Tobacco Float Bed Management

Tobacco Transplant Production Meeting
January 23, 2013 – HRREC, Springfield TN

Andy Bailey
Tobacco Extension Specialist
Univ. of KY / Univ. of TN

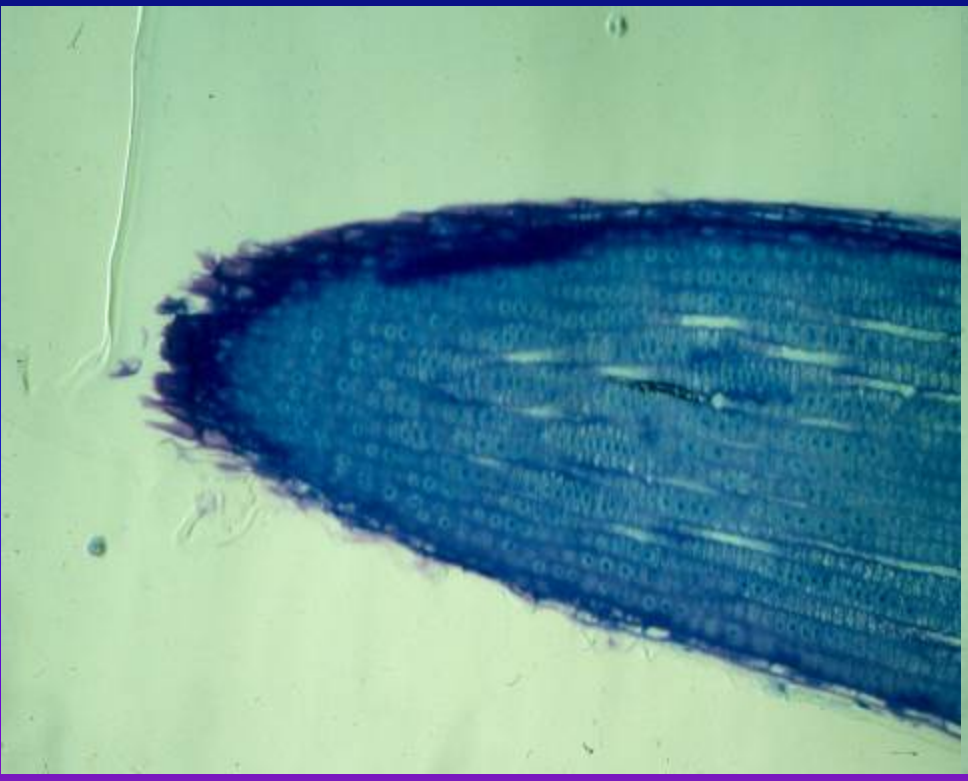
Float Bed Management - Topics

- Spiral rooting
- Temperature management
- Float bed fertility and clipping

Spiral Root or Negative Geotropism

Roots grow on top of tray
Approx. 1/3 will make usable transplants
2/3 will not be usable

What happens to the root cap of a seed that has enough moisture to germinate, but not enough to break out of the pellet?



Normal root cap

Damage to root cap, loss of direction

Factors that Influence Spiral Root

- Media
  - Varies by brand
  - May change from year to year
- Pellet
  - Unpredictable
- Weather
  - Inconsistent
  - Moderately predictable
- Variety:
  - Worst Burley = KY 14 x L8
  - Worst Dark = NL Madole

Reducing Spiral Root

- Hard seed coat

- Changing microenvironment around seed
  - Increase moisture around seed to melt coat
  - Lightly tapping trays, moving trays
  - Agrimate – clay particle covering over seed
  - Reemay?

