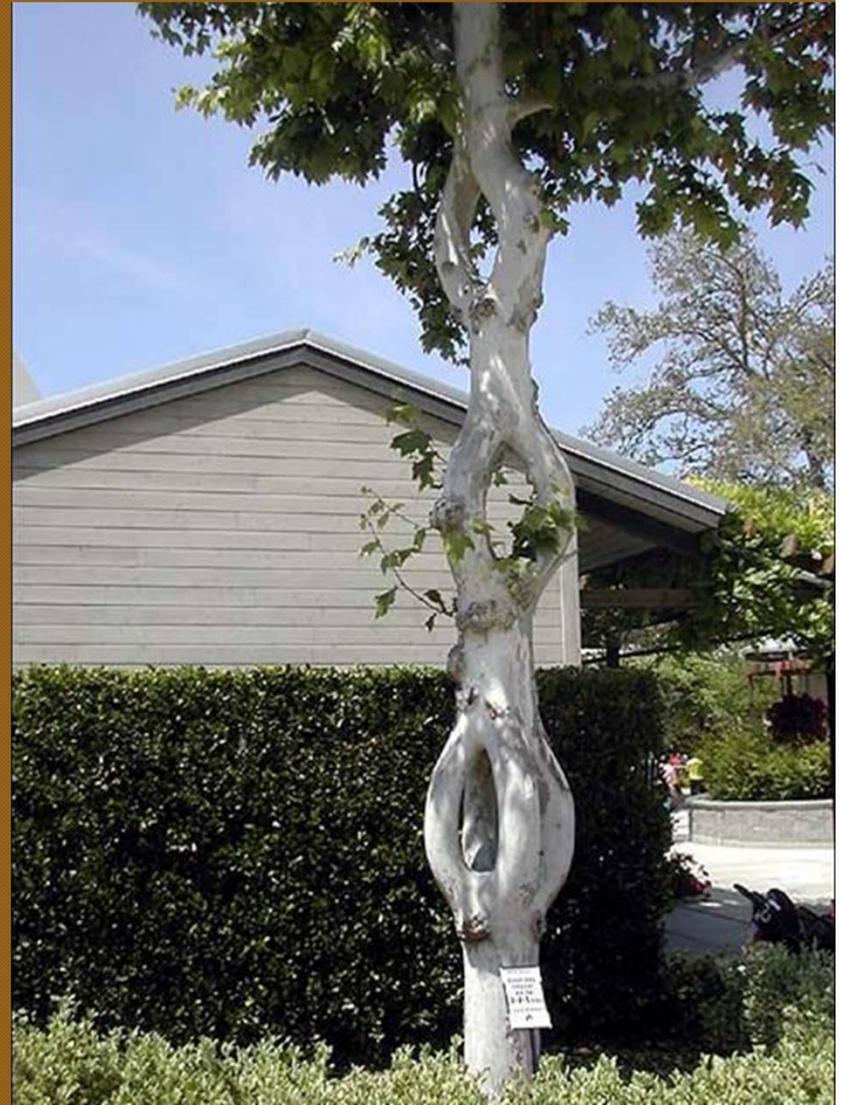
