Intro to Tree Pruning; Relating Tree Biology and Structure to Pruning

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In the next 40 minutes... You will learn about the WHY?

• Relating Tree Biology to Pruning

• Relating tree structure to Pruning
What is tree biology?

The study of the *Life Processes* of a tree.

That includes a study of the GROWTH, STRUCTURE, EVOLUTION, etc. of a tree.
The Crown

The canopy is made up of the foliage and branches…
Biologically this is where most of your photosynthesis is occurring.
Tree Biology…

Leaves are the factories of the tree….

Inputs
- Soil Minerals
- Water
- Minerals

Outputs
- Oxygen ($O_2$)
- Wood
- Bark
- Leaves
- Roots
- Growth
When pruning you are often removing limbs with photosynthesis/food producing leaves...

Less pruning is always better or stretching it out over several years....
There are two primary reasons why not to top or over-prune damages trees...

1. Reduction of growth

2. Formation of poor structure
1. Growth Reduction;

Where are the carbs stored?

- No leaves no photosynthesis
- Carbohydrates/sugars are stored in the woody tissue of branches and trunk
- Excessive pruning/storms will removed stored energy
- This weakens trees and make them susceptible to insects & disease
2. Poor Structure;
What is the Responses to over/incorrect pruning?

- Sucker growth
- Water sprouts
- Epicormic branching
Why do trees respond this way?

• Apical meristem or dominant bud...is gone
• That means:
  – No more hormones suppressing thousand of dormant buds
  – Resulting in excessive re-sprouting
Why is sucker growth a problem?
Reason not to top trees:

- Tree responds with rapid uncoordinated growth
- Poor branch collar formation
- Introduces decay to key branches
- Increases risk of insects and disease
- Branches are poorly attached
- Increases future risk of failure
- If you're going to top, you better keep topping to maintain the problem – Expensive$$_$$$_$$_$$_$
Pollarded trees in Sluis, Netherlands
Don’t Top!!!

There are other options

- It won’t Work
- It’s Ugly
- It dangerous

Pictures: www.plantamnesty.org
The biology of reduction pruning

- **Reduction pruning** - removes branches back to a leader larger enough to assume appical dominance.
  - (i.e. hormones won’t release hundreds of dormant buds…)
  - This prevents epicormic branching
  - Also can help limit size of cut or cutting back to the trunk
The Trunk:

The trunk provides the support and strength to the tree…avoid damage to tree trunks at all costs!!!!

Avoid Large Pruning Cuts…Especially those back to the trunk!
Trees don’t heal…

Trees compartmentalize or “wall-off” decay.

Some species are better than others at keeping decay from spreading.
compartmentalizer
Poor compartmentalizer
Trees that resist decay make better candidates for restoration

<table>
<thead>
<tr>
<th>Trees that resist decay</th>
<th>Trees prone to decay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald Cypress</td>
<td>Laurel oak</td>
</tr>
<tr>
<td>River Birch</td>
<td>Water Oak</td>
</tr>
<tr>
<td>Hickory</td>
<td>Willow Oak</td>
</tr>
<tr>
<td>Pecan</td>
<td>White Oak</td>
</tr>
<tr>
<td>American Holly</td>
<td>Maple</td>
</tr>
<tr>
<td>Shumard Oak</td>
<td></td>
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</tbody>
</table>
Improper pruning allows decay to enter and decay the tree.

Avoid the following:
1. Leaving stubs
2. Making large pruning cuts back to the trunk
3. Removing the branch collar
Leaving Stubs...

• Is an avenue for decay & insects to enter the tree

• Tree cannot seal over the wound
Large pruning cuts back to the trunk:

As pruning cuts get larger it becomes increasingly difficult for the tree “seal” or compartmentalize that wound.
Large Cuts take:

- More energy reserves to grow over wounds
- More time to seal over (i.e. more time for decay and insects)
Big cuts can result in decay and cracks.
Sprouts develop from large pruning cuts
Size/Age of the tree

- Larger more mature trees are more difficult to restore;
  - More prone to decay due to larger branches
  - Recovery more difficult due to more canopy loss
  - Recovery will be a multiyear process due to pruning doses
Pruning dose; storms excluded....