Effect of Tray Type and Tray Covering on Wicking Speed, Germination, and Spiral Rooting

2009 – HRREC, Springfield, TN

- KT 206LC burley, 288-cell trays, Carolina Choice media
- Tray comparison:
  - Standard Speedling tray: 13.5 in. x 26.25 in. x **2.5 in. deep (■ hole)**
  - Beltwide "shallow" 1.8 low density tray: 13.5 in. x 26.25 in. x **2 in deep (● hole)**
- Tray covering:
  - Trays seeded and floated with no cover
  - Individual trays seeded, covered with Continental fabric, floated
- Tray types compared for speed of wicking
- Tray covering treatments compared for spiral rooting

Effect of Tray Type on Speed of Wicking

2009 – HRREC, Springfield, TN

Non-dibbled trays seeded and floated on a sunny day (March 18, 10% cloud cover)

Tray Type	Time Required for Complete Wicking (min.)	Dry Cells per 8 trays after 24 hours
Standard Speedling (2.5" deep)	241	9.5
Beltwide Shallow (2" deep)	54*	1*

Dibbled trays seeded and floated on a cloudy day (March 19, 80% cloud cover)

Tray Type	Time Required for Complete Wicking (min.)	Dry Cells per 8 trays after 24 hours
Standard Speedling (2.5" deep)	123	0
Beltwide Shallow (2" deep)	55*	0

Effect of Tray Type on Speed of Wicking

2010 – HRREC, Springfield, TN

Dibbled trays seeded and floated on a sunny day (March 18, 15% cloud cover)

Tray Type	Time Required for Complete Wicking (min.)	Dry Cells per 8 trays after 24 hours
Standard Speedling (2.5” deep)	90	0
Beltwide Shallow (2” deep)	42*	0

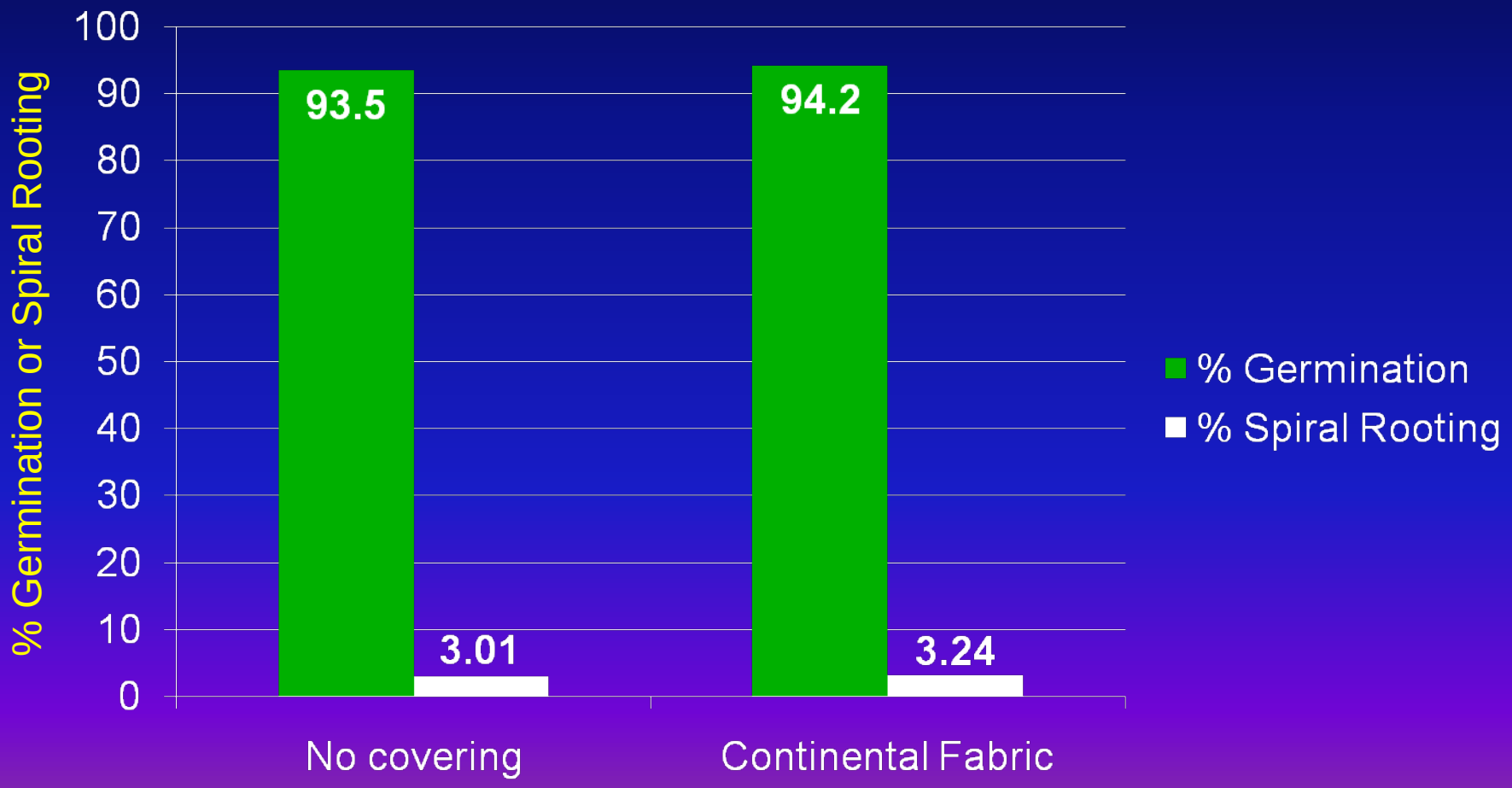
Dibbled trays seeded and floated on a cloudy day (March 25, rainy with 100% cloud cover)