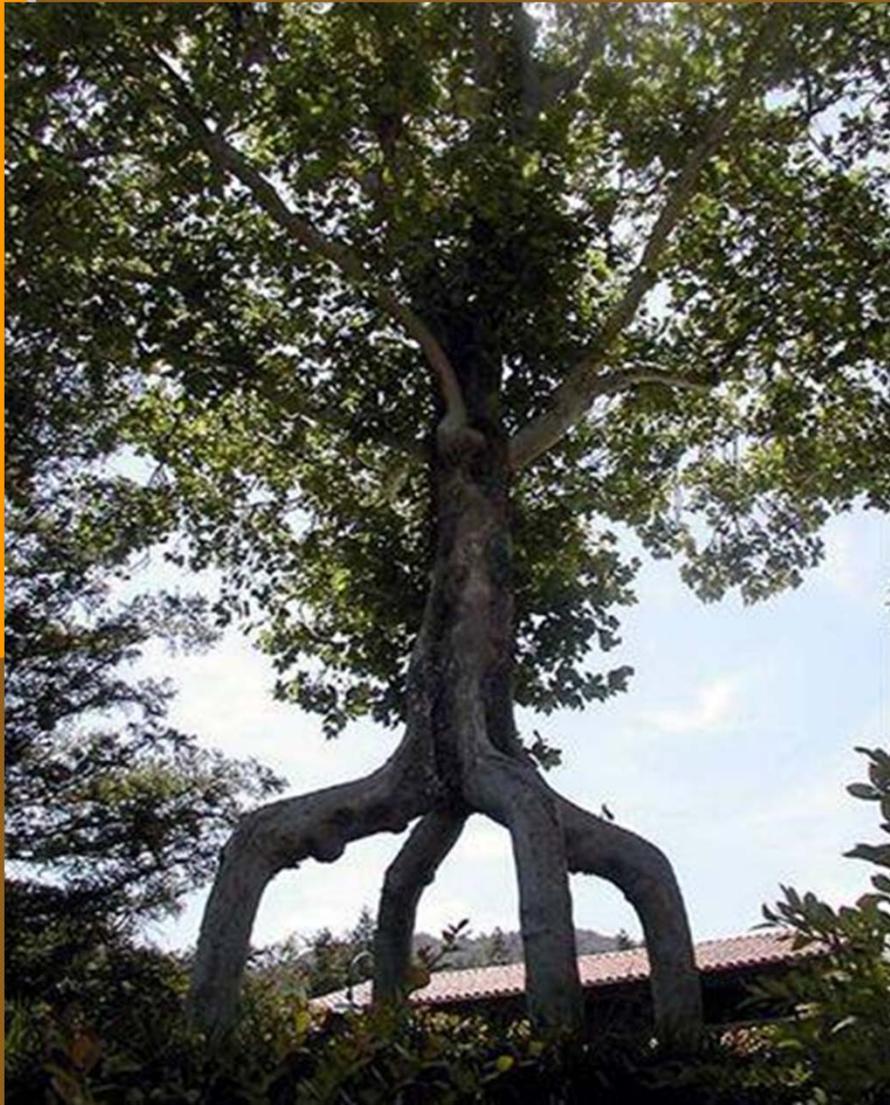
# What we want to avoid . . .



