Using Blue Dye Tests to Optimize Your Drip Management

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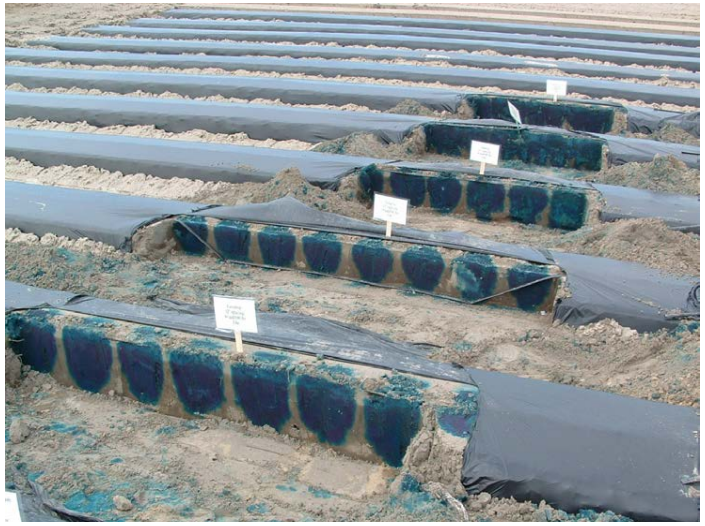
Live Oak, Florida



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OPTIMIZING WATER MANAGEMENT IN DRIP IRRIGATION SYSTEMS

- Know root zone of the crop
- Know the soil water-holding capacity
- Drip tape emitter spacing and flow rate
- Placement of drip tape in the bed (center or offset)
- Know crop's stage of growth
- Know crop ET

- Answer: when to start the irrigation system?
- Answer: how long to run the irrigation system

IRRIGATION MANAGEMENT- WHY?

- Conservation of water
- Control movement of soluble nutrients like N and K

Needed load reductions

Area	Required reduction to meet TMDL (lb-N/yr)
Lower	2,442,962
Middle	1,011,225
Withlacoochee	621,748
Total	**4,075,935**

20-year reduction plan (lbs-N/yr)

Years 0-5 30%	Years 5-10 50%	Years 10-15 20%	Total nitrogen reduction 100%
1,222,781	2,037,968	815,187	**4,075,935**

