Woody Plant Propagation Via Dormant Hardwood Stem Cuttings

Jim Schmidt - NCBG Native Plant Certificate Candidate
What are Dormant Hardwood Stem Cuttings?

• Veg. Prop vs. Seed Grown

• Types of Cuttings (soft, semi, hard)

• Dormant?
WHY DORMANT CUTTINGS?

• Take advantage of slow period at the garden

• Reduce summer workload

• Reduce production time by speeding up rooting and subsequent growth
HOW ARE WE GOING TO DO THIS?

- Select Species/Cultivars
- Select Rooting Medium
- Select Rooting Hormone(s)
- Take Cuttings
- Stick Cuttings
- Place Cuttings in a Rooting Chamber
- Transplant Rooted Cuttings
### Step 1: Select Cuttings

– 30 Species/Cultivars were selected
  • 17 Broadleaf Evergreens

<table>
<thead>
<tr>
<th>Species/Cultivars</th>
<th>Plant</th>
<th>Species/Cultivars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agarista populifolia</td>
<td><em>Ilex opaca</em> ‘Maryland Dwarf’</td>
<td>Leucothoe axillaris</td>
</tr>
<tr>
<td><em>Ilex glabra</em> (red tip)</td>
<td><em>Ilex x attenuata</em> ‘Greenleaf’ or ‘Topel’</td>
<td>Leucothoe racemosa</td>
</tr>
<tr>
<td><em>Ilex glabra</em> ‘Shamrock’</td>
<td><em>Illicium floridanum</em></td>
<td>Lyonia lucida</td>
</tr>
<tr>
<td><em>Ilex myrtifolia</em></td>
<td><em>Kalmia carolinianum</em></td>
<td>Magnolia virginiana var. virginiana</td>
</tr>
<tr>
<td><em>Ilex opaca</em></td>
<td><em>Kalmia latifolia</em></td>
<td>Myrica cerifera</td>
</tr>
<tr>
<td><em>Ilex opaca</em> ‘Croonenberg’</td>
<td></td>
<td>Osmanthus americanus</td>
</tr>
</tbody>
</table>
Step 1: Select Cuttings (Cont.)

– 30 Species/Cultivars were selected
  • 13 Deciduous species

<table>
<thead>
<tr>
<th>Aronia arbutifolia</th>
<th>Hydrangea quercifolia ‘Snow Queen’</th>
<th>Quercus michauxii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyrilla parviflora</td>
<td>Hypericum frondosum</td>
<td>Quercus minima</td>
</tr>
<tr>
<td>Cyrilla racemiflora</td>
<td>Itea virginica ‘Saturnalia’</td>
<td>Rhus aromaticia</td>
</tr>
<tr>
<td>Euonymous americana</td>
<td>Quercus lyrata</td>
<td>Viburnum rafinesquianum</td>
</tr>
<tr>
<td>Hydrangea quercifolia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Selection Basis

– Availability of Physiologically Suitable Plants
  • Stock plants in future

– Reported success in the literature (Dirr, etc...)

– Desirable species for NCBG Plant Sale!
Step 2: Select Rooting Medium

- Criteria
  - Pore Space = air + water = root growth
  - Proper drainage
- 4 parts perlite: 4 parts vermiculite: 3 parts peat (V/V/V)
- Ingredients were thoroughly mixed
- Moistened with water
- 6” x 6” “Jumbo Pot” filled with the mixture
### Step 3: Select Rooting Hormones

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5% IBA</td>
<td></td>
</tr>
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<td>1.0% IBA</td>
<td></td>
</tr>
<tr>
<td>1.5% IBA</td>
<td></td>
</tr>
<tr>
<td>5x Dip-n-Gro = 0.5% (IBA + NAA)</td>
<td></td>
</tr>
</tbody>
</table>
Step 4: Take Cuttings

- Cuttings taken between 12/20/10 and 2/2/11

- Minimum of 9 cuttings per hormone treatment

- Look for juvenility
Step 5: Stick Cuttings

- Trim cuttings to about 5” in length

- Remove lower ½ of leaves from stem

- Wound the stems
  - Double
  - Single
  - None

- Dip stems in rooting hormone solution for 5 seconds
Step 5: Stick Cuttings (cont.)

