The Art of Growing Dogwoods in Containers

Mark Halcomb, UT
Dr. Amy Fulcher, UT
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Container grown dogwoods

- Dogwoods can be successfully grown in containers – with attention to detail
  - All of you have had success
Container grown dogwoods

- Dogwoods can be successfully grown in containers – with attention to detail
  - All of you have had success
  - Problems that seem to continually arise
    - Fertilization issues
    - Over watering
    - Poor drainage
    - Avoiding roots
Address problems early

- Problems that are identified early in the growing season, may be remedied

- Problems that are allowed to get serious, is seldom corrected
Dogwood nutrition

- Fertility/Nutrition
  - Optimal pH 5.0 – 6.5
  - Optimal EC 0.5 - 0.75 mmhos
  - Recommend ½x rate CRF at potting
    - ½ of what? ½ of low rate
    - i.e. 19-5-9 Osmocote Pro (12-14 mo)
      - 1x rate = 11-14 lbs / yd
      - (1/2 rate) = 5.5 lbs / yd
  - Recommend ½x rate topdress in May
Dogwood nutrition

- **Fertility/Nutrition**
  - Winter potting & placed in overwintering
    - Can get release due to warm temperatures
    - Important to keep substrate moist otherwise fertilizer salt will burn root tips
  - Winter potting & placed outdoors
    - Can get root damage from extreme temperatures
Nutrient availability

Macro elements

Minor elements
Dogwood nutrition

- Fertility/Nutrition
  - Recommend $\frac{1}{2}x$ rate topdressing in May
  - What about a 2 year production cycle
    - In spring of 2\textsuperscript{nd} year top dress with a 1x low rate CRF with minors
    - i.e. Micromax provides $\sim$ 18 months
Container grown dogwoods

- **Fertility/Nutrition**
  - **Micromax**
    - 6.0 % Calcium (Ca)
    - 3.0 % Water Soluble Magnesium (Mg)
    - 12.0 % Combined Sulfur (S)
    - 0.10 % Boron (B)
    - 1.0 % Water Soluble Copper (Cu)
    - 17.0 % Iron (Fe) -- 13.60% Water Soluble Iron
    - 2.5 % Water Soluble Manganese (Mn)
    - 0.05 % Molybdenum (Mo)
    - 1.0 % Water Soluble Zinc (Zn)

59.75 %
Container grown dogwoods

- Lime or dolomitic lime??
  - Not recommended unless irrigation water tests indicates low amounts

- Test irrigation water annually
  - Jan/Feb and Jul/Aug are 2 best times
Dogwood root system

- Roots
  - Root tips take up nutrients
  - Damage to root tips – little to no nutrient uptake
  - May not be visible or detected on foliage if roots are not checked
  - Symptoms – yellowing, chlorosis, necrosis, poor growth
Container substrate

- Substrate
  - Media management with all plants
    - piles, pH, dry areas
    - pH – too acidic, seldom too alkaline (high pH)
    - Dry areas – hydrophobic
Improper handling of bark piles

- If stacked > 8 feet or compacted then an accumulation of alcohols or acetic acid (lower pH).
- If dry areas in bark piles exist (< 34% moisture by wt) then bark is extremely difficult to rewet.
- Bark may be anaerobic (pH < 3.5 & EC > 2.5 mmhos – this can kill bare root plants.
- High fungal populations, mycelium may make wetting difficult.
Container substrate

- Substrates
  - 100% pine bark
  - 10–20% of bark extender (organic)
    - Cotton gin waste
    - Mushroom compost
    - Fluff
    - Peat moss
  - Must manage irrigation to match substrate!
Potting depth - dogwoods

Potting depth is critical with dogwoods
Container grown dogwoods

- Lowest water content
- Highest air level
- Highest water content
- Lowest air level
Sap flow system - measures a heat index and correlates heat and stem diameter to amount of water moving up the xylem tissue in the plant.
Potted at correct depth

Substrate surface 6-inches above root
Root flare
2 – inches

Root flare
4 – inches

Cherokee Princess Dogwood
Stepping up plants?