Tray Type	Time Required for Complete Wicking (min.)	Dry Cells per 8 trays after 24 hours
Standard Speedling (2.5” deep)	145	0
Beltwide Shallow (2” deep)	50*	0

Effect of Fabric Tray Covering on Germination and Spiral Rooting

20 days after seeding/floating

2009 – HRREC, Springfield, TN



Effect of Fabric Tray Covering on Germination and Spiral Rooting

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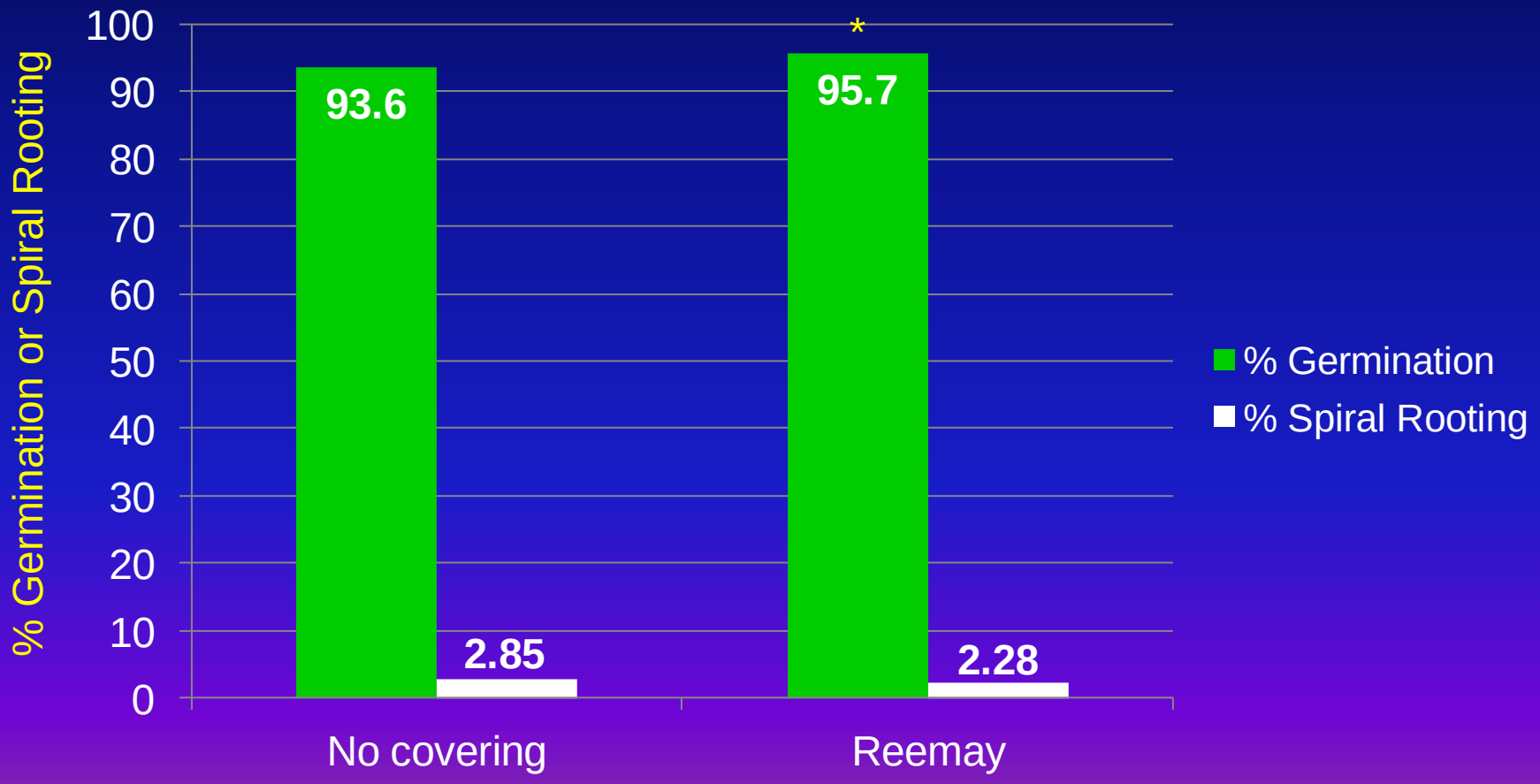