## PEGSMOR – Basics of Good Management

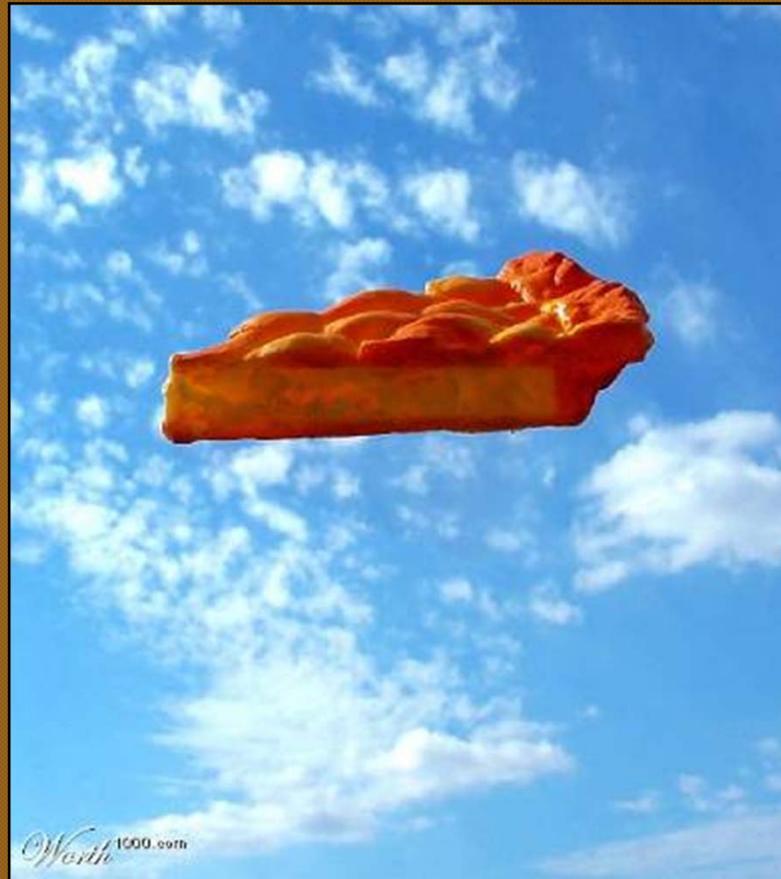


# Pruning (grafting) for fun



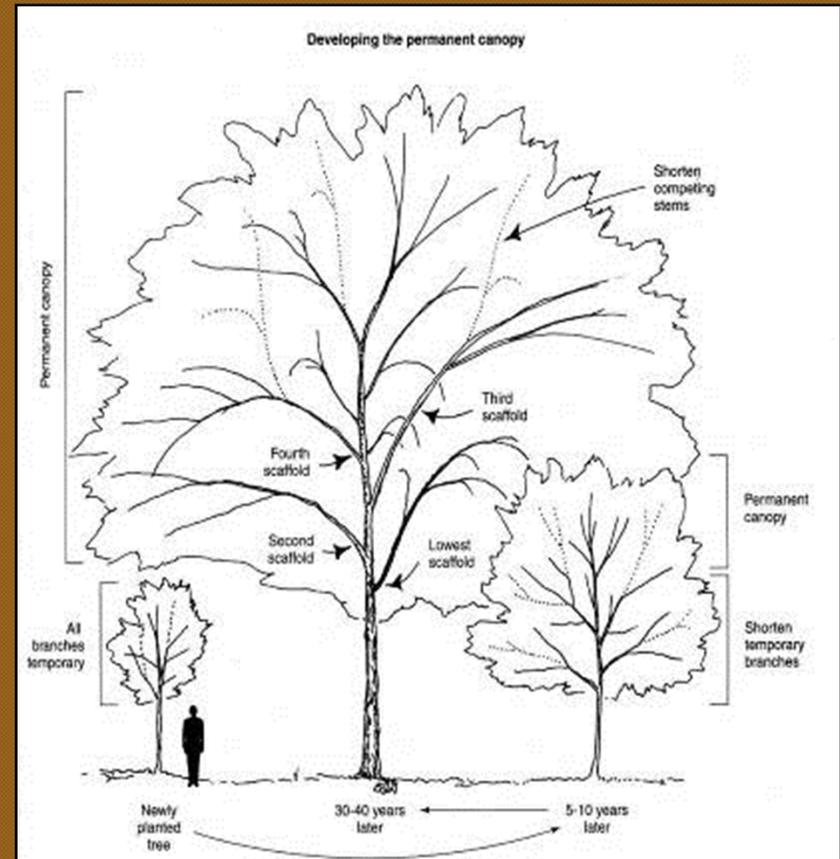
# PEGSMOR

- Tree Management System



# PEGSMOR

- Plant
- Establishment
- Growth
- Structure
- Mature
- Over-Mature
- Replace



# Planting

- Right Tree Right Place Right Way
- Proper Planting Procedure
- Watering
- Mulching
- Staking
- Little or No Pruning



