The Art of Growing Dogwoods in Containers

Mark Halcomb, UT
Dr. Amy Fulcher, UT
Dr. Donna Fare, USDA

UT Extension

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

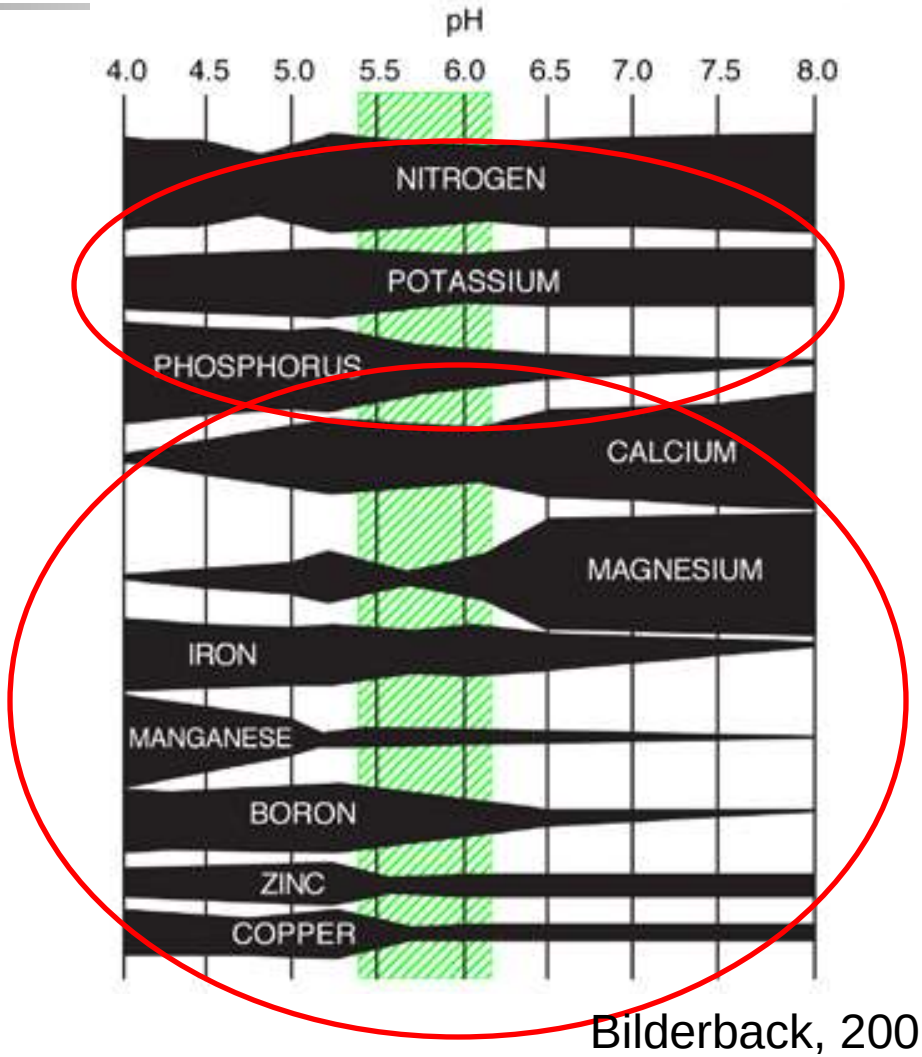
Dogwood nutrition

- 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



Bilderback, 2001

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Dogwood nutrition

- Fertility/Nutrition
  - Recommend ½x rate topdress in May
  - What about a 2 year production cycle
    - In spring of 2nd year top dress with a 1x low rate CRF with minors
    - i.e. Micromax provides ~ 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

