Culture and Development of Cold Hardy Camellia

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LONGWOOD GARDENS
Talk outline

• Longwood Gardens *Camellia* history
• Camellia culture
  – Propagation
  – Soil
  – Planting in the North
• Camellia breeding at Longwood Gardens
Longwood Gardens Camellia History

• Camellias from France were some of the first species planted upon completion of the Conservatory in 1921.

• Du Pont also desired large specimen camellias
  – He had a contact rural Georgia who would locate well-shaped plants with good flowers and make an offer.
Longwood Gardens Camellia History

• Camellia Inventory of 1937
  – 372 plants representing 167 cultivars
    • All were Japanese cultivars except for one *C. reticulata*

• 2011
  – 229 Living accessions
    • 12% - indoor display
    • 29% - indoor – research greenhouses
    • 59% - outdoor research plots
Longwood Gardens Camellia History

• Dr. Russell J. Seibert was the first director of Longwood Gardens

• He initiated LWG’s research program, which included camellia trials and breeding
First outdoor camellia trial - 1957
First outdoor camellia trial - 1957
Cold Hardiness Breeding

• 1957 to the late 70’s

• Longwood collaborated with the U.S. National Arboretum and Dr. Clifford Parks at Descanso Gardens near LA.

• Parks did most of the hybridizing and hybrids were evaluated at Longwood and USNA. Two extremely cold winters (temps < -14 °F) in the late 70’s, killed most of the trial plants (Thomas, 1999).
C × *williamsii* ‘Aida’
selected in 1974
C × williamsii ‘Aida’ – Released 1995

C. japonica 'Ville de Nantes'

C. saluenensis 'Dogrose'

available at rareFINDnursery.com
Cold Hardiness Trials

• Reinvigorated by plant exploration to Sochong Island, off the North West coast of South Korea (zone 6)
Plant Exploration Trip

  - 28 collections of *C. japonica* seeds
  - Cuttings from 20 well established trees
Releases from Korea trip

*C. japonica*

‘Longwood Centennial’

Available at rareFINDnursery.com
Releases from Korea trip

*C. japonica*

‘Longwood Valentine’

Both released in 2006 to celebrate the 100th anniversary of du Pont’s purchase of the property that is Longwood Gardens

Available at rareFINDnursery.com
Releases from Korea trip

*C. japonica* ‘Korean Fire’

Released by Barry Yinger

Awarded the Gold Medal by the Pa Hort Society in 2003

Morris Arboretum is planning on releasing 4 more cultivars
Camellia Propagation

- Cuttings
- Grafting
- Air layering
Camellia Cuttings

• Should collect semi-hardwood cuttings
  – Partially mature wood on current seasons growth

• Season: late summer

• Propagation system: mist, fog or humidly tent

• Cutting length: 3-6”
Humidity Tents
The Jar Method
Wounding

- Callus and root formation is greater along the margins of the wound
Auxin – Rooting Hormone

- Naturally occurring plant hormone that is used to stimulate adventitious rooting
- 2500 - 5000 ppm (0.25 - 0.5 %)

0.1 % IBA  0.3 % IBA  0.8 % IBA
Trimming leaves will reduce transpiration
Grafting Camellias
Grafting Terms

Scion - Piece of detached shoot with buds that comprise the upper portion of the graft from which the shoots of the new plant will arise.
**Rootstock/Understock** – Lower portion of a graft from which the roots are formed.

Could be seedling, cutting or root piece
Late Winter/Early Spring – the time to graft

- Ideal situation
  - Dormant scion
  - Active root stock

- If possible place rootstock in warmer location (cold frame/sunroom) a few weeks prior to grafting.
During grafting it is essential that the cambium of the scion and root stock are aligned.
Cleft/Wedge Grafts

• The tapered cut on the end of the scion is fit into the wedge shaped incision on the rootstock.
Cleft/Wedge Grafts

• When the scion is smaller it is moved to one side to ensure cambial contact
Air Layering

• Useful for propagating plants of relatively large size
Steps for Air Layering

1. Girdle stem
2. Apply auxin/rooting hormone
3. Pack area with moist sphagnum or peat moss
4. Cover with polyethylene and tie at ends
5. Check the make sure moss remains moist
6. After roots are visible, rooted stem can be cut from mother plant and planted
1. Girdle Stem

