EVALUATING DRIP IRRIGATED TOMATOES ON 80-INCH BEDS

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- CTRI
- UCCE WSREC
- Devon Rodriguez
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- Dan Burns, San Juan Ranch
GETTING TO 100 T/A

California Processing Tomato Yield (avg.)

- **State Avg**
- **UCCE Variety Trial**

<table>
<thead>
<tr>
<th>Year</th>
<th>State Avg</th>
<th>UCCE Variety Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
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<tr>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
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</tbody>
</table>

Tons/A
Drip irrigation has increased substantially in the last 10 years

- > 50% state acreage

- Benefits (yield) vs issues (cost, maintenance, and rotation limitations)
ROTATIONS (CENTRAL SJV)

- tomato/cotton/corn on 60” (Merced) or 66” (Fresno) beds
- melons on 80”
- lettuce, cole crops, onions, garlic on 40”
BED AND DRIP LINES

25% more furrow

25% less linear feet

20 ft

20 ft
PLANT SPACING

20 ft

50% ↑ 25% ↓ 0% ↑↓

20 ft
DOUBLE-ROW 80” BEDS

- 1 drip line per bed
  - reduced installation cost
  - limit rotation possibilities?
- 2 drip lines per bed
  - increased $$
  - increased rotation options
- ↑ plants, ↑ yields?
- Equipment & harvest configuration
OBJECTIVE:

Compare yield, economics, and flexibility of processing tomatoes on standard 66” beds to 80” beds with different plant populations and drip systems.
METHODS

1. Std 66” bed w/buried drip, single row plants
2. 80” bed w/single buried drip, double row plants
3. 80” bed w/two buried drip lines, double row plants
4. 80” bed w/single drip, following fallow bed

A. Same amount of water for trts 1 - 3 (107% Et).
   a. lower flow rate for double row tape
   b. similar cut-off date
B. Plant spacing split plots of 6, 8, 10, 12 thousand plants per acre
C. Measure yield, PTAB fruit quality, economic analysis
METHODS

- Location WSREC.
- RCB split plot, 3 beds x 300 ft. ~ 1.5 acres
- Mechanically transplanted, good stand numbers
- TSWV moderate to severe
- Machine harvest middle bed
transplanting
CHALLENGES 2010

- irrigation system
- TSWV
RESULTS
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Applied Water, inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 66” beds</td>
<td>26.9</td>
</tr>
<tr>
<td>2. 80”, one line</td>
<td>27.2</td>
</tr>
<tr>
<td>3. 80”, two lines</td>
<td>25.7</td>
</tr>
<tr>
<td>4. 80”, rotation</td>
<td>26.8</td>
</tr>
</tbody>
</table>
RESULTS: YIELD

80” Double-row Tomatoes 2010

- 66 in bed
- 80 in one drip line
- 80 in 2 drip lines
- 80 in rotation

Tons/A

Plants/A

6000 8000 10000 12000
2009 YIELD

80" Double-row Tomatoes 2009

LSD sig at p=0.05

Tons/A

66-inch std

80-inch 1 drip line

80 inch 2 drip lines

Plants per Acre

6080 7405 8610 10166

ab ab a b
RESULTS: PLANT SPACING

2009

R^2 = 0.12

R^2 = 0.31

2010

R^2 = 0.09

R^2 = 0.04
IMPACTS: TSWV

80° Double-Row Tomatoes 2010
Fruit Yield

80° Double-Row Tomatoes 2010
TSWV Infection (%)
IMPACTS: TSWV

80” Double-Row Tomatoes 2010
TSWV impacts on yield

\[
-0.26x + 26.7, R^2 = 0.12
\]
## FRUIT QUALITY

<table>
<thead>
<tr>
<th></th>
<th>color</th>
<th>Brix</th>
<th>pH</th>
<th>red %</th>
<th>green %</th>
<th>rot %</th>
<th>sun-burn %</th>
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</thead>
<tbody>
<tr>
<td><strong>AVG</strong></td>
<td>25.6</td>
<td>5.66</td>
<td>4.41</td>
<td>61.4</td>
<td>8.2</td>
<td>18</td>
<td>12.4</td>
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<tr>
<td><strong>F test bed</strong></td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>3.4</td>
<td>NS</td>
</tr>
<tr>
<td><strong>F test spacing</strong></td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Bed x spacing</strong></td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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</table>
## ECONOMIC ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>plant cost</th>
<th>drip line</th>
<th>yield</th>
<th>gross $ ($61.50)</th>
<th>net $/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 66” std</td>
<td>$x$ ($350)</td>
<td>$y$ ($160)</td>
<td>22</td>
<td>$1353</td>
<td>$1353 - 510 ($843)</td>
</tr>
<tr>
<td>2. 80” one line</td>
<td>1.10x</td>
<td>0.75y</td>
<td>25</td>
<td>$1538</td>
<td>1538 - 505 ($1033)</td>
</tr>
<tr>
<td>3. 80” two lines</td>
<td>1.10x</td>
<td>1.5y</td>
<td>27</td>
<td>$1661</td>
<td>1661 - 625 ($1036)</td>
</tr>
<tr>
<td>4. 80” rotation</td>
<td>1.10x/2</td>
<td>0.75y</td>
<td>34</td>
<td>$2091/2</td>
<td>1045 - 312 ($733)</td>
</tr>
</tbody>
</table>
SUMMARY

- 2 years of data suggest there are potential economic benefits to the 80” system.
  - yields improved, no loss of fruit quality
  - 2 drip lines vs 1: deficit irrigation?
  - benefit of rotation?
- double row 80” beds seem to need slightly higher plant populations (~ 10%)
PROPOSED TREATMENTS 2011

1. Std 66” bed w/buried drip, single row plants
2. 80” bed w/single buried drip, double row plants
3. 80” bed w/two buried drip lines, double row plants
4. Rotation. 80” bed w/ single drip (fallow, tomatoes, melons...)

A. Increased amount of water for trts 1 - 4 (115% Et).
   a. new tape
   b. lower flow rate for double row tape
   c. similar cut-off date

B. Plant spacing split plots of 4, 6, 8, 10 thousand plants/A

C. TSWV resistant variety

D. Improved weed management

E. Measure yield, PTAB fruit quality, economic analysis
THANK YOU

Questions?