Handling bark piles

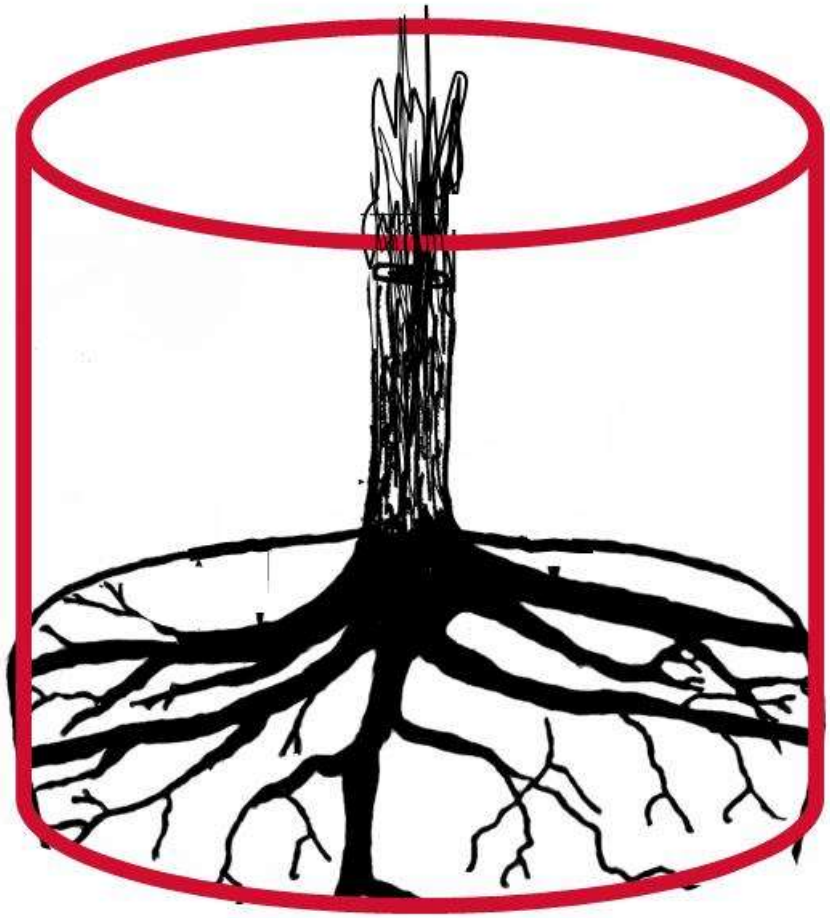
- Improper handling of bark piles
  - If stacked > 8 feet or compacted then an accumulation of alcohols or acetic acid (lower pH).
  - If dry areas in bark piles exist (< 34% moisture by wt) then bark is extremely difficult to rewet.
  - Bark may be anaerobic (pH < 3.5 & EC > 2.5 mmhos – this can kill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