# Basics of Good Tree Planting:

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



# PLANTING OUTLINE:

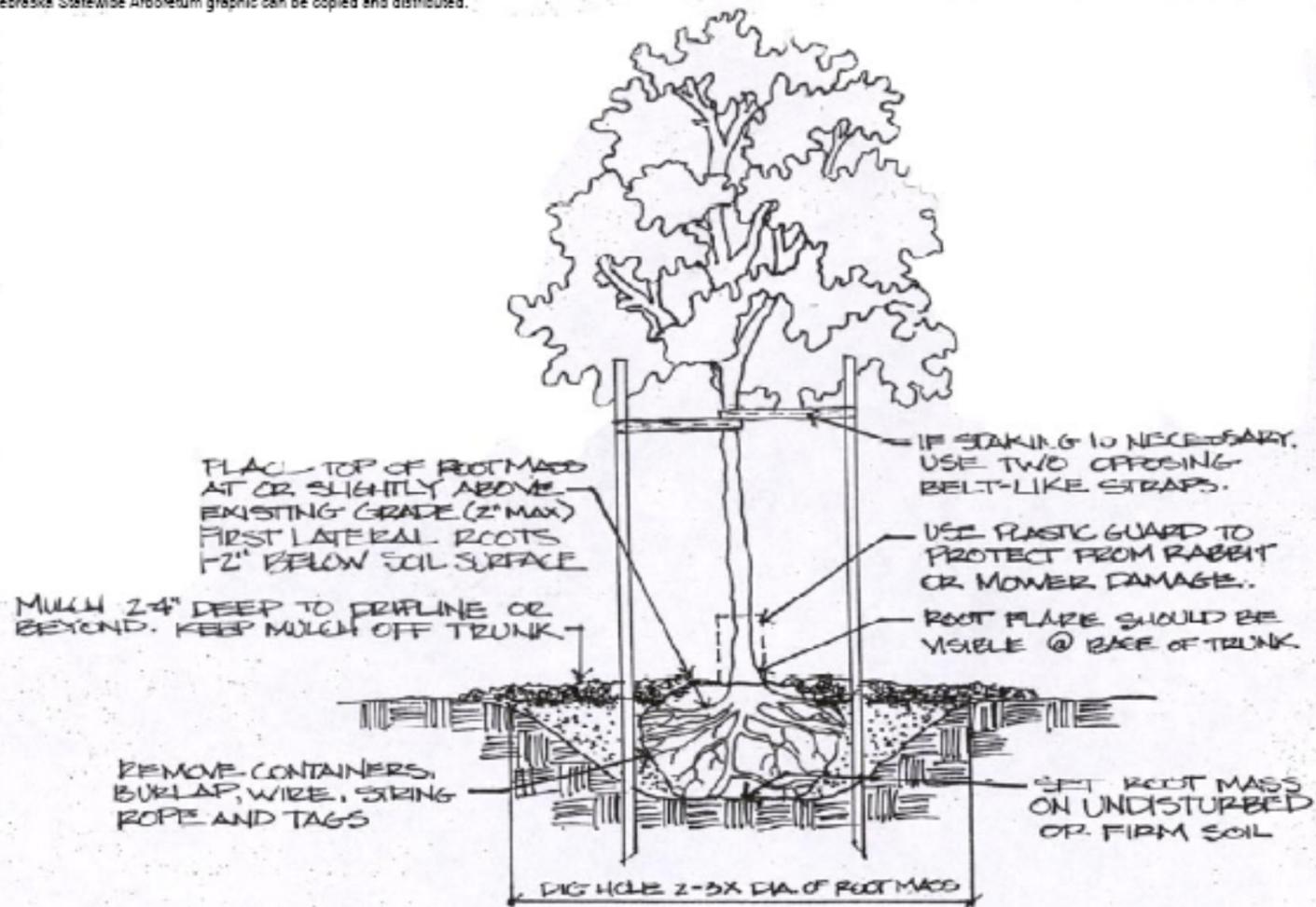
1. Site Selection
2. Plant Selection
3. Root Selection
4. Plant Placement
5. Planting Procedure
6. Planting Policies
7. Protect It
8. Provide for It

Develop a



# Planting Overview:

\* This Nebraska Statewide Arboretum graphic can be copied and distributed.

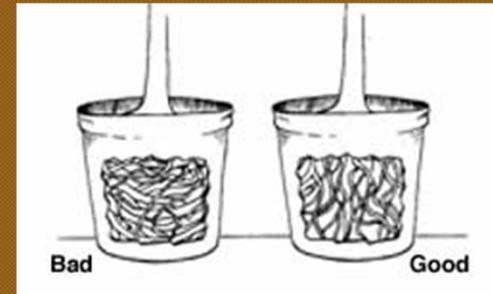


TYPICAL TREE PLANTING DETAIL

(NO SCALE)

# Tree Planting Information:

- treesaregood
- treelink
- NSA



TreeLink: The Urban Forestry Portal - Microsoft Internet Explorer

Address: http://www.treelink.org/

TreeLink log on ~ branch out

Mission: To improve urban and community forests by providing Internet-based information, tools and inspiration.

Search: Find specific info on urban forestry.