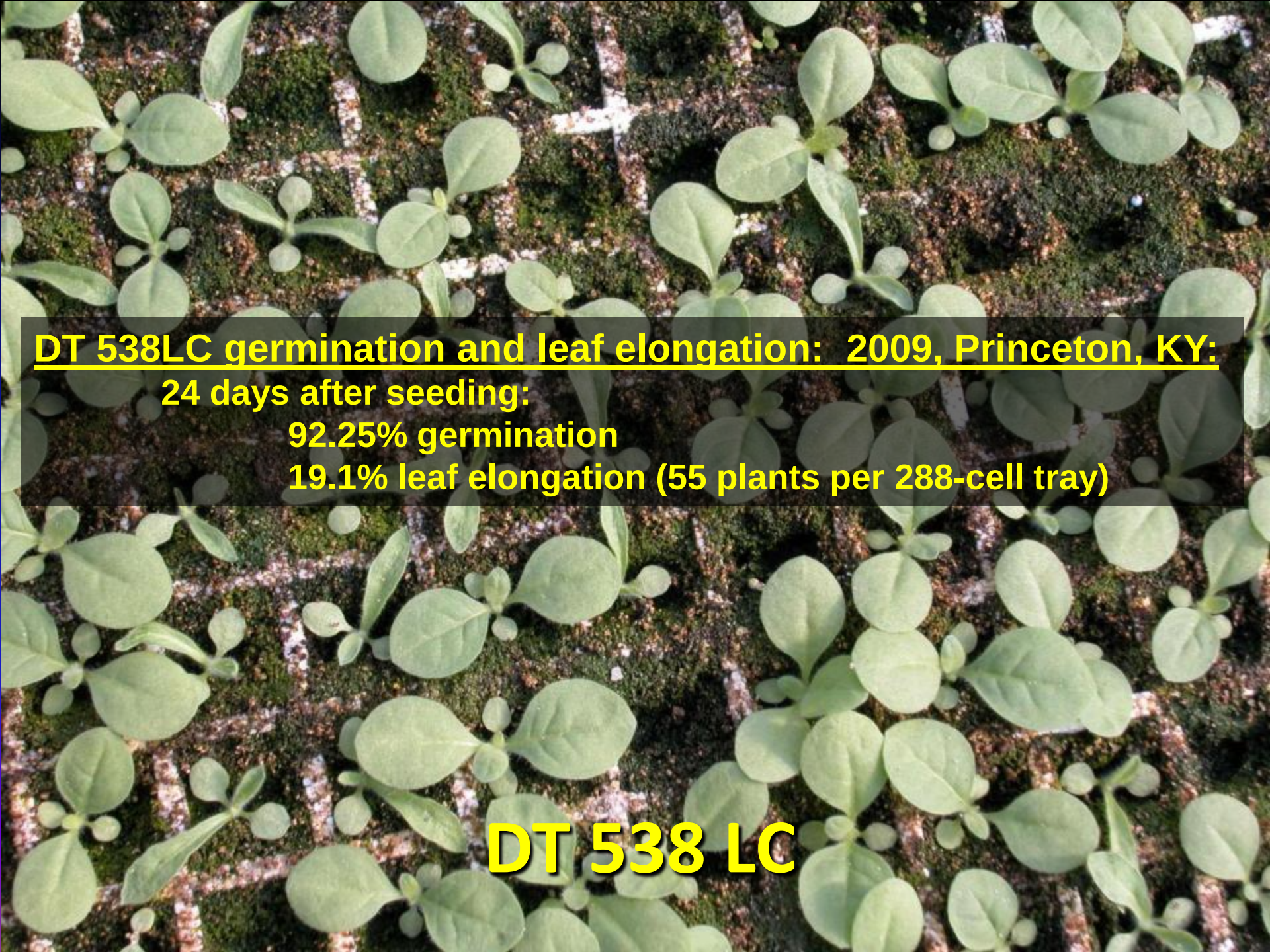
Effect of Tray Type and Tray Covering on Wicking Speed, Germination, and Spiral Rooting

