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

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

**Node & Internode**

- **Node**
  - Buds, leaves and branches arise here

- **Internode**
  - Stem area between nodes

**Bud scale scars**
- Indicates yearly growth and tree vigor

**Stem & Buds**

- One year old
- Two years old
- Three years old
Pruning Trees

One year old
Two years old
Three years old

- indicates yearly growth and tree vigor
- inactive lateral buds at nodes
- found in unexpected areas (roots, stems)

Node
Internode
Stem & Buds

Latent bud
Adventitious bud

Bud scale scars

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

Watersprouts
Suckers

Epicormic Growth

Dormant Buds

Latent
Adventitious

Stem & Buds

Internode
Node

Axillary (lateral) bud
- found along branches below tips
Bud scale scars
- indicates yearly growth and tree vigor

Latent bud
Adventitious bud
- inactive lateral buds at nodes
- found in unexpected areas (roots, stems)
Axillary (Lateral) Buds

- Axillary (lateral) buds 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)

Apical (Terminal) Bud

- Found at branch tips
- Contains primary meristem

Stem & Buds

- Apical (terminal) bud
- 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)

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**

- 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**

- **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

**Vascular Rays**

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

**Tree Structure**

- **Trunk**
  - Leaders
  - Scaffold branches
  - Lateral branches
  - Spur shoots
  - Twigs

- **Crown**
  - Leaders
  - Scaffold branches
  - Lateral branches
  - Spur shoots
  - Twigs

- **Epicormics**
  - Suckers
  - Watersprouts
Tree Form

Decurrent

Excurrent

Branches

Branch Wood & Trunk Wood

Branch Wood and Trunk Wood
Branch Collar & 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

Codominants & Included Bark
Acute Angle of Attachment

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.

Codominants with included bark (and decay)

Included bark due to acute attachment
Pruning Trees

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

Pruning Cut: Heading

Reduction Cut
**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)

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**Reduction Cut**

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

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**Pruning Trees**

**Pruning Cut Types**

- **Heading Cut**
- **Thinning Cut**
- **Reduction Cut**

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**Heading or Reduction Cut?**

**Heading**

Cut here

Cut to a node

Lateral branch remains

**Reduction**

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

Before & After Thinning

- 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)

- cut just outside the branch collar
- the branch collar is kept intact
Pruning technique: no visible branch collar

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

Pruning Trees

Callus & Woundwood

symmetrical formation indicates proper cut

Pruning Trees

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

Pruning Trees
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

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

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