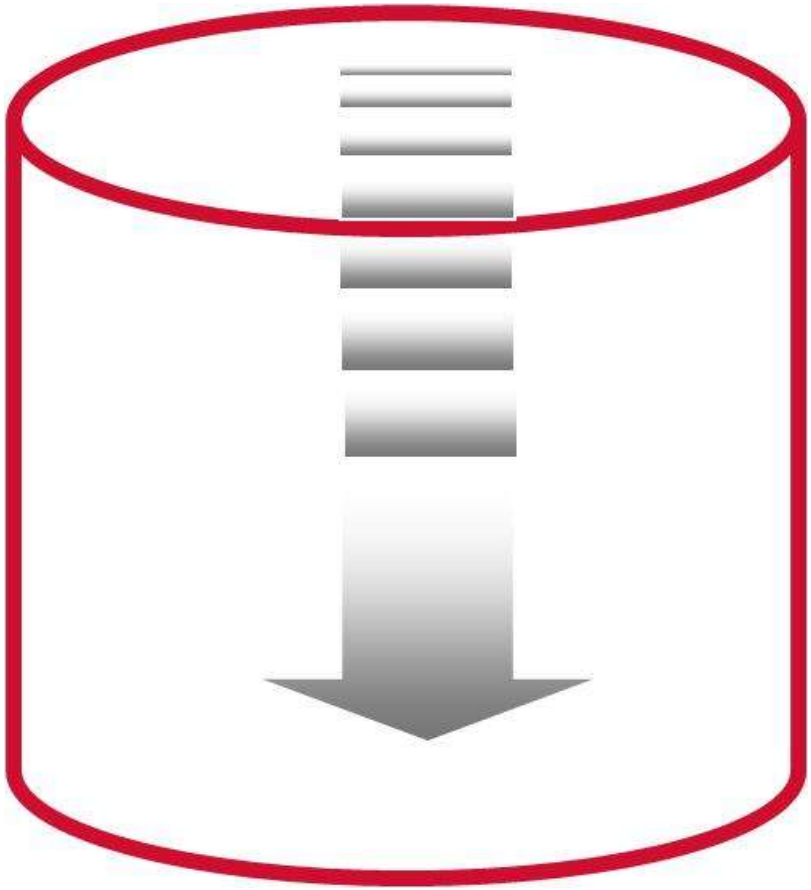
Container substrate

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

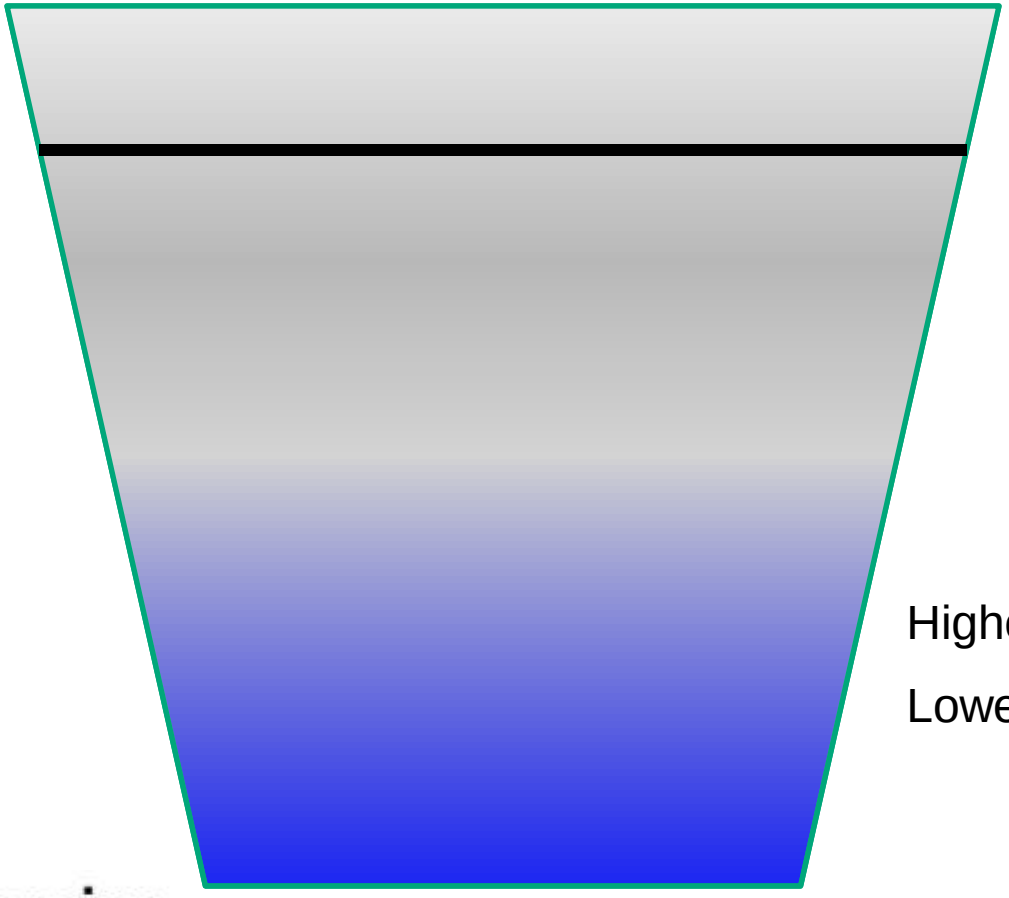
Potting depth - dogwoods

Potting depth is critical with dogwoods





Container grown dogwoods



Lowest water content