2009 – HRREC, Springfield, TN

- Faster wicking and potentially fewer dry cells with shallow trays
- Slight increase in germination at 20 days with Reemay covering in 2010.
- No effect of tray type or covering on spiral rooting

Effect of Tray Type and Tray Covering on Wicking Speed, Germination, and Spiral Rooting

2009 – HRREC, Springfield, TN


DT 538LC germination and leaf elongation: 2009, Princeton, KY:
24 days after seeding:
92.25% germination
19.1% leaf elongation (55 plants per 288-cell tray)
DT 538 LC

Temperature Control

- Target temperature: 72 F (70 to 75 F)
- Acceptable range: 60 F to 90 F
- Cold Injury:
  - < 60 F for first 3 weeks
  - < 50 F after 4 weeks or 4-leaf stage
  - Quick drops in temperature (85 F to 55 F)
- Heat Injury:
  - > 95 F for several hours
  - Sporadic germination, uneven growth

Thermostats / Thermometers

- Shade top and sides
- Allow free air circulation
  - Aspirated chamber or enclosure
    - Small fan moves air by the thermostats
- Locate near plant level
- Mount to swing out of way of clipping system
- Max / Min thermometer
  - Daily maximum/mininum temperature
  - < $50
  - Records Max/Min for 6 days

Cold Injury

- Leaf constriction
- Can range from very mild to severe.
- Damage to terminal bud is key symptom of long-term damage.

Outdoor Float Beds

Cold Injury

- More likely to sustain cold injury, direct frost damage.
- Bud may be protected by outer leaves in large plants that have been clipped.
- Terramaster injury may increase cold injury symptoms.

Transplant Problems to Field Problems?

- Premature bloom
  - Low light and cool temps
  - More than 6 leaves
  - Dark tobacco more prone
  - 4 hrs of low light at night reduces early bloom
- Ground Suckers
  - Due to main bud damage
  - Chill injury
  - Float plants more prone ?

Vented Heaters

*Exhaust escape through stack to outside.