BLUE DYE TESTS PROVIDE THE OPPORTUNITY TO “SEE” REAL DATA

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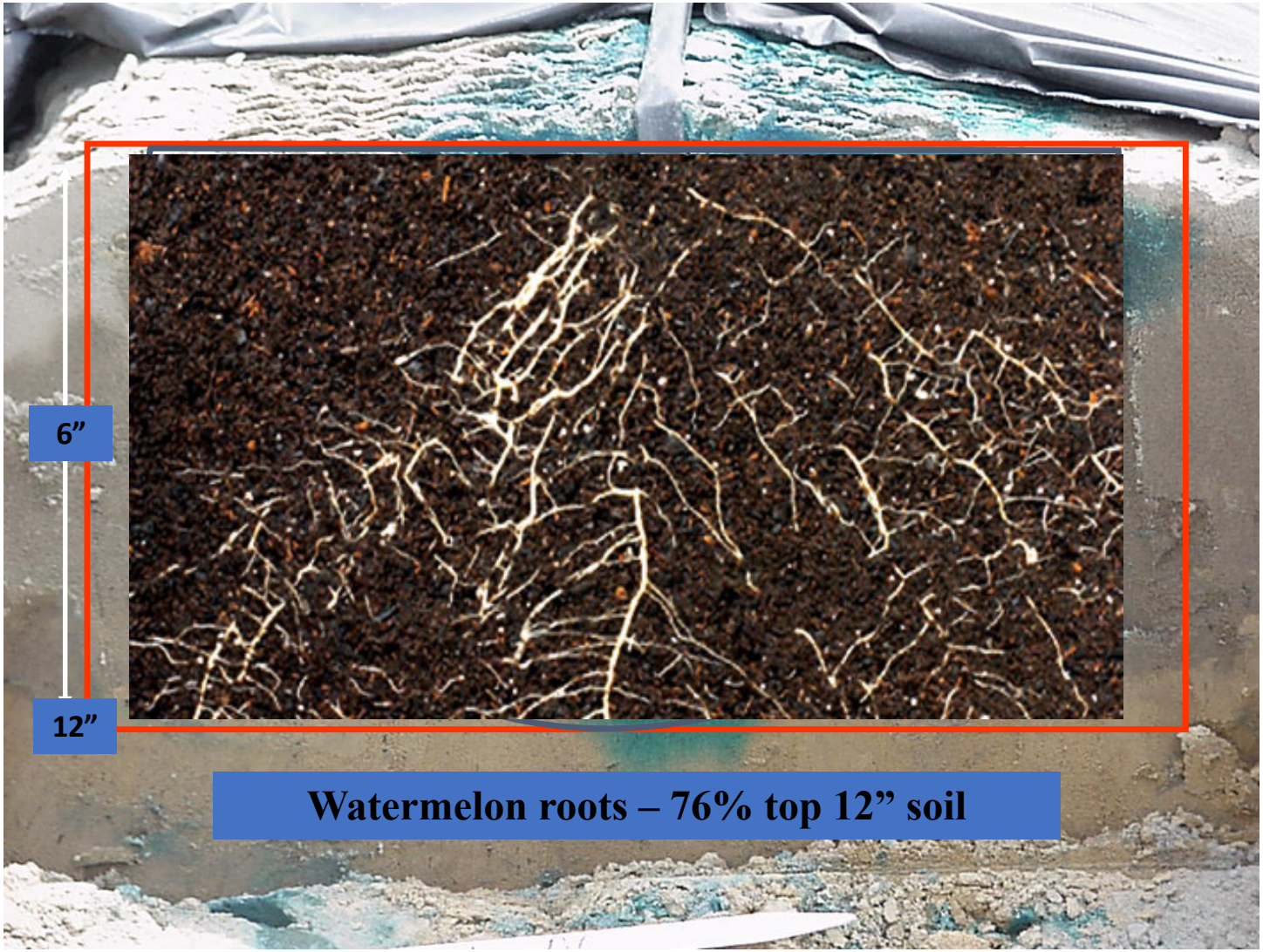
Tomato Roots – 88% top 10” soil (loam soil)