Highest air level

Highest water content

Lowest air level

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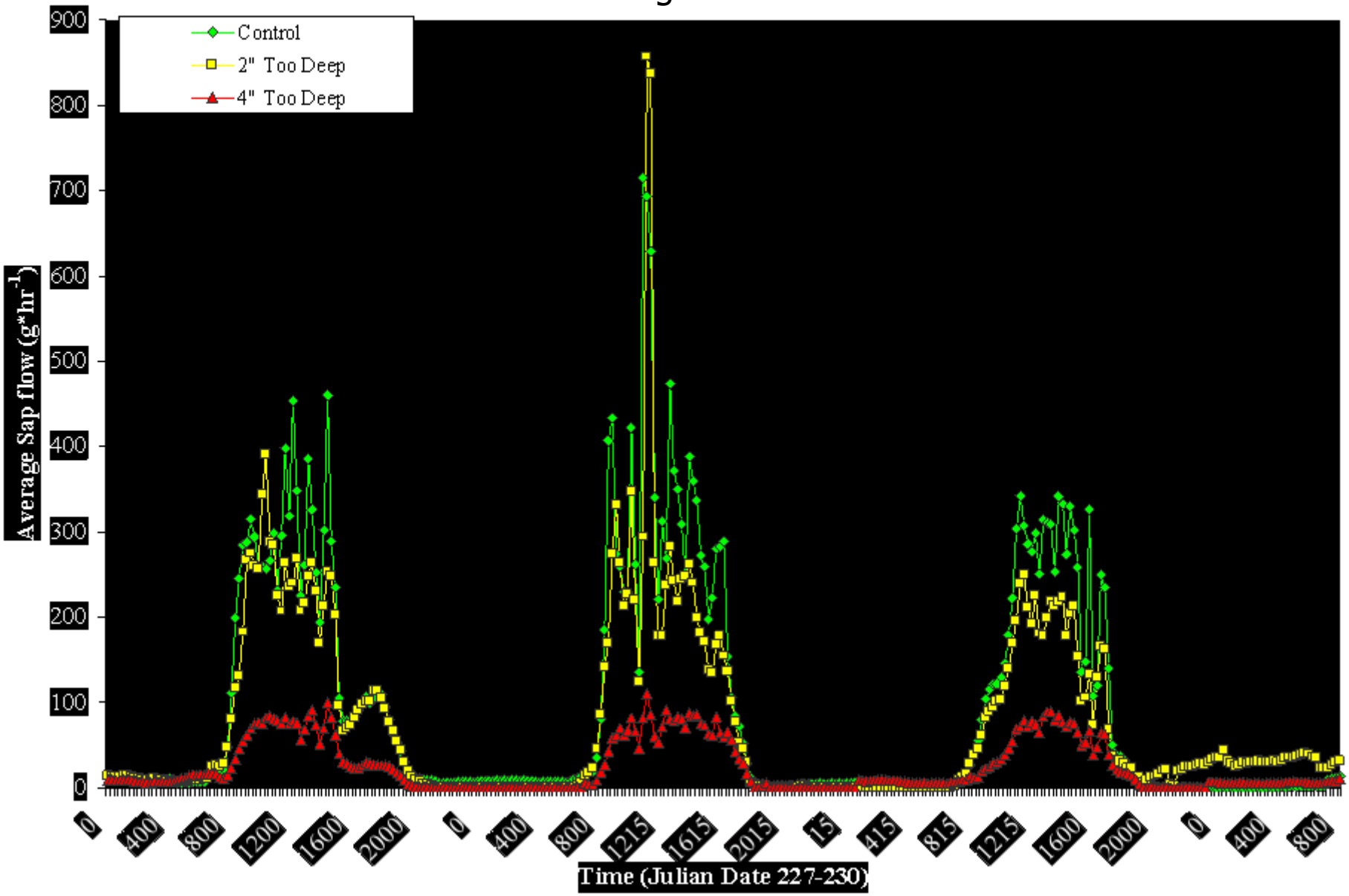
Sap flow system - measures a heat index and correlates heat and stem diameter to amount of water moving up the xylem tissue in the plant.

