Tree Pruning: The Basics

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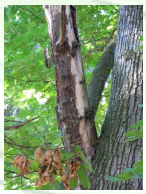
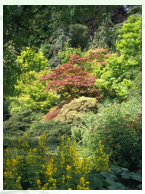
Pruning Objectives

Improve Plant Health



Safety



Aesthetics

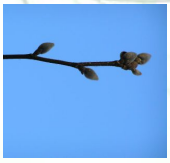
Direct Growth

Increase Flowers & Fruit

Remember-

Plants have a genetically predetermined size. Pruning can't solve all problems. So, plant the right plant in the right way in the right place.

Leaf, Bud & Branch Arrangement



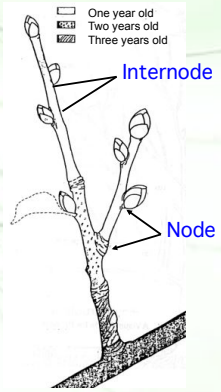
MADCap Horse, Ole!

Maple
Ash
Dogwood
Caprifoliaceae
Horsechestnut
Oleaceae

Most plants found in these genera and families have **opposite** leaf, bud and branch arrangement.

Pruning Trees

Stem & Buds

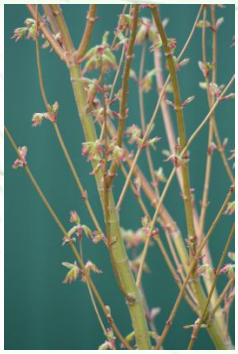


Pruning Trees

Node & Internode

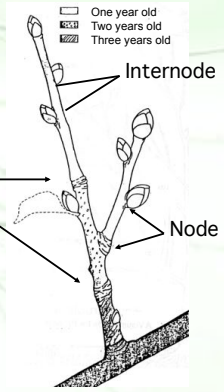
Node
- Buds, leaves and branches arise here

Internode
- Stem area between nodes



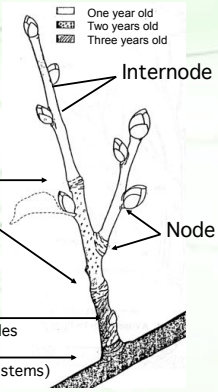
Pruning Trees

Stem & Buds



Pruning Trees

Stem & Buds



Bud scale scars
- indicates yearly growth and tree vigor

Latent bud
- inactive lateral buds at nodes

Adventitious bud
- found in unexpected areas (roots, stems)

Pruning Trees

Dormant Buds

Latent

Adventitious

Pruning Trees

Epicormic Growth

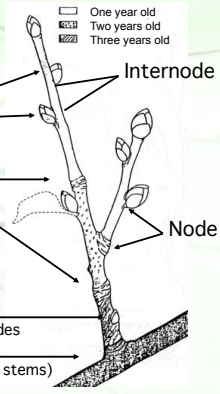
Watersprouts

Growth from dormant buds, either latent or adventitious. These branches are weakly attached.

Suckers

Pruning Trees

Stem & Buds



Axillary (lateral) bud
- found along branches below tips

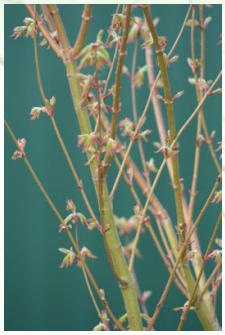
Bud scale scars
- indicates yearly growth and tree vigor

Latent bud
- inactive lateral buds at nodes

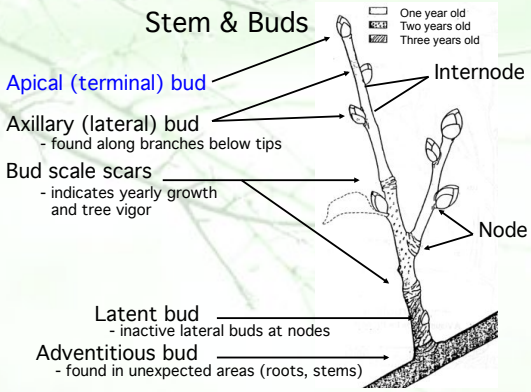
Adventitious bud
- found in unexpected areas (roots, stems)

Pruning Trees

Axillary (Lateral) Buds



Stem & Buds



Apical (Terminal) Bud

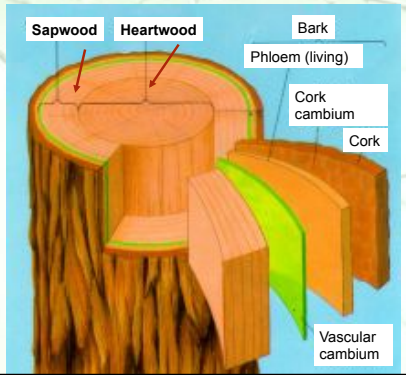
- Found at branch tips
- Contains primary meristem

Apical Dominance

The apical (terminal) bud contains the **apical meristem**, which contains plant hormones called **auxins** that inhibit growth of lateral buds.