Always water before potting
2 weeks later -
Daily irrigation
> ¾” rain

Dry pockets
Stepping up - Container size

7-gallon

15-gallon

Backfill
<table>
<thead>
<tr>
<th>Container size</th>
<th>Displacing</th>
<th>Adding</th>
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<tbody>
<tr>
<td>3 gal</td>
<td>20 %</td>
<td>80 %</td>
</tr>
<tr>
<td>7 gal</td>
<td>44 %</td>
<td>56 %</td>
</tr>
<tr>
<td>10 gal</td>
<td>70 %</td>
<td>30 %</td>
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<tr>
<td>15 gal</td>
<td>58 %</td>
<td>42 %</td>
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Stepping up - Container size

- 3 gal = 674 cu in.
- 7 gal = 1342 cu in.
- 10 gal = 2373 cu in.
- 15 gal = 3396 cu in.
- 25 gal = 5811 cu in.
Container Dogwood - Moisture
My Dogwood Problems!!
Things Improved-Systems Approach!
Whole Systems Approach

- Temperature
- Wind
- Water
- Years in Production
- Substrate
- Fertilizer
- Light
- Humidity
- Container Size and Shape
- Plant Size (leaf area)
Flowering Dogwood

- Natural environment
  - Cool forest understory, edge
  - Shady
  - Deep soil
  - Rich soil-evenly moist
  - Constant, low nutrient
Container Nursery Conditions

The Opposite!!

- High root and foliage temps
- No shade (usually)
- Substrates/Moisture
  - Extremes – wet or dry
- Irrigation - a lot of water, infrequently?
- Container - shallow
Container Nursery Conditions

The Opposite!!

- All of these impact plant water use (and irrigation)
Container Nursery Conditions

- Hot – full sun
  - Leaves
    - 5.4 °F higher than air
  - Roots
    - 120 + °F

Container Nursery Conditions

- Hot – full sun
  - Leaves
    - 5.4 °F higher than air
  - Roots
    - 120 + °F
- Greater heat ->
  greater water loss evapotranspiration

Container Nursery Conditions

- High root temps can also damage roots.
Container Nursery Conditions: Substrates

- Substrates/Moisture
  - Fine texture
  - Coarse texture
Container Nursery Conditions: Substrates

- Forest Floor
- Barky Beaver Pro. Grow Mix
- Pine Bark Mulch
- Metro Mix 280
Container Nursery Conditions: Substrates

- Substrates/Moisture
  - May be fine and wet or coarse and dry quickly
Container Nursery Conditions: Substrates

- One substrate may be both!
  - Fine/wet at the bottom
  - Coarse/dry at the top
Container Nursery Conditions: Substrates

- Both
  - Heavy (wet) at the bottom coarse (dry) at the top
  - Not homogeneous
  - Strata/layers
Container Nursery Conditions: Substrates

Wet at the bottom, dry at the top

dogwood

birch

Wet at the bottom, dry at the top
Container Nursery Conditions: Substrates

Roots on top - dogwood, roots on bottom - river birch
Dogwood and birch belong in different zones
Substrate Conditions Affecting Moisture Content

- Hydrophobic
- Channeling
Container Nursery Conditions: Irrigation

Overhead

Sub-irrigation
Container Nursery Conditions: Irrigation

- Root Growth - Sub-irrigation
  - Oxygen balance moisture
  - Roots choose to live where they like it
Container Nursery Conditions: Irrigation

- Root Growth - Sub-irrigation
  - Oxygen balance moisture
  - Roots choose to live where they like it
Q. How Much Water Do Dogwoods Need?
A. How Much Water Do Dogwoods Use?
How Much Water Do Dogwoods Use?

- Planted 30”+ bareroot liners into #7 previous year
- Barky Beaver Professional Grow Mix
- August
How Much Water Do Dogwoods Use?

- Make Your Best Estimate!
How Much Water Do Dogwoods Use?

- Planted ¼” cal., Anderson bands into #1, current year
- MM 280
- August
How Much Water Do Dogwoods Use?

- Your best estimate
How Much Water Do Dogwoods Use?

7 gallon pot-in-pot plants

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<th>Transpiration</th>
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<td>24</td>
<td>2.1 lb./33.6 oz.</td>
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<tr>
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<td>24</td>
<td>1.3 lb./20.8 oz.</td>
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# How Much Water Do Dogwoods Use?

*C. florida* ‘Cherokee Princess’ uses 1.6 more water “every day”!

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1 gallon plants
How Much Water Do Dogwoods Use?

1.2 more water “every day” – cumulative!

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How Does Weather Affect Water Use?

- What drives evapotranspiration (water loss)
  - Light (Solar Energy)
  - Wind
  - Temp
  - Vapor pressure deficit (humidity)
How Does Weather Affect Water Use?

- What drives evapotranspiration (water loss)
  - Light (Solar Energy)
How Does Weather Affect Water Use?