Cherokee Princess Dogwood, 2005

15-18 Aug 2005



Potted at correct depth

Substrate surface 6-inches above root

Root flare
2 – inches

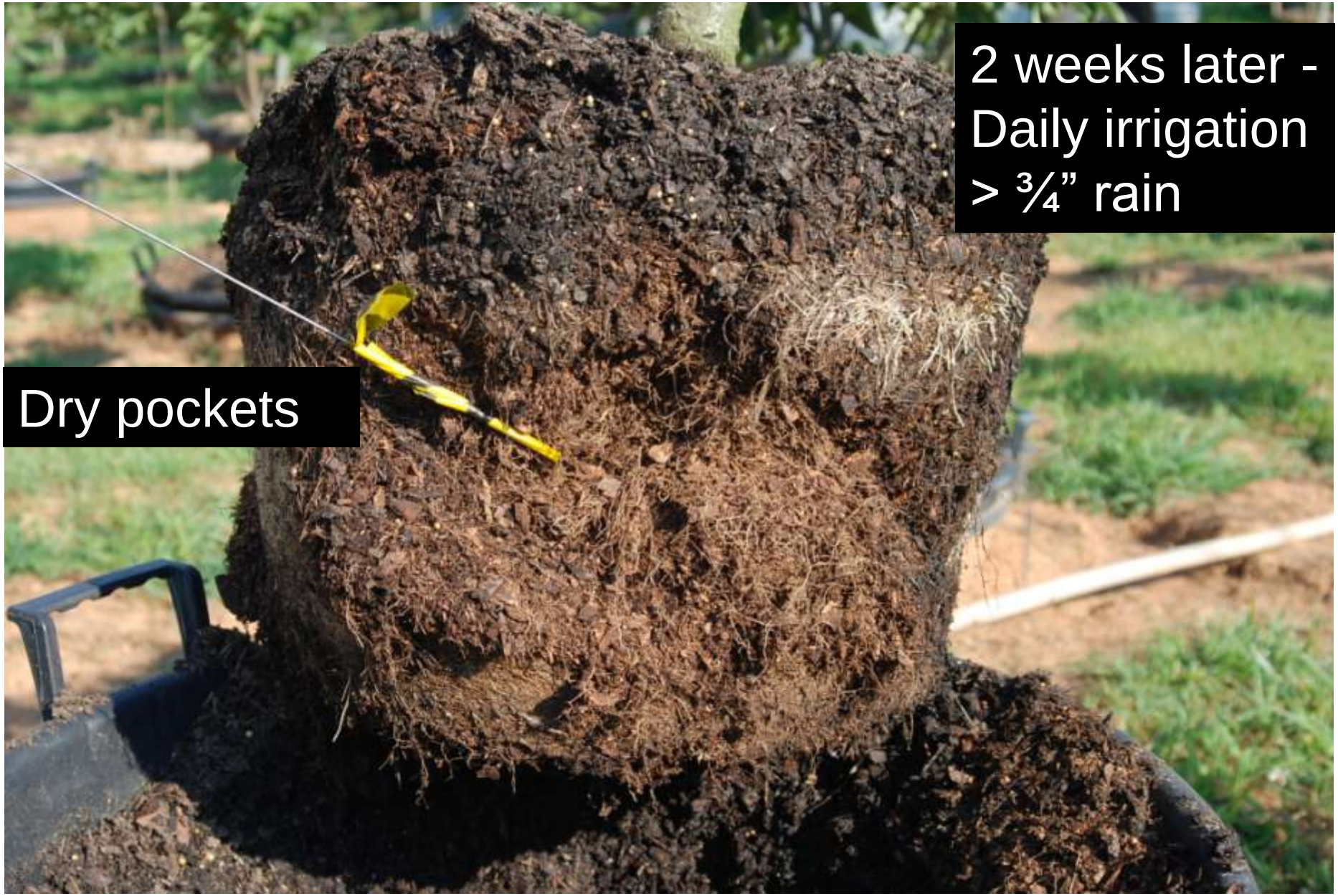
Root flare
4 – inches

Cherokee Princess Dogwood

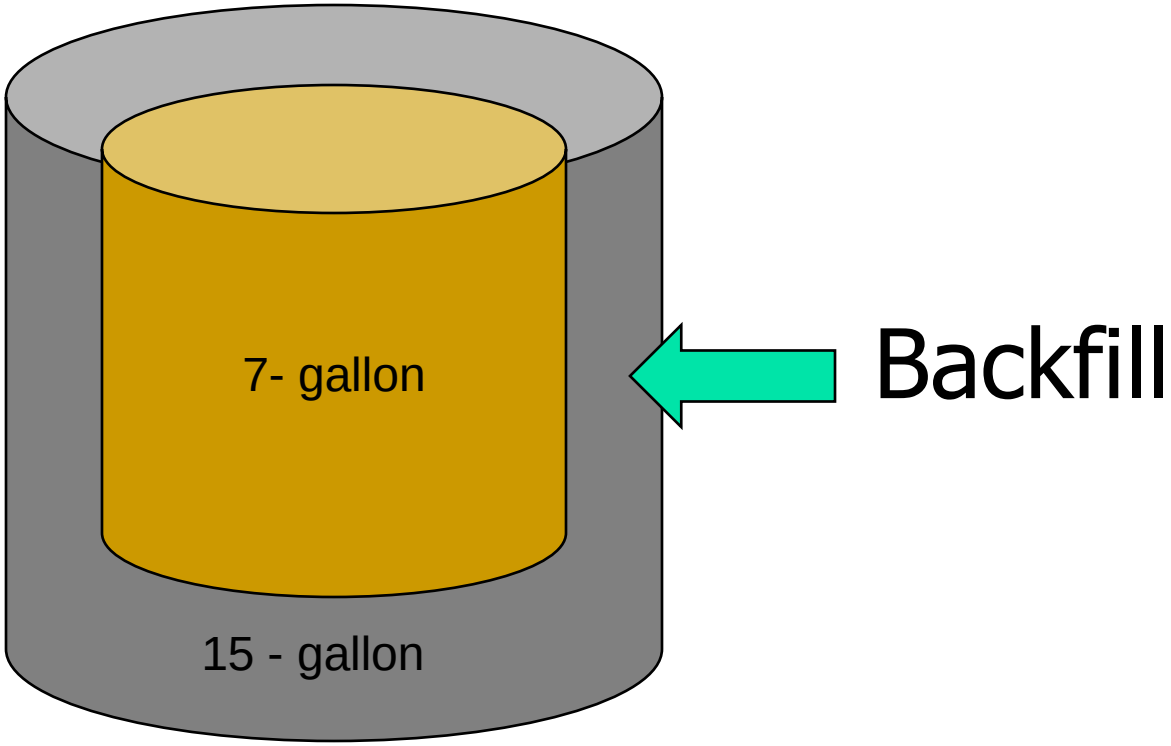
Stepping up plants ?