Unvented Heater Problems

Sulfur Dioxide Injury

- Suspended or portable

*Most likely to occur during prolonged cool, cloudy weather

Poor Wicking Media

- Trays with good media should wick within minutes after floating on a cloudy day, within an hour on sunny days.
- Make sure media is fresh (current year) when purchased.
- Tobacco media contains wicking agent to allow absorption
- Wicking agent can evaporate during long-term storage
  - Can be replaced by adding 1 oz of nonionic surfactant per bag and mixing thoroughly
  - Can add 1 to 2 qts water per bag and mix thoroughly
- Float a few trays before seeding to check wicking
- Can try pushing down trays/cells or misting overhead for minor wicking problems.

Heat Injury

- Temperatures > 95 F for several hours:

- Symptoms:
  - Sporadic germination
  - Sporadic growth rate
  - Water-soaked, translucent appearance
  - Increased soluble salts injury may accompany


Heat Injury

Fertilization in the float system

- Grade
  - 2:1:2 or 3:1:3, Low P
  - 20-10-20; 15-5-15
- N-Source
  - Avoid urea based
  - Look for nitrate
- Rate
  - 100 ppm N
  - 4.2 lbs 20-10-20/1000 gal
  - 5.6 lbs 15-5-15/1000 gal
- Monitoring
  - EC - Conductivity (DiST 4)
  - TDS – total dissolved solids (DiST 1, Sharp, Oakton, others)

Float System Fertility

- ACCURATELY CALCULATE WATER VOLUME
- ACCURATELY WEIGH FERTILIZER
- GET EVENLY DISTRIBUTED IN FLOAT BED
  - Branching PVC manifold system, sump pump