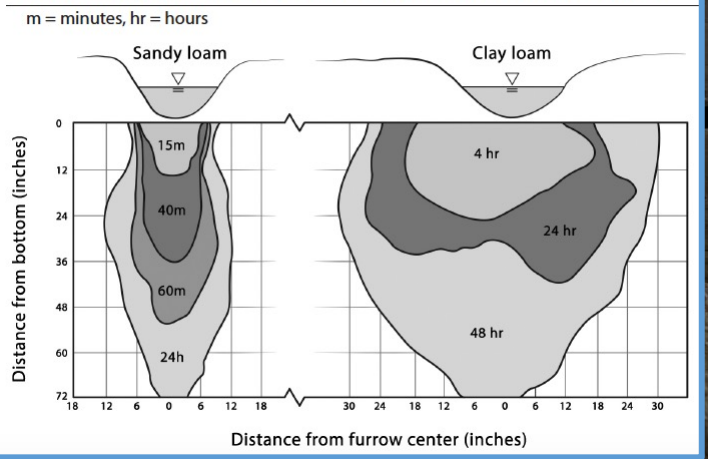
Watermelon roots – 76% top 12” soil

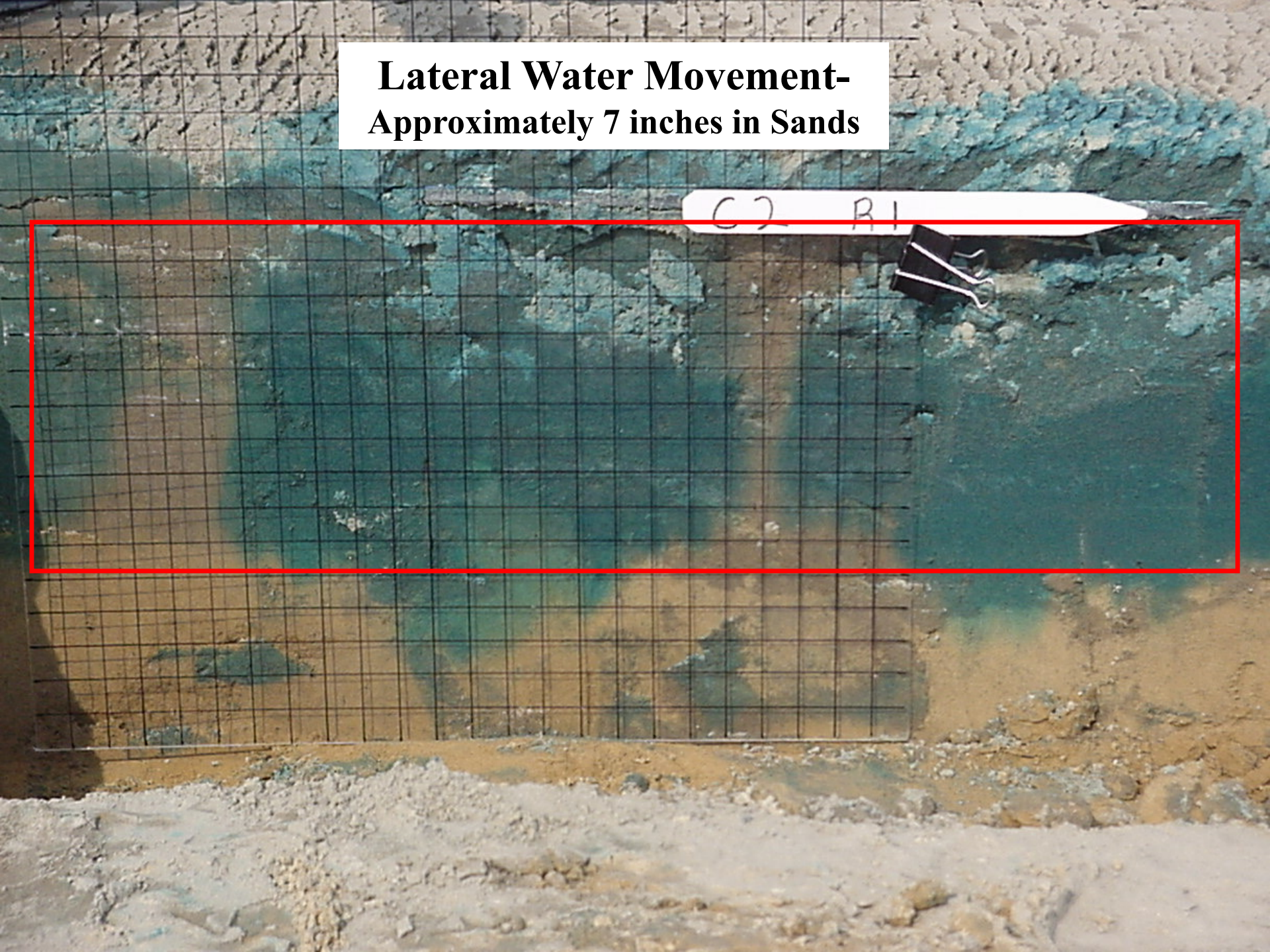
Soil texture influences permeability and infiltration