– Insert stem into rooting medium
  • Vertically insert about ½ the length of cutting
  • Do not bend the stem while sticking
  • Firm medium around the cutting
  • Maximum of 9 cuttings per pot
  • Trim remaining leaves if needed
  • Thoroughly water and place pot in rooting chamber
Step 6: Place Cuttings in Rooting Chamber

- 3’ x 6’x 12” high, no bottom
- Heating mat set @ 70-75F
- Spray plants with 1% hydrogen peroxide
- Polyethylene film placed over hoops and enclosed at ends and sides
- During rooting pots were watered as needed
- Chamber vented during hot weather
Outdoor Rooting Chambers
Step 7: Transplant Rooted Cuttings

- Cuttings were monitored for rooting by gently tugging on the stem; or by inverting the pot and looking for roots.

- When a cutting was sufficiently rooted, it was transferred to a 4” – 6” pot containing a standard potting mix.
Step 7: Transplant Rooted Cuttings (Cont.)

- Transplant was fertilized (Nutricote), watered, and placed in the misting chamber in the greenhouse.

- After one week it was moved to a bench in the greenhouse until it was warm enough to be placed outside.

- Any cuttings not ready to be transplanted were restuck and the process repeated until they rooted or we gave up!
Osmanthus americanus

Ilex opaca
Results

• Overall % rooted = 176/748 = 23.5%

• Overall Broadleaf Evergreens = 103/523 = 22.7%
  – *Ilex x attenuata* = 24/54 = 44.4% (Feb?, Post event?)
  – *Lyonia lucida* = 23/54 = 42.6%
  – *Illicium floridanum* = 11/18 = 61.1%
  – *Osmanthus virginicus*
  – *Magnolia virginiana*

• Overall Deciduous = 51/225 = 22.7%
  – *Euonymous americanus* = 39/63 = 61.9%
Overall Rooting Results and Rooting by Plant Classification
(Broadleaf Evergreen vs. Deciduous)

Overall (Broadleaf + Deciduous)  n=748

Broadleaf Evergreen  n=523

Deciduous  n=225
Rooting Results
Hormone Treatment x Plant Classification

Rooting Percentage (%)

<table>
<thead>
<tr>
<th>Hormone Treatment</th>
<th>Plant Classification</th>
<th>Overall n=207-243</th>
<th>Broadleaf n=144-172</th>
<th>Deciduous n=63-72</th>
</tr>
</thead>
<tbody>
<tr>
<td>5X Dip-n-Gro</td>
<td>1% IBA</td>
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Rooting Results for
*Euonymous americanus* and *Lyonia lucida*

<table>
<thead>
<tr>
<th>Species X Hormone Treatment</th>
<th>Euonymous americanus</th>
<th>Lyonia lucida 2x wound</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoHormone</td>
<td>Rooting Percentage</td>
<td>Rooting Percentage</td>
</tr>
<tr>
<td>0.5% IBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% IBA</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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<tr>
<td><em>Euonymous americanus</em></td>
<td>No Hormone</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>0.5% IBA</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>1% IBA</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>5X Dip-n-Gro</td>
<td>90</td>
</tr>
<tr>
<td><em>Lyonia lucida</em></td>
<td>No Hormone</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>1% IBA</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>1.5% IBA</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>5X Dip-n-Gro</td>
<td>100</td>
</tr>
</tbody>
</table>

Species X Hormone Treatment

Euonymous americanus  
- No Hormone  
- 0.5% IBA  
- 1% IBA  
- 5X Dip-n-Gro  
  
Lyonia lucida  
- No Hormone  
- 1% IBA  
- 1.5% IBA  
- 5X Dip-n-Gro  

n=36
Rooting Results for *Osmanthus americanus*

Stock Plant Age X Hormone Treatment
Conclusions

• Rooting decreased with increased hormone concentration
• Dip-n-Gro (5x) worked best with broadleaf evergreens → IBA + NAA
• Need to improve environmental control
  – The Costa Rican Factor!
    • Early rooters okay
  – Modify rooting medium → improve drainage
  – Modify rooting chamber → better control of humidity and ventilation
  – Focus on juvenile cuttings (STOCK PLANTS)