WOODNOTES quarterly

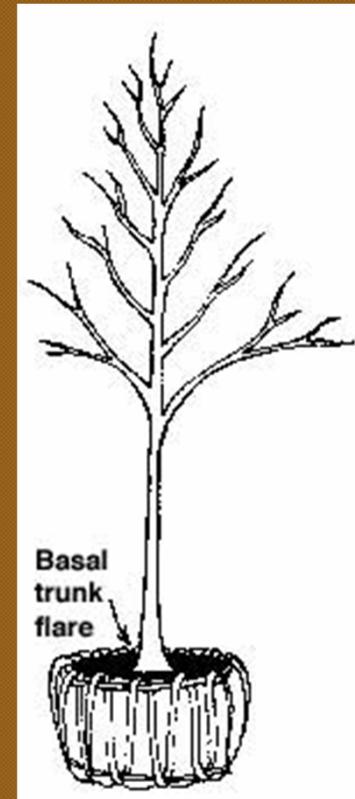
RESOURCE CENTER: Urban & Community Forestry, Management, Research & Technology Transfer, Learning Center, Care and Maintenance, Weather.

NEWS DESK: Featured Articles: L.A.'s One Million Trees Initiative, When Being Green Raises the Heat, Space for our urban souls.

QUICK POLL: Does your city inventory its trees? Yes, No, I don't know.

TREE FACTS: Research reports savings of between 10 and 15 per cent on winter heating costs thanks to trees acting as windbreaks...

TREE GUIDES LIBRARY



# Tour at Papio – October 23, 2012



PEGSMOR – Basics of Good Management





# Root Selection:



**Balled & Burlapped**



**Containerized**



**Bareroot**

# Lets get 1 trial installed:

Test impacts of root health by container type

- B&B
  - Container
  - Rootmaker / Root trapper
  - Bare root?
- 
- Goal to plant 1 location
  - Planted 2 locations with 3 different trials
- 
- HUGE kudos to CFSL staff, Alan Weiss, AG & HORT, City of Omaha & John Wynn.

# NP Dodge Park, Omaha – 11/16



- Existing SWO—
- #15 Container—
- #7 Rootmaker bag—
- 30" B&B—
- 6" Anderson pot—

PEGSMOR – Basics of Good Management



# UNL East Campus – 11/26/12



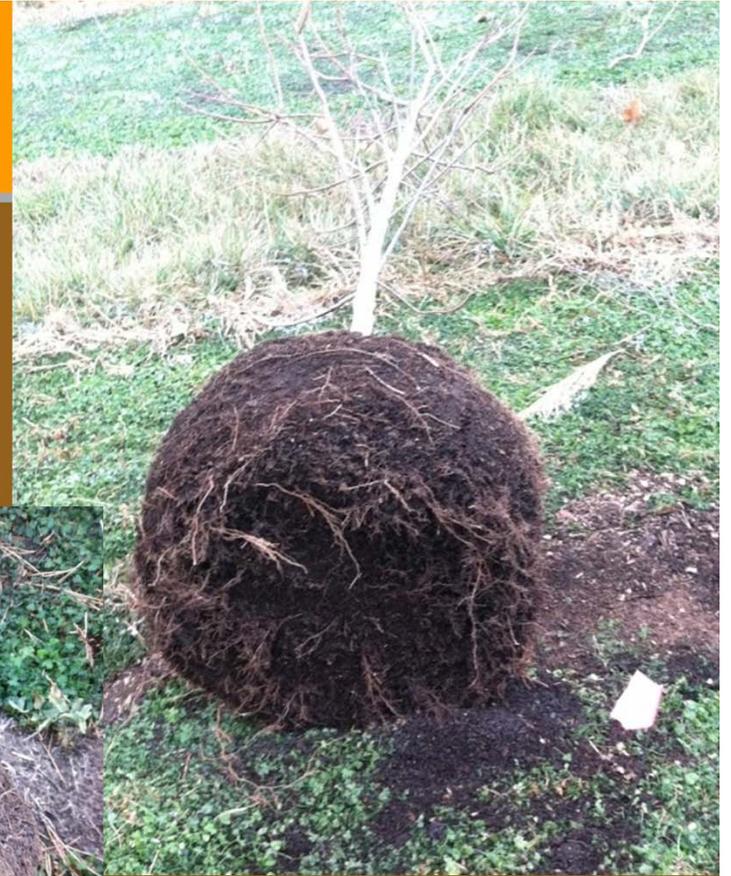
# Cold am . . .