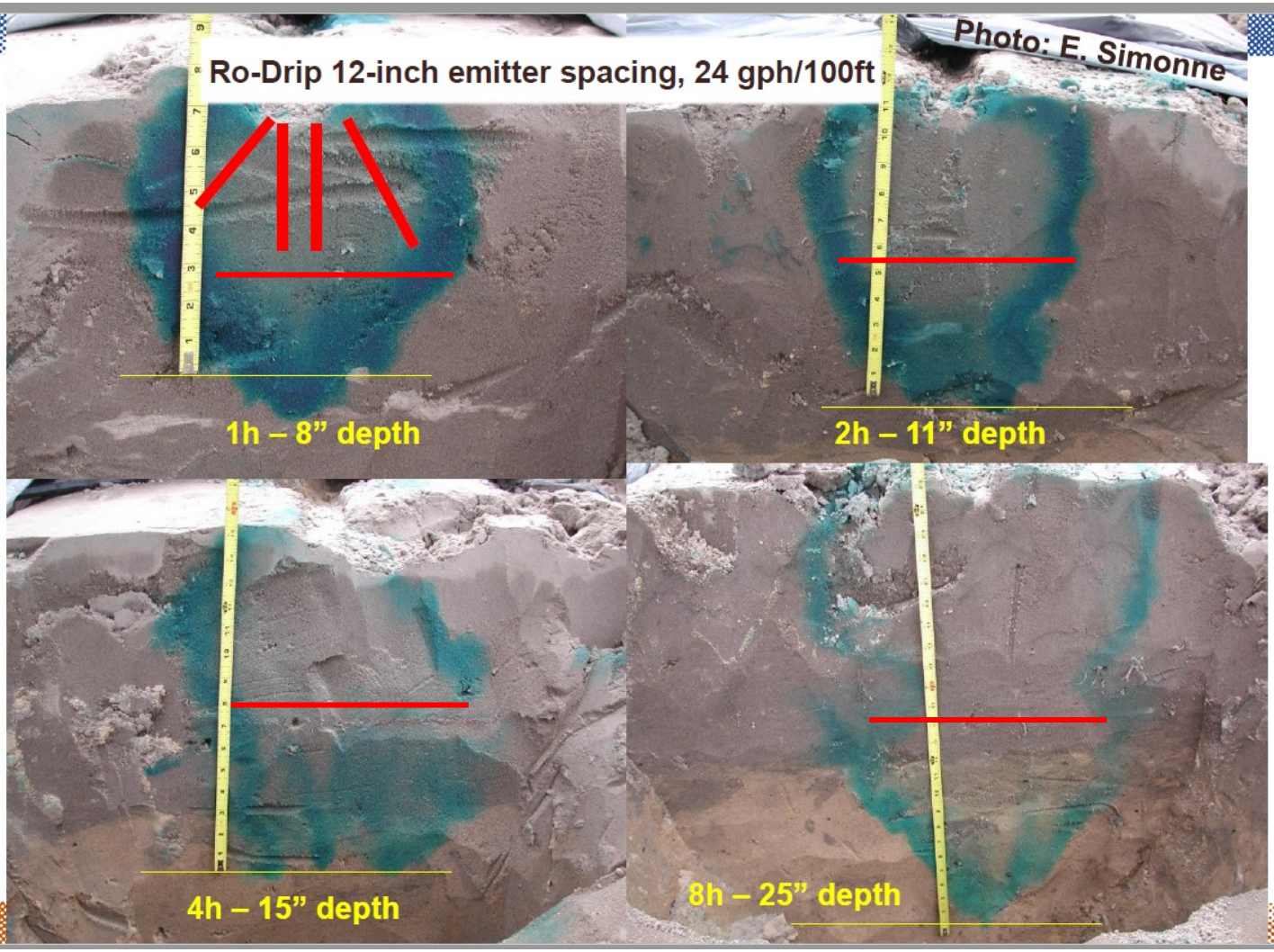
TABLE 2.7 | SOIL PERMEABILITY CHART
THESE ARE NORMAL VALUES FOR NON-COMPACTED SOILS, SUCH AS IN GRASSLAND SITUATIONS

TEXTURE CLASS	TEXTURE	PERMEABILITY RATE	PERMEABILITY CLASS
Coarse	gravel, coarse sand sand, loamy sand	> 20 inches/hour 6 – 20 inches/hour	very rapid rapid
Moderately Coarse	coarse sandy loam sandy loam fine sandy loam	2 – 6 inches/hour	moderately rapid
Medium	very fine sandy loam loam silt loam silt	0.60 – 2 inches/hour	moderate
Moderately fine	clay loam sandy clay loam silty clay loam	0.20 – 0.60 inches/hour	moderately slow
Fine	sandy clay silty clay clay (<60%)	0.06 – 0.20 inches/hour	slow
Very fine	clay (>60%) clay pan	< 0.06 inches/hour	very slow