Always water before potting


July 2010


2 weeks later -
Daily irrigation
> ¾” rain
Dry pockets

Stepping up - Container size



Stepping up - Container size

			Displacing	Adding
3 gal	→	15 gal	= 20 %	80 %
7 gal	→	15 gal	= 44 %	56 %
10 gal	→	15 gal	= 70 %	30 %
15 gal	→	25 gal	= 58 %	42 %

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

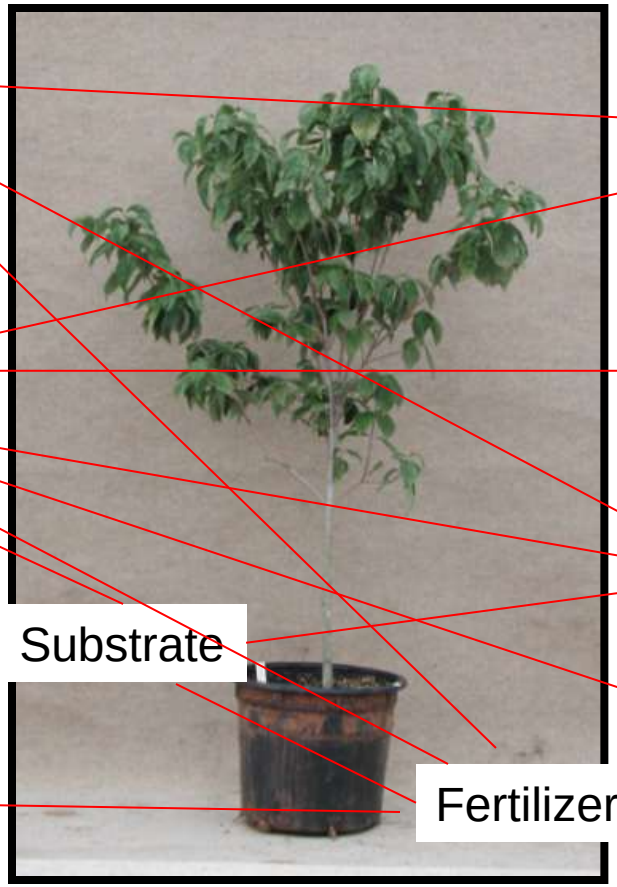


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Photo credit: Donna Fare

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

JOHN W. MARKHAM III. COLOR AND SHADING OF CONTAINERS AFFECTS ROOT-ZONE TEMPERATURES AND GROWTH OF NURSERY PLANTS. MS Thesis. Kansas State University. http://krex.k-state.edu/dspace/bitstream/2097/3298/1/JohnMarkham2010.pdf

Container Nursery Conditions

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

JOHN W. MARKHAM III. COLOR AND SHADING OF CONTAINERS AFFECTS ROOT-ZONE TEMPERATURES AND GROWTH OF NURSERY PLANTS. MS Thesis. Kansas State University. http://krex.k-state.edu/dspace/bitstream/2097/3298/1/JohnMarkham2010.pdf

Container Nursery Conditions

- High root temps can also damage roots.

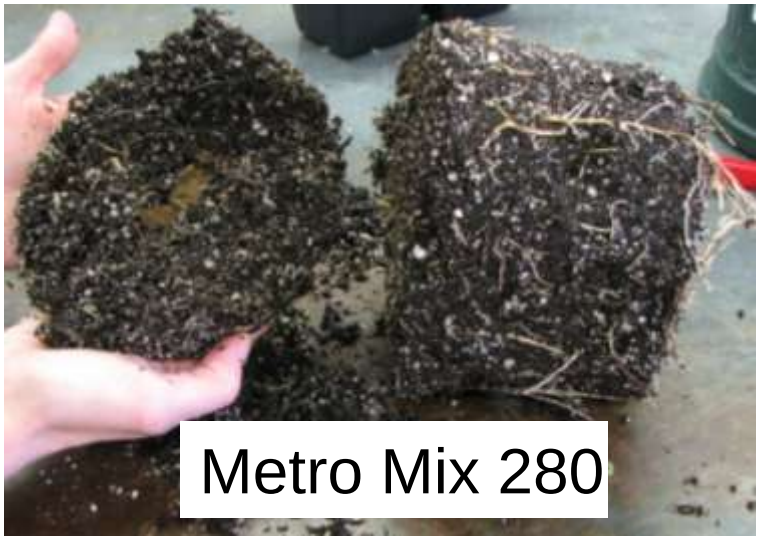
Container Nursery Conditions: Substrates

