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

<table>
<thead>
<tr>
<th>Area</th>
<th>Required reduction to meet TMDL (lb-N/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>2,442,962</td>
</tr>
<tr>
<td>Middle</td>
<td>1,011,225</td>
</tr>
<tr>
<td>Withlacoochee</td>
<td>621,748</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,075,935</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Years 0-5 30%</th>
<th>Years 5-10 50%</th>
<th>Years 10-15 20%</th>
<th>Total nitrogen reduction 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,222,781</td>
<td>2,037,968</td>
<td>815,187</td>
<td>4,075,935</td>
</tr>
</tbody>
</table>
BLUE DYE TESTS PROVIDE THE OPPORTUNITY TO “SEE” REAL DATA
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

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

**FIGURE 2.5 | MOVEMENT OF WATER THROUGH SANDY AND CLAY SOILS**

Distance from furrow center (inches)
Lateral Water Movement - Approximately 7 inches in Sands
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
Decrease in all depths except at 20-inches.
Highest fertilizer at planting at 16 and 20 inches
Blue dye tests: Overhead irrigation
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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