FIGURE 2.5 | MOVEMENT OF WATER THROUGH SANDY AND CLAY SOILS




Lateral Water Movement-
Approximately 7 inches in Sands
C2 R1



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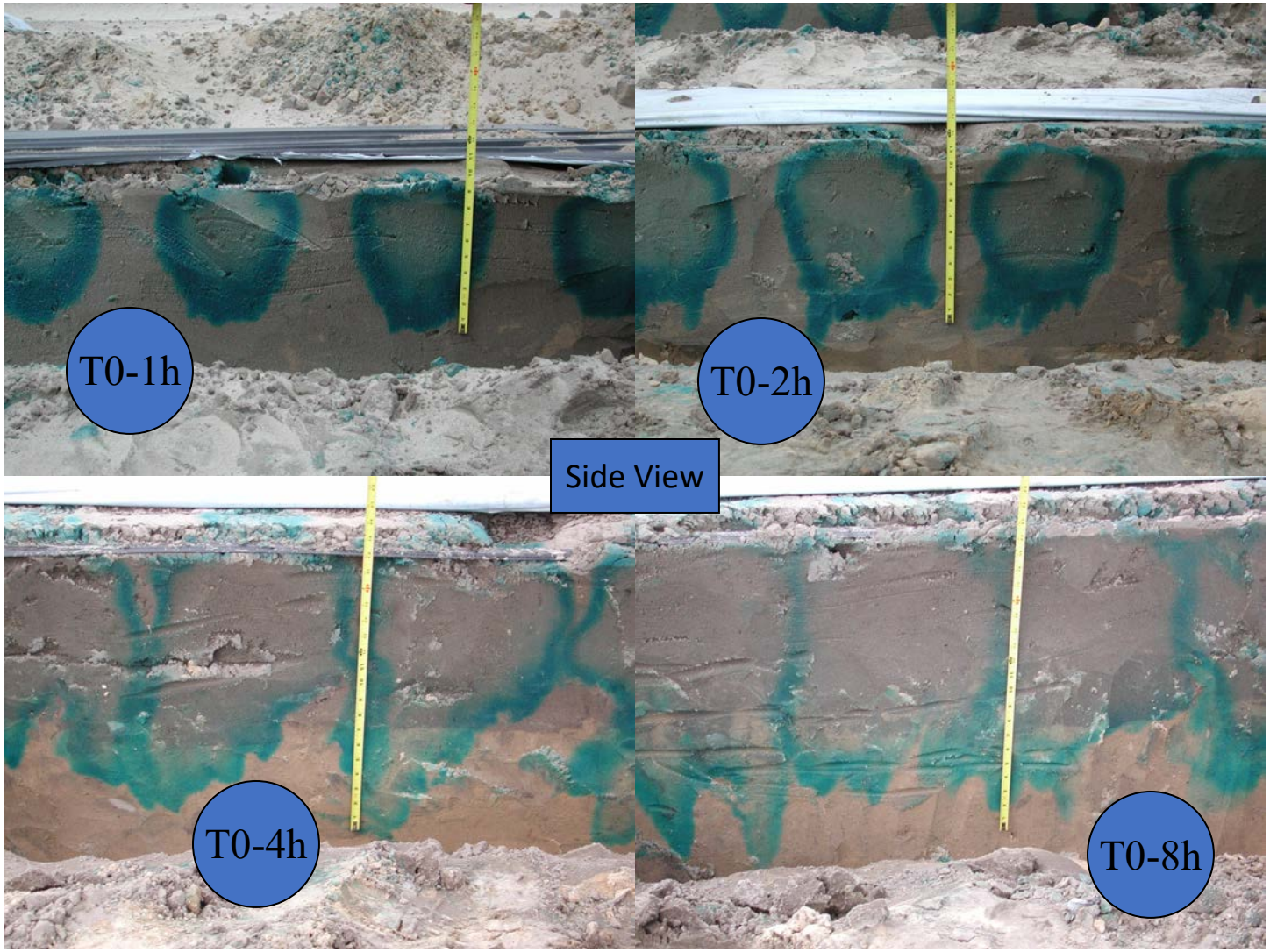
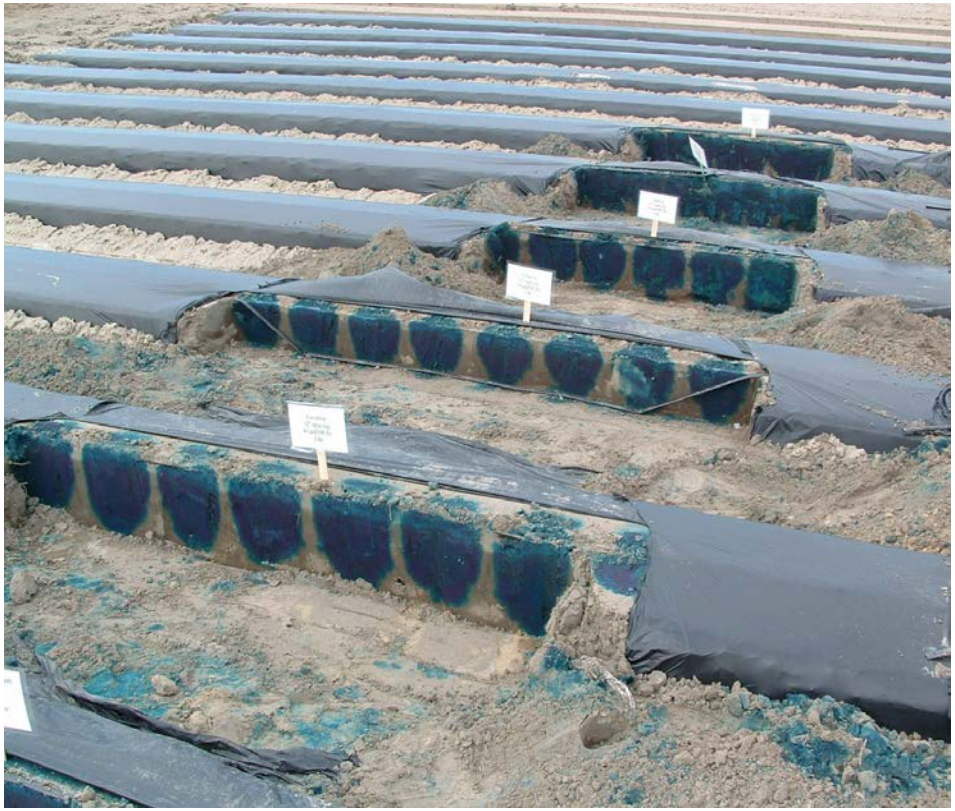

