Irrigation & Tomato Fruit Quality

2008 Project update

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UC Davis January 26, 2009
Cooperation with

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✓ Jim Leap—UC S. Cruz Agroecology Cntr
✓ Maria Giovanni – UCCE Nutrition Advisor

• Acknowledgments:
✓ Michael Cahn-UCCE Monterey County
✓ Small Farm program
✓ UC S Cruz Agroecology Center (CSAFS)
Objectives

- Investigate the feasibility of dryland tomato culture
- Compare yield response to water input
- Assess the effect of water input on fruit quality (physical, chemical, eating)
- Assess consumer acceptance
- Assess potential water savings
Design

✓ Study established UCSC Agroecology Center.
✓ Plots: 40 ft long single bed beds at 60” width
✓ 4 Replications
✓ 5 Treatments: % CIMIS (100, 75, 50, 25, 0)
✓ CRBD (Complete Randomized Block Design)
Plot layout
Timeline

- Planting
- Irrigation started
- Treatment start up
- Harvest
- Data collection: fruit count, fruit sizes, fruit weight, sub-sampled fruit
- Sensory evaluation: S. Cruz 9/25-26, San Jose (2 X)-10/20
Plot set up 6/15/08
Temperature Profile (weekly av.)

7/1 7/15 7/29 8/12 8/26 9/9 9/23 10/7 10/21
Earliest fruit set in drier trt 8/22/08
Data Collection

- Planting: June 26, 2008
- Preplant irrigation
- 2 Irrigation sets
- Imposed treatment
- Harvest: 9/23; 10/14; 10/17
Electronic Fruit Sizer
**Biological Yield Comparison to Control (100%)**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Biological #/A</th>
<th>% of Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>20,046</td>
<td>100%</td>
</tr>
<tr>
<td>25%</td>
<td>19,406</td>
<td>97%</td>
</tr>
<tr>
<td>50%</td>
<td>22,265</td>
<td>111%</td>
</tr>
<tr>
<td>75%</td>
<td>23,638</td>
<td>118%</td>
</tr>
<tr>
<td>100%</td>
<td>19,980</td>
<td>100%</td>
</tr>
</tbody>
</table>
X-Large and Large contribution to yield
# Tomato Fruit Physical Attributes

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Skin toughness</th>
<th>Color Hue value</th>
<th>Firmness</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% CIMIS</td>
<td>6.5</td>
<td>39.3</td>
<td>16.8</td>
</tr>
<tr>
<td>75% CIMIS</td>
<td>6.3</td>
<td>38.8</td>
<td>16.6</td>
</tr>
<tr>
<td>50% CIMIS</td>
<td>6.4</td>
<td>38.7</td>
<td>16.4</td>
</tr>
<tr>
<td>25% CIMIS</td>
<td>5.8</td>
<td>38.1</td>
<td>14.3</td>
</tr>
<tr>
<td>0% CIMIS</td>
<td>6.3</td>
<td>37.4</td>
<td>13.6</td>
</tr>
<tr>
<td>LSD.05</td>
<td>ns</td>
<td>ns</td>
<td>1.6</td>
</tr>
</tbody>
</table>
## Tomato fruit Chemical Attributes

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Lycopene µg/g FW</th>
<th>Soluble solids %</th>
<th>Sugar mg/mL</th>
<th>pH</th>
<th>Titratable acidity %</th>
<th>Ascorbic acid mg/100mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% CIMIS</td>
<td>5</td>
<td>6.7</td>
<td>38.3</td>
<td>4.22</td>
<td>0.52</td>
<td>60.1</td>
</tr>
<tr>
<td>75% CIMIS</td>
<td>5.4</td>
<td>6.6</td>
<td>37.8</td>
<td>4.27</td>
<td>0.44</td>
<td>65.5</td>
</tr>
<tr>
<td>50% CIMIS</td>
<td>6.1</td>
<td>7.2</td>
<td>41.5</td>
<td>4.23</td>
<td>0.54</td>
<td>61.9</td>
</tr>
<tr>
<td>25% CIMIS</td>
<td>7</td>
<td>7.7</td>
<td>47.5</td>
<td>4.26</td>
<td>0.59</td>
<td>63</td>
</tr>
<tr>
<td>0% CIMIS</td>
<td>7</td>
<td>8</td>
<td>48.3</td>
<td>4.27</td>
<td>0.53</td>
<td>64.8</td>
</tr>
<tr>
<td>LSD.05</td>
<td>1.1</td>
<td>0.4</td>
<td>3.5</td>
<td>ns</td>
<td>0.07</td>
<td>ns</td>
</tr>
</tbody>
</table>
Conclusions

- No significant differences in Biological yield
- 0 and 25% ET treatments resulted in 15-20% reduction in salable yield
- Drier treatments resulted in lower percentage of X-large fruit
- % BER and SB were higher in drier treatments
- No significant color differences
Conclusions-ii

- Tasting panel showed clear preference for drier treatments.
- Lab results reported significantly higher levels of sugar (24-26%), Lycopene (40%), total solids (15-19%).
- Trials to repeat in 2 different climatic zone (SC/Gilroy) to include additional heirloom varieties.