Master Gardeners of Jefferson County
University of Florida & Jefferson County cooperative extension
2. Apply auxin/rooting hormone
3. Pack area with moist sphagnum or peat moss
Wring excess moisture from the sphagnum. Use moist but not wet moss.
4. Cover with polyethylene and tie at ends

No Moss Showing
Reflective foil or black plastic may be used to protect the rooting area.
5. Check to make sure moss remains moist

Rewet if necessary
6. After roots are visible, rooted stem can be cut from mother plant and planted.
A. The Rooter Pot

With the rooter pot system, in just 8 weeks you can produce a brand new plant of a size that would take 3 years from seed or a cutting. Simply remove a strip of bark from a branch on a mother plant, apply rooting hormone, attach the rooter pot to the stem, fill the reservoir in the base with water, and pack the interior of the pot with moist, soilless (peat-based) potting medium such as sphagnum moss. Every week or two, add a bit of water to the pot if necessary - we found our curved-tip syringe perfect for this. After 8 weeks (additional time required for colder climates), if roots have developed, remove the newly rooted plant from the mother plant and transplant it to a container or directly into the soil. It couldn’t be easier, and the pots are reusable. Full instructions are included. Offered as a set of five pots with lids and 15 labels. Each pot is 3” in diameter and 4” deep. This winner of numerous international innovation awards will save you money and make your gardening easier.

The root stimulator we offer combines a root-stimulating hormone and a mild fungicide in a gel carrier. Comes in a 50 ml (1.7 oz) bottle, enough to do hundreds of plants. Also works on all types of cuttings - softwood or hardwood.

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<tr>
<td>AA640</td>
<td>Rooter Pots, set of 5</td>
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<td>25K07.05</td>
<td>Curved-Tip Syringe, ea.</td>
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<td>SG690</td>
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<tr>
<td>AA642</td>
<td>*Rooter Kit</td>
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*B Root stimulator must be protected from freezing. Available between April and October only.
Camellia Culture: Soil

• Roots need both water and air
  – Camellias prefer well drained soil

• Small substrate particles increase water holding capacity
  – Peat moss and clay

• Large substrate particles increase air porosity
  – Perlite and sand
Large particles

Small particles
Large particles

Good aeration
Low water holding capacity

Small particles

Poor aeration
High water holding capacity
Blend of Small and Large particles
Blend of Small and Large particles

Good aeration
Moderate water holding capacity
Soil amendments improve drainage

- Heavy clay soils will need amended
  - Sand
  - Perlite $$
  - Gravel
Soil pH

- Slightly acidic: 5.5 – 6.5
- pH controls nutrient availability and high pH can cause deficiencies
- Conduct soil tests to determine if you have the appropriate pH
Camellia Culture: Planting in the North

• South Facing???  No

• Evergreen camellias transpire at higher rates on south facing sun exposed slopes

• Root systems cannot supply enough water during freezing temperatures and plants desiccate and die
Ideal Planting Area/Time

• North side of structure or hedge with protection from drying winds

• Ideal time of year is late winter/early spring to give the plant a growing season for establishment
Size Matters

• At Longwood, we never plant anything that is less than 2-3’ in height

• Smaller plants are more susceptible to winter death
Camellia Development at Longwood
Emasculation
Emasculation

- To remove the male parts of the flower to prevent self pollination during cross pollination.
Camellia Breeding - Tag Your Flower

Maternal or Seed Parent

×

Paternal or Pollen Parent

+ Date

Tag: MMACK1CL X Cally 0837
Seed Viability Test

C. Azalea hybrid seed
Seed Viability Test
Seed Viability Test

Embryo Rescue
Embryo Rescue

- Takes place in sterile tissue culture
- Provides optimal environment
  - Light
  - Water
  - Fertilizer
  - Sugar
  - Insect free
  - Disease free
Floating Seed
Somatic Embryogenesis

- Induced embryo formation from vegetative tissue
Current and Future Work

- Continue to refine somatic embryogenesis process
- Determine effects of genetic variation
- Develop broader range of available camellias for zone 6 or maybe lower
Acknowledgments

• Dr. Edwin Leinbach

• Louis Kasprzyk

• And many others
Thank You!
Questions or Comments

LONGWOOD GARDENS