- Substrates/Moisture
  - Fine texture

    or
  - Coarse texture

Container Nursery Conditions: Substrates

Barky Beaver Pro. Grow Mix



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

Container Nursery Conditions: Substrates

Roots on top - dogwood, roots on bottom - river birch

Container Nursery Conditions: Substrates

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
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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

Taxa	Time since last irrigation (hours)	Transpiration
C. florida 'Cherokee Princess'	24	2.1 lb./33.6 oz.
C. kousa 'National'	24	1.3 lb./20.8 oz.
C. x Constellation®	24	1.4 lb./22.4 oz.

How Much Water Do Dogwoods Use?

C. florida 'Cherokee Princess' uses 1.6 more water "every day"!

Taxa	Time since last irrigation (hours)	Transpiration
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How Much Water Do Dogwoods Use?

1 gallon plants

Taxa	Time since last irrigation (hours)	Transpiration
C. florida	24	0.6 lb./9.6 oz
C. kousa	24	0.5 lb./8.0 oz

How Much Water Do Dogwoods Use?

1.2 more water “every day” – cumulative!

Taxa	Time since last irrigation (hours)	Transpiration
C. florida	24	0.6 lb./9.6 oz
C. kousa	24	0.5 lb./8.0 oz

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?

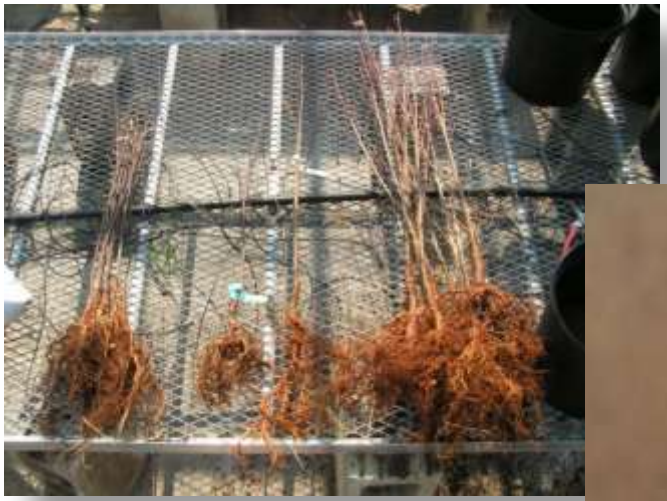
- What drives evapotranspiration (water loss)
  - Light (Solar Energy)

How Does Weather Affect Water Use?

- Ever have a plant wilt overnight???