## PEGSMOR – Basics of Good Management



# Container Study



- As is
- Scored
- Squared

## 2<sup>nd</sup> planting – Depth Study





4 reps of each treatment:

- 4" above grade
- At grade
- 4" below
- 8" below
- 8" below + volcano mulch

# PEGSMOR – Basics of Good Management



## PEGSMOR – Basics of Good Management



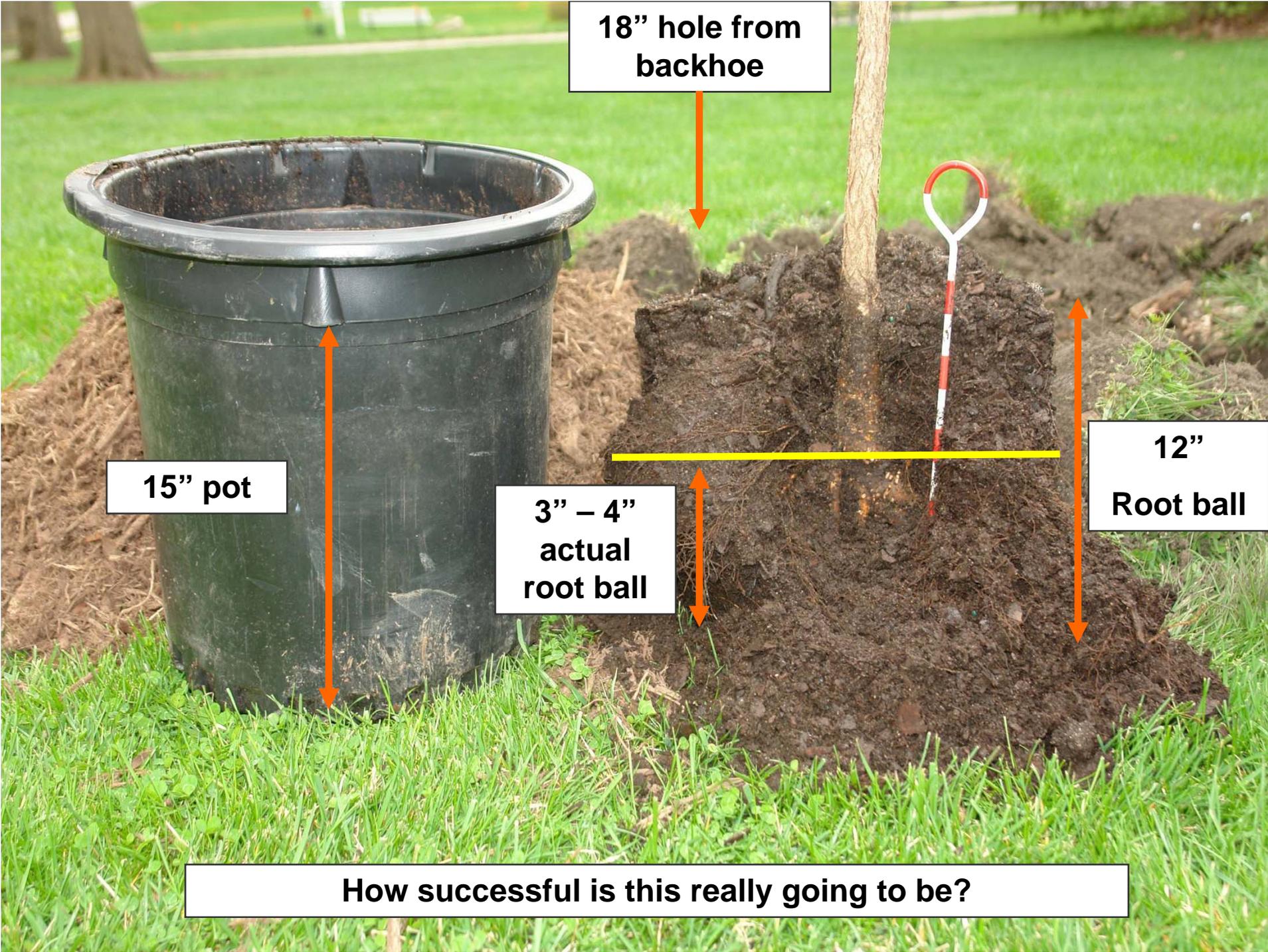
## PEGSMOR – Basics of Good Management





**15" pot**

**12"  
Root ball**



## Establishment: 1 to 4 years

- Root Replacement Period
- Maintain Mulch
- Limited Pruning



## Growth: 5 to 15 Years



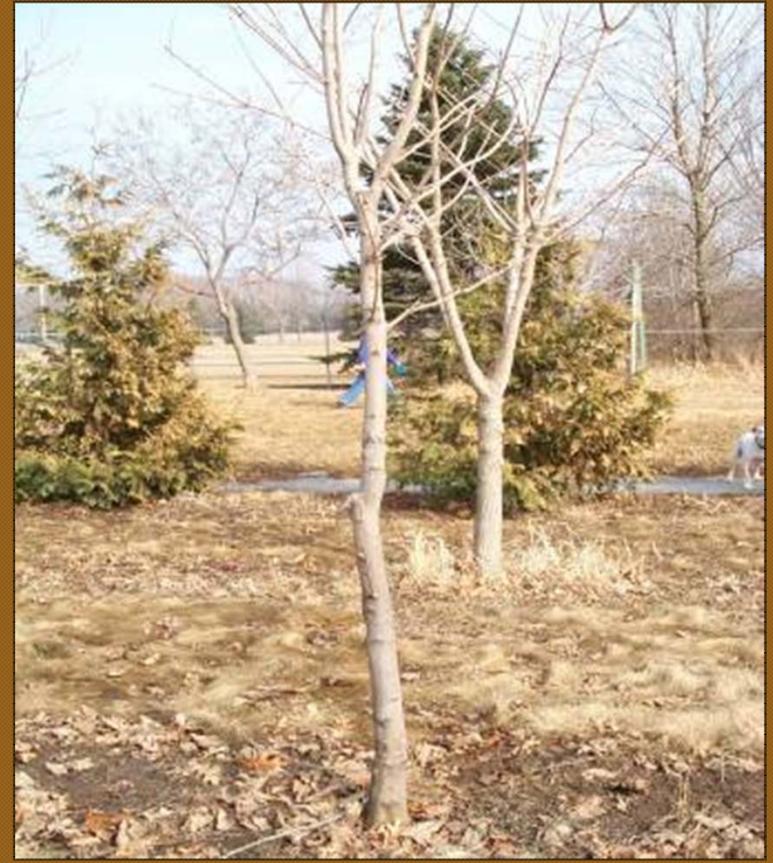
- Maintain Mulch

# “The Formative Years”

**Remove Codominant Leaders and Weak Attachments when they are Small.**



**Before**



**After**

# “The Formative Years”

**Branch Attachments with Included Bark Will Eventually Fail During a Loading Event**

Weak Attachments



Will Become This!

PEGSMOR – Basics of Good Management



PEGSMOR – Basics of Good Management



## Structure: 15 to 25 Years

- Prune Every Five Years
- Select Permanent Branches
- Remove Weak Crotches
- Remove Dead Wood
- Maintain Mulch





## **Maturity: 25 to 80 Years**

- **Prune Every 7 to 10 Years**
- **Remove Dead Wood**





## Over-Mature: 80+

- Prune Every 3 to 5 Years
- Remove Dead Wood
- Remove Defective Branches



PEGSMOR – Basics of Good Management



# Replacement

- **Remove Tree**
- **Plant New Tree**



## Summary:

- **Interrelated systems  
(Canopy/Stem/Roots)**
- **Trees have natural defenses  
(CODIT)**
- **Prune to maximize CODIT**
- **Proactive rather than Reactive**
- **Focus on the Formative years**
- **When in doubt . . . Cut it out**

# References

**USDA Forest Service – NE Area. Found online at:**

[http://www.na.fs.fed.us/spfo/pubs/howtos/ht\\_prune/prun001.htm](http://www.na.fs.fed.us/spfo/pubs/howtos/ht_prune/prun001.htm)

**Bartlett Arboretum Gardens. Found online at:**

<http://bartlett.arboretum.uconn.edu/pollarded.html>

***An Illustrated Guide to Pruning***

**Edward F. Gilman**

**Delmar Publishing**

# Questions



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