- Calculating water volume: simple formula assuming bed is full of trays

  # of Trays X depth of water in inches X 1.64

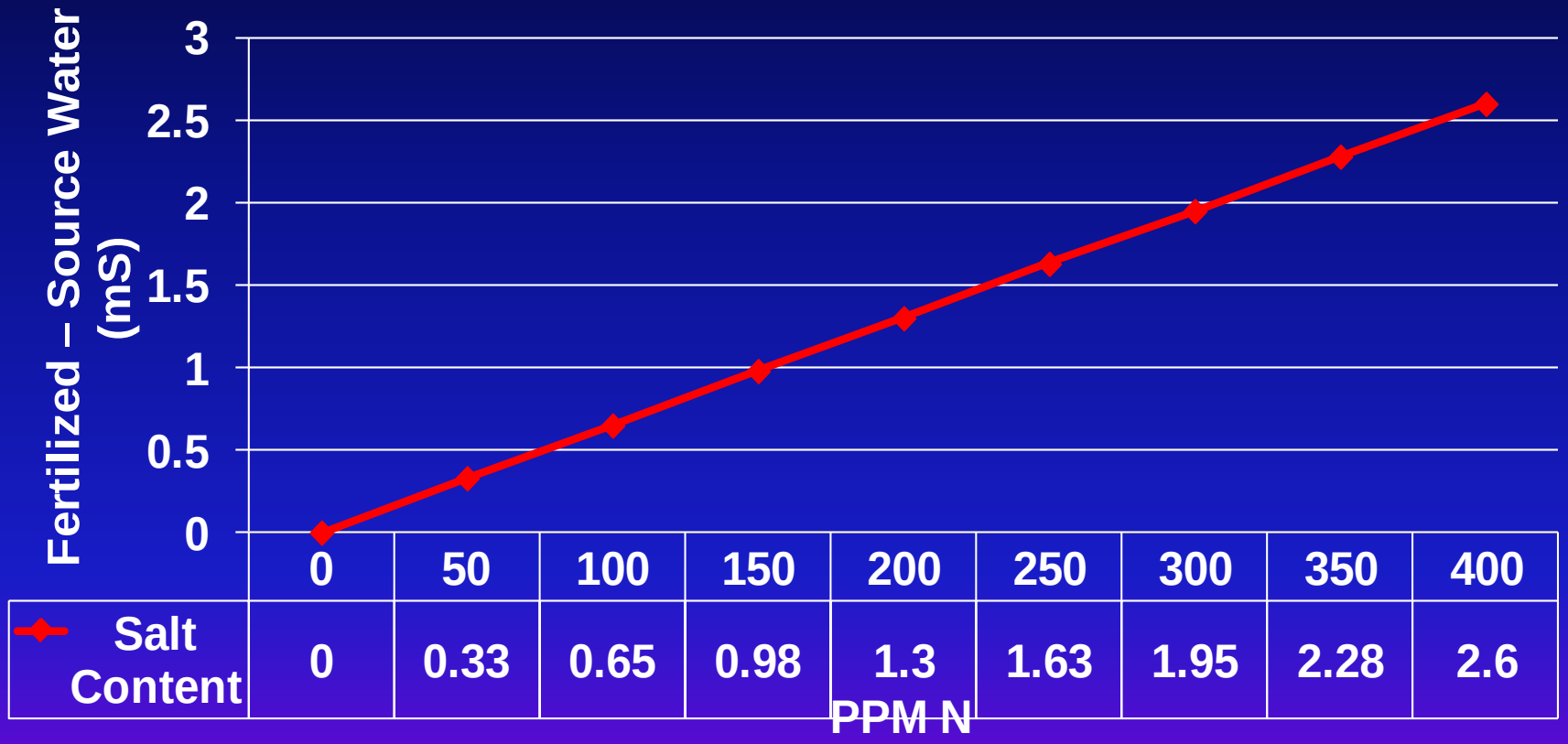
Float Bed Fertility

- Water volume
  - Tray # X depth in inches X 1.64
  - Example: 759 trays * 4.5 in. deep * 1.64 = 5600gal
- Fertilization
  - Nitrogen
    - Amount
      - 100 ppm ideal
      - 4.2 lbs 20-10-20/1000 gal X 5.6 (5600 gal) = 23.5 lbs
    - Calculations
      - 20-10-20 to get 100 ppm N
      - Water = 8.34 lb/gal
      - 8.34 X 1000 gal = 8340 lbs
      - 100 ppm = 1/10000 or .834 lb / 1000 gal
      - 20-10-20 is 20% N. .834/20% or .834/.2 = 4.17 or 4.2
      - If 15-5-15 - .834/.15 = 5.56 lbs.

CONDUCTIVITY READINGS

STANDARDS CHART FOR 20-10-20

1 mS (DiST 4 meters)



	0	50	100	150	200	250	300	350	400
Salt Content	0	0.33	0.65	0.98	1.3	1.63	1.95	2.28	2.6