T0-1h
T0-2h
Side View
T0-4h
T0-8h


45 min
1.5 hours



Dye demonstration, UF Live Oak Center, E. Simonne and B. Hochmuth

8” Spacing, .67 GPM/ 100’

8” Spacing, .50 GPM/ 100’

12” Spacing, .45 GPM/ 100’

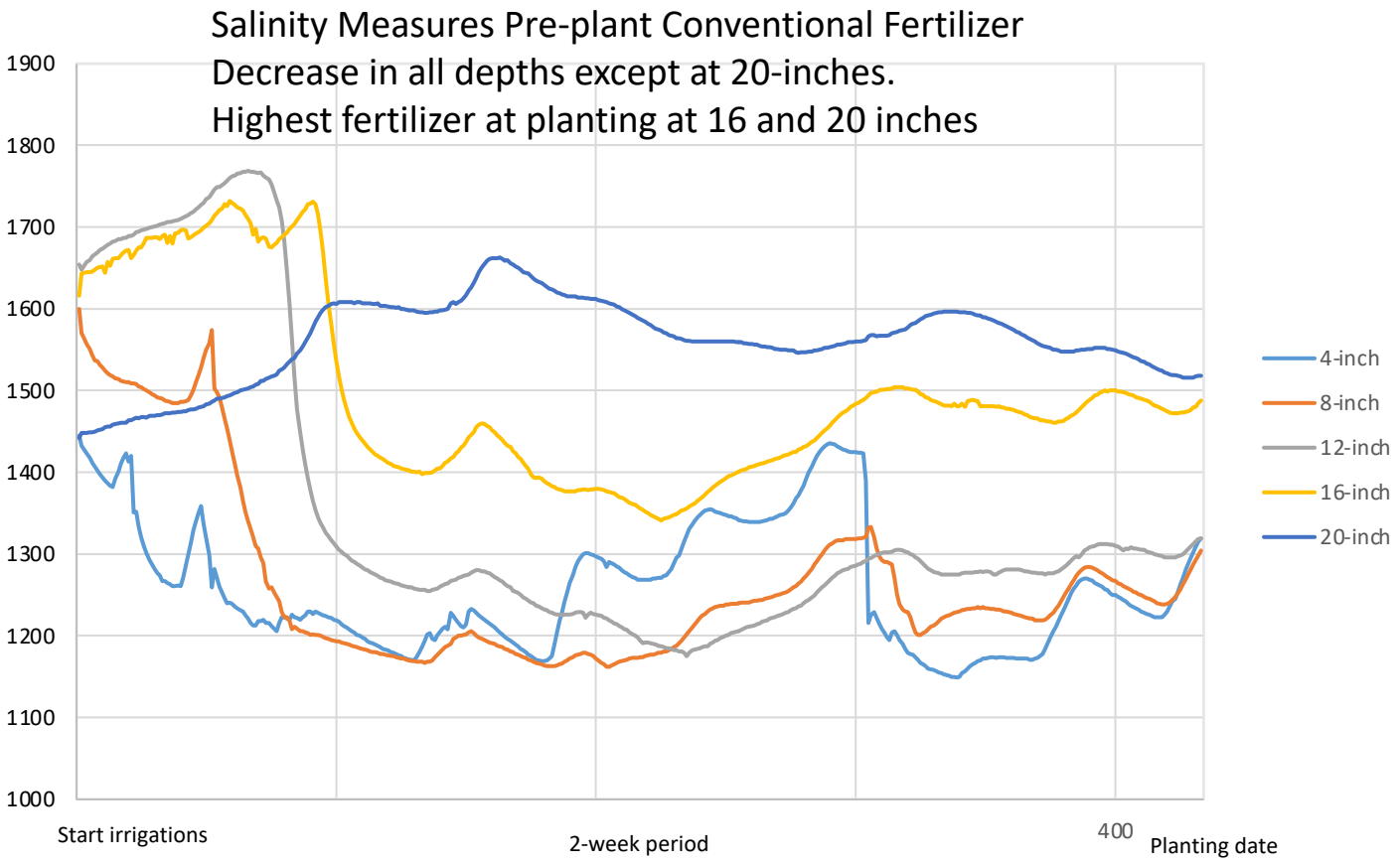
12” Spacing, .34 GPM/ 100’

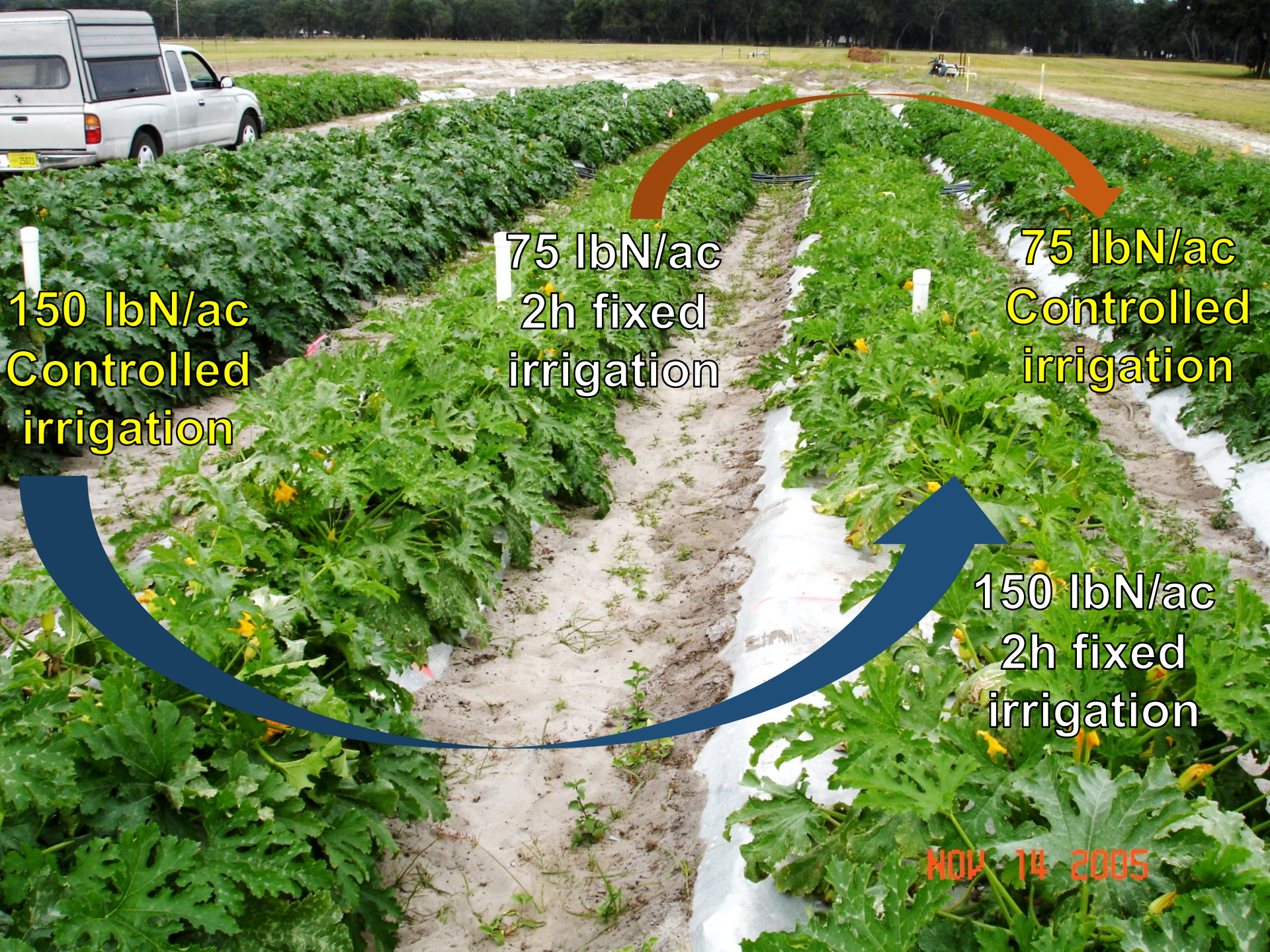
12” Spacing, .20 GPM/ 100’