Plant Growth and Development

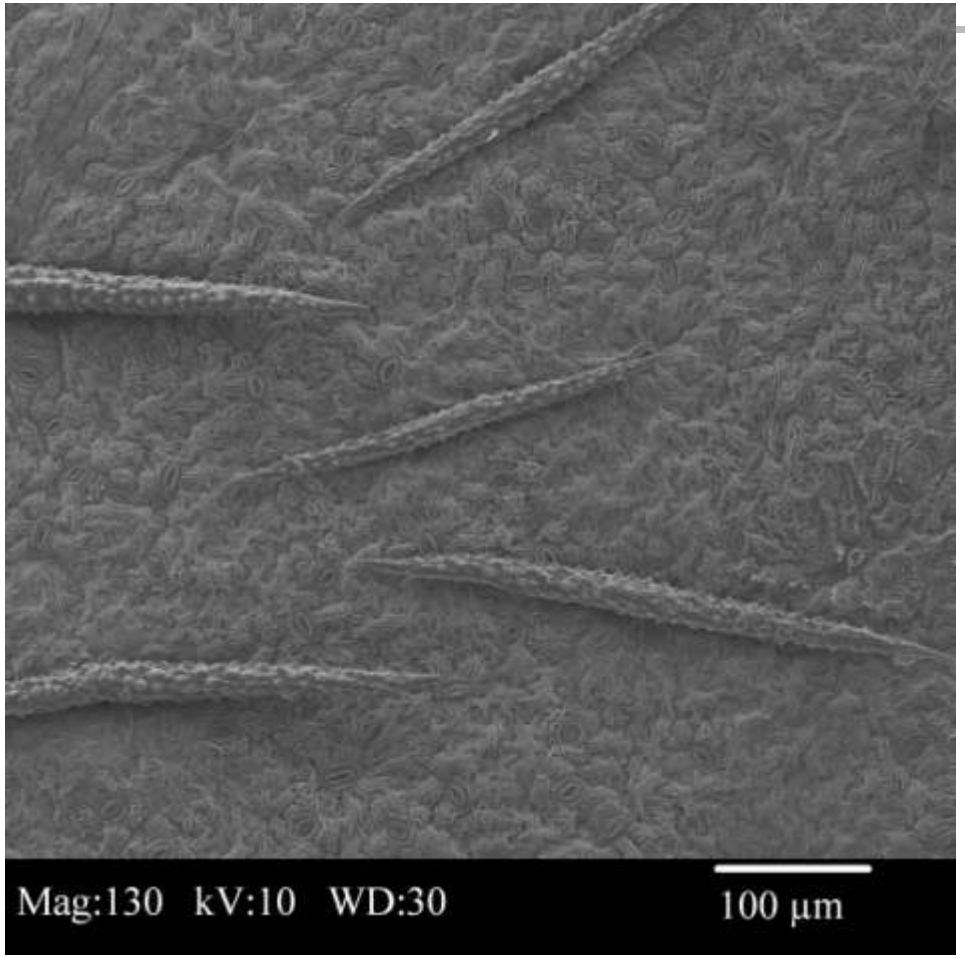
- Bareroot vs fully foliated



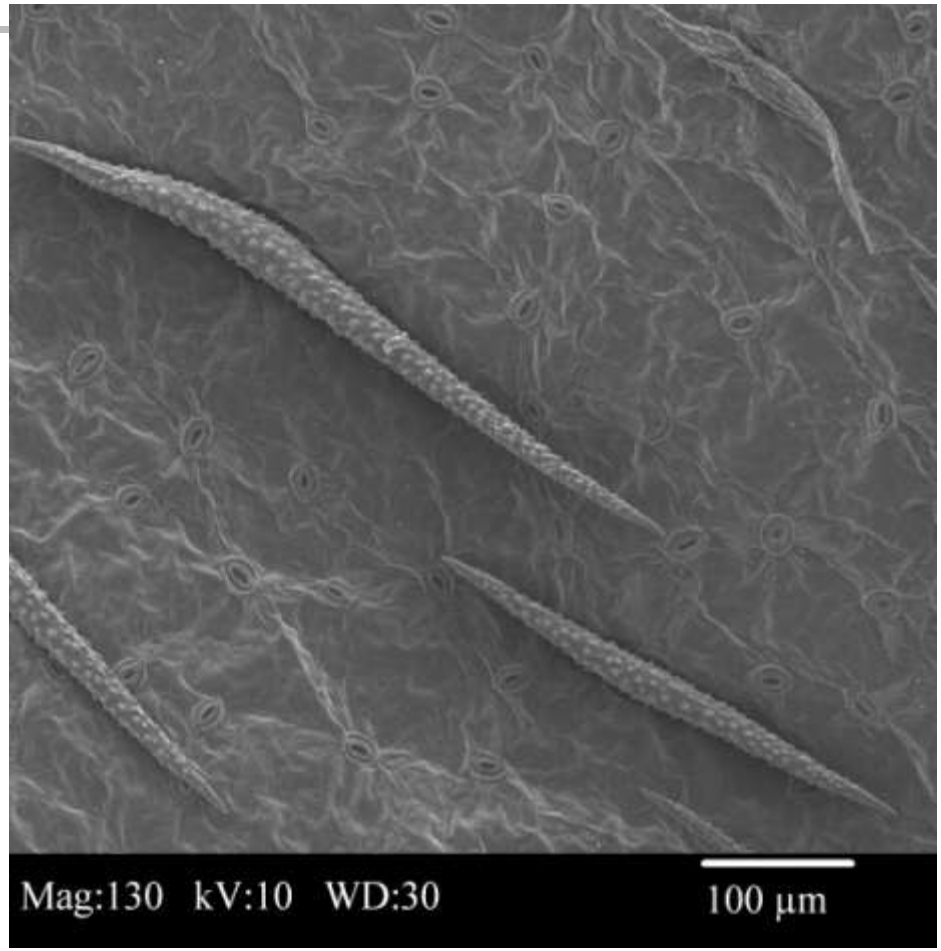
Plant Growth and Development

- 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^{o} 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 !!