When apical dominance is broken by injury (storms, animals, etc.) or pruning, lateral and dormant buds fight to become the new terminal leader.

Woody Plant Tissues: **Xylem**



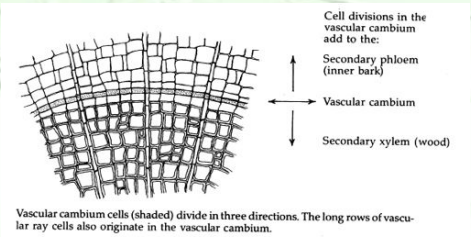
Heartwood

- provides structural backbone

Sapwood

- conducts water and nutrients from roots throughout the tree

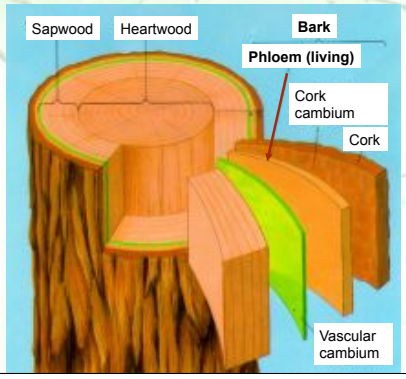
Woody Plant Tissues: **Vascular Cambium**



Vascular cambium cells (shaded) divide in three directions. The long rows of vascular ray cells also originate in the vascular cambium.

This is a secondary (lateral) meristem that allows for increase in xylem and phloem tissues, as well as cambium cells. The result is increased stem and trunk diameter.

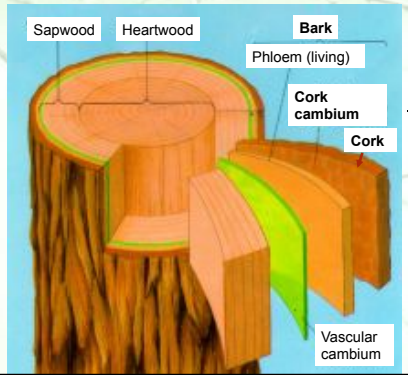
Woody Plant Tissues: **Bark (Inner)**



Phloem (living)

- conducts food from the leaves throughout the plant

Woody Plant Tissues: **Bark (Outer)**



Cork
- protection

Cork cambium
- cambium cells present in some species increase cork

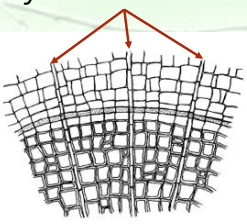
Annual Growth Rings

Earlywood (Springwood)
- First new wood in spring
- Large cells with thin cell walls
- Light in color

Latewood (Summerwood)
- Growth later in summer
- Small cells with thicker cell walls
- Dark in color

Pruning Trees

Vascular Rays



Vascular rays transport sugars and other compounds radially through vascular tissues, store starch, and assist in restricting decay in wood tissue.

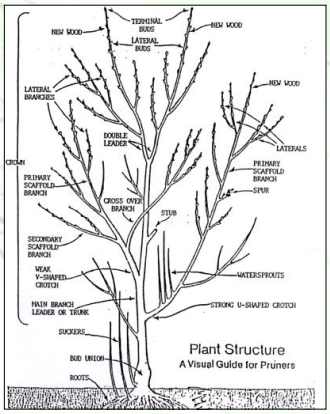
Pruning Trees

Tree Structure

Trunk

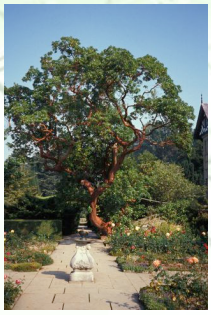
Crown
- leaders
- scaffold branches
- lateral branches
- spur shoots
- twigs