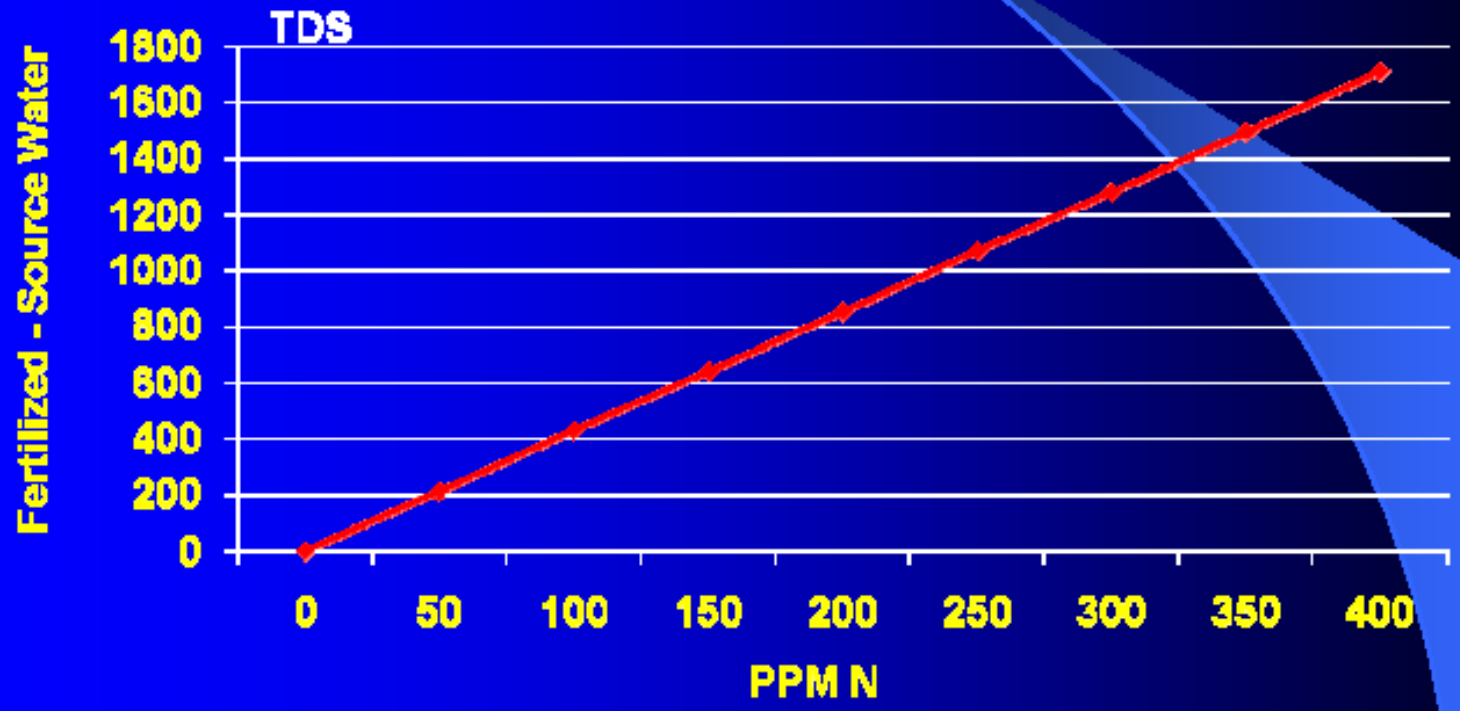
PPM N

1. TAKE WATER SOURCE READING (PLAIN WATER)
2. TAKE FERTILIZED WATER READING
3. SUBTRACT WATER SOURCE FROM FERTILIZED

EXAMPLE: IF PLAIN WATER = .4 & FERTILIZED WATER = 1.4, 1.4-.4=1.0, PPM N = 150

CONDUCTIVITY READINGS

STANDARDS CHART FOR 20-10-20
ppm TDS (DiST 1 meters)



1. TAKE WATER SOURCE READING (PLAIN WATER) 2. TAKE FERTILIZED WATER READING
3. SUBTRACT WATER SOURCE FROM FERTILIZED
EXAMPLE: IF PLAIN WATER = 400 & FERTILIZED WATER = 1041, 1041-400=641, PPM N = 150

Using EC and TDS meters

- Conductivity meters are a good tool for monitoring float beds, but not essential to production
- Use for monitoring N status as plants take up N, water evaporates, and N is diluted by adding water.
  - Helps us estimate how much fertilizer to “add back” after initial application
- Meters should not be used as a tool for making the initial fertilizer application.
- If we correctly calculate the water volume and correctly weigh the fertilizer and apply it uniformly in the bed, it will be 100 ppm N.

Common Fertility Problem

- **Water contaminated with UAN solution**
  - Using water from farm supply store to fill beds
  - Nurse tanks/hoses used for sidedressing wheat then used to fill float beds
  - May be low UAN levels, but still toxic to young transplants. Usually have to just start over with clean water.
  - **Recommendation:** use on-site water, even if it takes longer to fill the beds.


mS
DiST 4

Clipping

- Start early
  - 1.5 – 2 in. height
  - Take off 0.25 to 0.5 in.
  - At least weekly
- Reduce risk of disease spread
  - Slow blade speed
  - Catch clippings
  - Wash and sanitize after each use (10% bleach solution)
  - > air and light penetration

Proper clipping does not cause premature bloom or ground suckering

Old Trays vs. New Trays

- New trays best
- Useful life no more than 3-4 years
- Disposable trays and glazed trays

Websites:

Dark Tobacco:

http://ces.ca.uky.edu/darktobacco

Burley Tobacco:

http://www.uky.edu/Ag/Tobacco