- Ever have a plant wilt overnight???
Plant Growth and Development

- Bareroot vs fully foliated
Plant Growth and Development

- Small versus large
Small Plant Vs. Large Plant—Why?

C. florida

C. kousa
Q. When Do Dogwoods Need Watered?
A. To Maintain Moderate Moisture
A. To Maintain Moderate Moisture

- Small pulses of water??
What Worked?

- Lots of things have worked!
- Lots of things haven’t work!
What Worked?

- Very coarse substrate didn’t work for me.
  - Extremes in moisture?
- Peat-based substrate did.
  - Moderated moisture extremes?
What Worked?

- “Overhead” irrigation worked well on well-rooted container dogwoods, not smaller ones
  - Took up a lot of water, didn’t stay wet for long.
- Sub-irrigation worked well
  - Allowed the roots to grow at their optimal water oxygen conditions
  - Never a moisture deficit
  - Never saturated
  - Consistent, low nutrients
What Worked?

- Standard, not squat pots.
Container grown dogwoods

Start with a healthy root system
Moisture Concerns Over the Winter, regardless of the method

- Roots & substrate must not dry out
- Bark can dry & become hydrophobic
  - Hard to wet
  - Acetic acid can form
  - Roots can die
  - No symptoms until after spring flush
How to Overwinter Dogwoods

- Poly house
- Outside is a gamble, $21^\circ$ can kill roots
- A trench ??
- PNP ??
- Stacking will conserve space but may interfere with getting the substrate irrigated over the winter
Sawdust can keep roots too wet and perhaps insufficiently protected.
A Poly house is the safest method to protect, with weekly inspections for moisture.
Overwintering House

- A single layer of white poly
- Have a plan to provide supplemental heat
- Be prepared to irrigate every few weeks
- How long should the water run?
  - 1 hr/ 2 hrs/ until water runs out bottom/ til the cows come home/
- Enough to saturate the rootball
Substrate can dry out too much

- Root damage or death
- Become difficult to wet
- Dry spots form within the root ball
- Acetic acid form
Result could be:

- No additional growth after the initial flush
- Many growers might suspect the fertilizer is gone without knowing
- Monitoring leachate would have found the acid pH in April (soluble salts)
- Rootball inspection would have found the dry spots in April or earlier.
Check containers for moisture weekly during winter regardless of method

- This is harder for a manager of a field operation to understand and do.
- Can not do from pickup truck
- The difference between thinking the containers are moist enough and knowing they are moist enough is called checking!!
Checking containers for moisture weekly during winter would find/avoid:

- Avoid substrate becoming hydrophobic
- Avoid dry spots
- Avoid acetic acid formation
- Gain normal plant growth
- Success: A quality, salable crop.
How do you check for moisture in substrate?

- Pick them up, by weight?
- Feel for moisture on the media surface?
- A moisture meter?
- Stick your finger into the media 10”
- Remove the container, look & feel
- Check several
- Around edge, in middle, near door
What do you do before a hard freeze?

- Drain the water lines?
- Not just yet  !!!!
- Irrigate the container crop first
- A moist root system is less likely to be damaged by the cold temps
Ask

- Have all of your container dogwood crops been salable? For most part?
- Any idea what was done differently?
- Did you have a grower in charge?
- Who is in charge?
- Who checks?
- Who uses the Myron L meter?
Take charge of the dogwood crop

- Delegate and then Inspect
- Determine how much water is applied in 15 min/ 30 min/ 60 min, etc of overhead
- Use rain gauges. Learn wind patterns.
- Check for uniformity of overhead irrigation
- Determine how much water is applied in 1, 2, 3, and 5 minutes if spray stakes
- Check for uniformity of the spray patterns
Telling me you irrigate for an hour is worthless information.

We want to know tenths or quarter inches
Do not become a Copy-cat

- If someone is successful with an hour of irrigation 3 times a day
- Do not try it
- Irrigation head size varies,
- Water pressure is not same at all nurseries
Do not become a Copy-cat

- If someone in Fla uses Epsom Salts (Mg) and has dark green foliage
- Do not try it without asking a Nsy Spec
- No reason to assume it will work for you
- Their water may lack Mg and yours may have plenty.
- MicroMax contains enough Mg
Become more responsible for your actions

- If you call an expert in July for issues that began in May . . . . .
- Even though you are sinking and grasping to save the crop avoid knee jerk reactions.
Please

- I need the Evaluation forms filled out
- Thank you !!