Epicormics
- suckers
- watersprouts



Pruning Trees

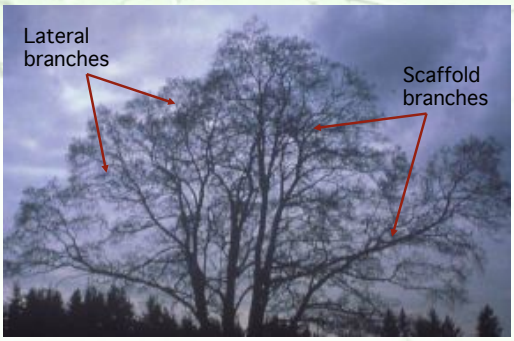
Tree Form



Decurrent

Excurrent

Branches

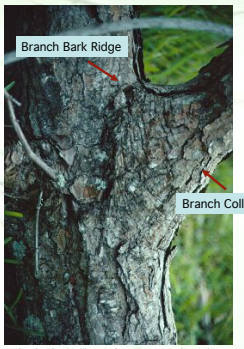


Branch Wood & Trunk Wood

Branch Wood and Trunk Wood

Photos by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

Branch Collar & Branch Bark Ridge



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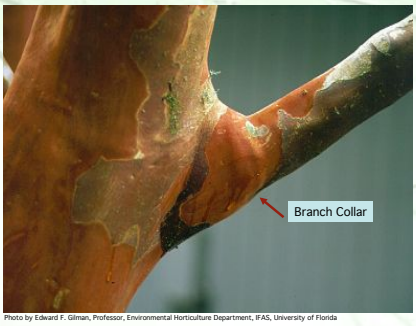
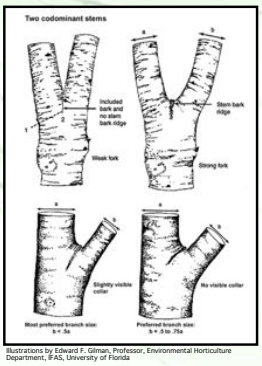


Photo by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

Branch collar with no visible **branch bark ridge**

Types of Branch Attachments

- strong attachments have smaller branches (**branch wood**) secured in larger branches or trunks (**trunk wood**)
- trunk wood forms **a branch collar** around the branch wood, and a **branch bark ridge** is often visible
- **codominant** stems are poorly attached
- **included bark** forms both in codominant and narrow angled attachments



Illustrations by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

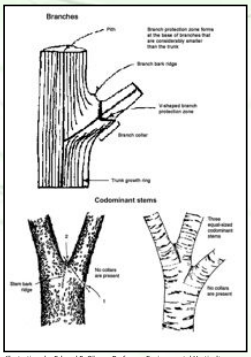
Codominants & Included Bark

Acute Angle of Attachment

Photos by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

Branch Protection Zone

- a **branch protection zone** forms at the base of branches that are small in comparison to the trunk
- codominant stems have no branch protection zone



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Codominants with included bark (and decay)

Photo by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

Included bark due to acute attachment

Photo by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

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Pruning Trees

Pruning Cut: **Heading**

- localized response
- 'hydra' effect
- leaves stubs
- cut to a node (selective heading)
- reduction cut (selective heading)
- shearing (non-selective heading)
- topping (non-selective heading)

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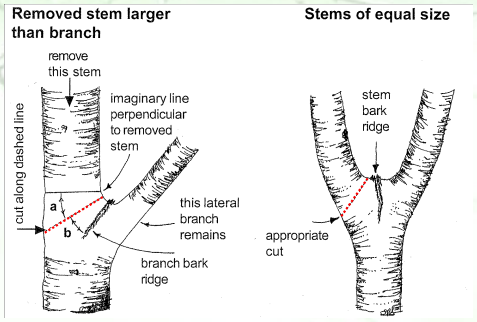
Pruning Trees

- localized response
- 'hydra effect'

- leaves stubs

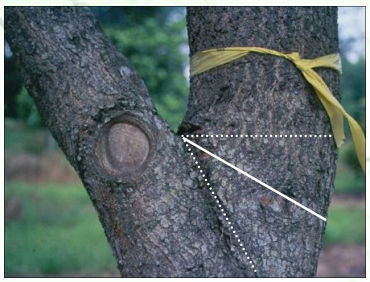
Pruning Trees

Reduction Cut



Pruning Trees

Reduction Cut



Cut the stem to a lateral branch large enough to assume the terminal leader role.