- Old trees can decline as a result of over pruning
- On young trees remove less than 20% of live foliage.
- On mature trees remove less than 10% of the live foliage
- Try to prune trees when they are young to avoid large cuts
Pruning; Storms Considered

• You can't pick how much the storms removed... So...
• Remove as little foliage as possible
• Prune away broken or stubbed branches
• Take a long term approach.
• Be prepared to spend several years restoring your trees
• Train future trees for better structure
In the next 25 minutes…

• Relating Tree Biology to Pruning

• Relating tree structure to Pruning
It is important to train young trees to develop good structure that will help them survive future storm events...
What is good structure?

Outline of topics

1. *Forest grown vs. open grown tree*
2. Codominant stems
3. Good branch attachment
The urban environment is unnatural environment
1. Forest grown tree vs. Open grown tree

• How do they develop on their own?
A forest tree shown at different ages
Codominant stems form far up into the canopy on most forest trees
Open grown trees

- Canopy develops low on the trunk
- Canopy spreads wide
- Tree is often wider than tall

Slide by Ed Gilman, UFL
Its party time for all

Its all about access to sunlight

Slide by Ed Gilman, UFL
Appears to be a nice tree
Huge crack

Same tree five years later

Slide by Ed Gilman, UFL
“I thought I heard something creak last night”
What is good structure?

Outline of topics

1. Forest grown vs. open grown tree
2. **Codominant stems**
3. Good branch attachment
2. Codominant stems

Stems nearly same diameter
Two codominant stems

1. Weak fork
   - Included bark and no stem bark ridge

2. Strong fork
   - Stem bark ridge

Slide by Ed Gilman, UFL
These are weak

“Elephant ears”

Severely acute angle

Slide by Ed Gilman, UFL
Codominant stems often cause branch failure in storms
Why are they a problem?

Included bark beginning to form
Bark inclusion

Decay and discoloration from self wounding

Slide by Ed Gilman, UFL
Bark inclusion
(Not a codominant stem!)
Close-up of closure crack

Slide by Ed Gilman, UFL
What is good structure?

Outline of topics

1. Forest grown vs. open grown tree
2. Codominant stems
3. Good branch attachment

Slide by Ed Gilman, UFL
3. Good branch attachment

• How does a BRANCH form?

• What are the indicators?

• Why are branch collards important?
Early last year

Later last year

Weaker union

Early this year

Strong union

Later this year

Codominant stems

Dominant trunk with one branch
Branch bark ridge present

1st indicator of good branch attachment

- Some branch unions have a prominent branch bark ridge
- Indicator of good branch attachment
2nd indicator of good branch attachment

No branch bark ridge

Collar

Another indicator of good branch attachment

Slide by Ed Gilman, UFL
Wood orientation at union
Why is the branch collar important?

- Specialized wood orientation helps:
  - Strengthens branch attachment
  - Trees heal over the wound quickly when pruning
  - Limits decay from entering the tree when pruning
What happens if you remove the branch collar?

- Create larger wound
- Increase healing time
  - More decay
  - More insects
  - Weaker tree

Image by Steve Houser
If branches are too close in size to the main stem branch collars won’t form...

Most preferred branch size: 
\[ b < 0.5a \]

Preferred branch size: 
\[ b = 0.5 \text{ to } 0.75a \]
Strong union

Weak union

Slide by Ed Gilman, UFL
Some trees naturally develop good structure in the urban environment and require less pruning maintenance and sustain less storm damage.
Weak vs. Strong

Slide by Ed Gilman, UFL
**Species:** trees with good structure will require less pruning attention

<table>
<thead>
<tr>
<th>Trees with good structure</th>
<th>Trees with poor structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldcypress</td>
<td>Silver Maple</td>
</tr>
<tr>
<td>Sweetgum</td>
<td>Red maple</td>
</tr>
<tr>
<td>Southern magnolia</td>
<td>Pecan</td>
</tr>
<tr>
<td>Live oak</td>
<td>Laurel oak</td>
</tr>
<tr>
<td>Shumard oak</td>
<td>Water Oak</td>
</tr>
<tr>
<td>Overcup Oak</td>
<td>Bradford Pear</td>
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</tbody>
</table>
In Review: Structural branch problems to correct:

1. Codominant stems
2. Branches with steep angles and included bark
3. Branches that are too close in diameter to the main stem

Correct these early…regularly…

Don’t allow these problems to become large and overbearing…
Pruning –

The How of pruning will be discussed by Mr. Jack Rowe
Special Thanks:

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http://hort.ufl.edu/woody/planting
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