1 Hour

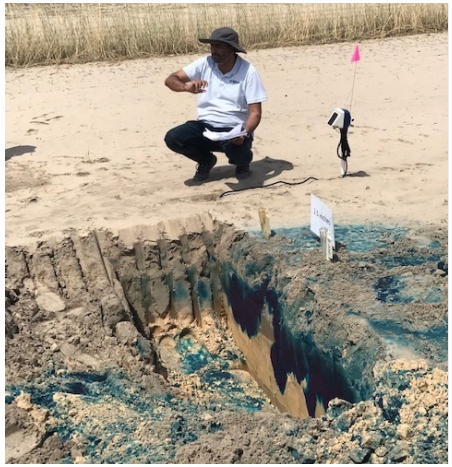
Spacing affected pattern, but flow rate/ volume did not. UF and Clemson research suggest 12-inch spacing is optimum in sandy soils.

DRIP TAPE BED PLACEMENT-
CENTER IS PREFERRED FROM A SOIL/WATER STANDPOINT.
PLACE FERTILIZER IN WETTED ZONE


Salinity Measures Pre-plant Conventional Fertilizer
Decrease in all depths except at 20-inches.
Highest fertilizer at planting at 16 and 20 inches
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
Start irrigations
2-week period
400
Planting date
4-inch
8-inch
12-inch
16-inch
20-inch


150 lbN/ac
Controlled
irrigation
75 lbN/ac
2h fixed
irrigation
75 lbN/ac
Controlled
irrigation
150 lbN/ac
2h fixed
irrigation
NOV 14 2005

Blue dye tests: Overhead irrigation



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LESSONS LEARNED FROM IRRIGATION AND BLUE DYE TRIALS

- Early Season (first 4 wks)
  - ❖ greatest risk of leaching
  - ❖ irrigation was generally reduced by 50%
- Mid Season
  - ❖ Irrigation sensors “caught” rapid increase in water demand (late April – early May)
- Late Season
  - ❖ Very difficult to over irrigate
  - ❖ Lowest risk of leaching

➢ **Single irrigation events in sands should be no longer than 1½ hours**

➢ **“Blue Dye Don’t Lie”**

➢ **Videos available at http://vfd.ifas.ufl.edu**

Blue Dye *"Don't"* Lie

THANK YOU

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