(at least 1/3 to 1/2 the diameter of the removed stem)

Reduction Cut

If the lateral branch is too small of a diameter, epicormic shoots will develop.

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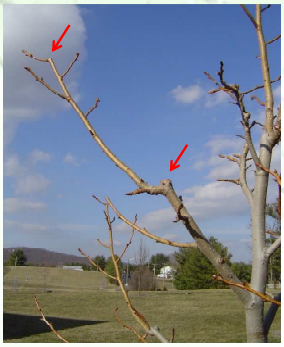
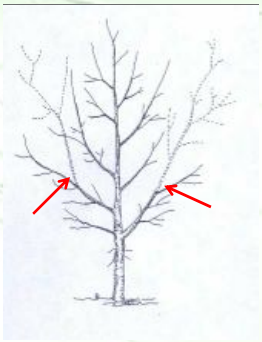
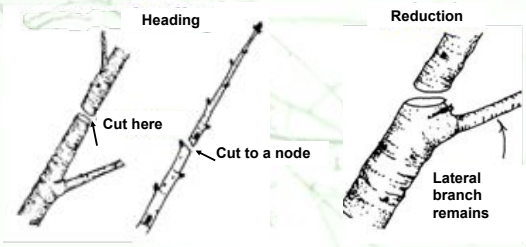
Reduction Cut





Heading or Reduction Cut?



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Shearing

- use on plants with small leaves that are tough enough to take it
- some large leaf plants OK
- formal look
- non-selective heading

Topping

- cuts through several years old wood
- ugly
- doesn't work to reduce height; plant responds with new, poorly attached stems
- unhealthy; opens tree to decay
- expensive to maintain

Photos by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

Thinning

- cut to branch's point of origin
- preserves apical dominance
- natural look
- cut outside of **branch collar**

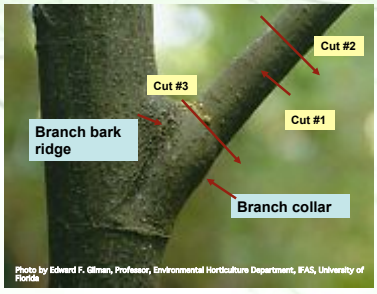
Photo by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

Before & After Thinning

Photos by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

- cut smaller laterals off main stems
- open and natural looking

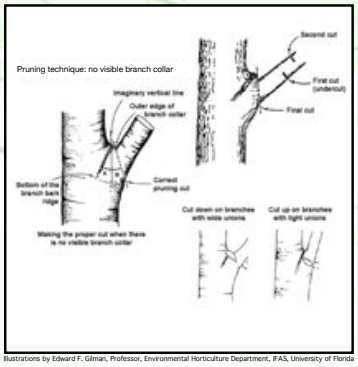
How to Make a Thinning Cut



- locate **branch collar** (use **branch bark ridge** for guidance)

Photo by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

- cut just outside the branch collar
- the branch collar is kept intact



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Callus & Woundwood

symmetrical formation indicates proper cut

asymmetrical formation indicates cut into trunk wood

CODIT: compartmentalization of decay in trees

- plants can limit, or wall off, decay that sets in after wounding
- plants don't HEAL, they chemically SEAL off damage
- CODIT works best on young wood (1-3 yrs.)
- species vary in successful compartmentalization
- 4 walls form to varying degrees of success

Wall 1: prevents the spread of decay up and down the branch or trunk by plugging the vertical cells as a reaction to wounding (weakest wall)

Wall 2: pre-existing defense of cells formed at the annual growth rings to slow spread of decay toward the center of the tree

Wall 3: pre-existing defense of 'ray' cells that slow spread of decay around the tree

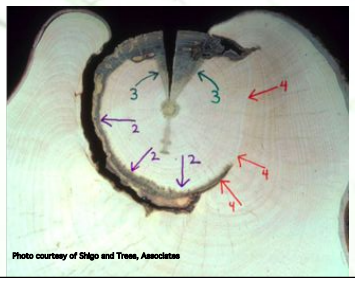

Photo courtesy of Shigo and Trees, Associates

Wall 4: a 'barrier zone' formed as a reaction to wounding that consists of new strong dense wood (strongest wall)

The bottom line on pruning-

- remove the 4 d's first- dead, damaged, diseased and deranged
- with ornamentals, do mostly thinning cuts to retain natural form and structure
- if you can't identify the plant, don't over prune
- know WHY you are making each cut