UCCE Processing Tomato Variety Trial 2004, Merced

UCCE Merced and Madera Counties

Location: NW corner of Henry Miller and Delta Rds, near Los Banos. Dan Burns, San Juan Ranch cooperator.

Mid maturity Varieties:

<table>
<thead>
<tr>
<th>REPLICATED plot</th>
<th>company</th>
<th>variety</th>
<th>resistance</th>
<th>OBSERVATIONAL plot</th>
<th>company</th>
<th>variety</th>
<th>resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CTRI/CPL</td>
<td>CPL 4863-N</td>
<td>VFFN</td>
<td>19</td>
<td>Campbell's</td>
<td>CXD 236</td>
<td>VFFN</td>
</tr>
<tr>
<td>2</td>
<td>Heinz</td>
<td>H2401</td>
<td>VFFNP</td>
<td>20</td>
<td>Harris Moran</td>
<td>HMX 3859</td>
<td>VFFNP</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>H2501</td>
<td>VFFNP</td>
<td>21</td>
<td>Moran</td>
<td>HMX 3863</td>
<td>VFFNP</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>H2601</td>
<td>VFFNP</td>
<td>22</td>
<td>Nippon Del</td>
<td>NDM 0098</td>
<td>VFFN</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>H5503</td>
<td>VFFNP</td>
<td>23</td>
<td>Orsetti</td>
<td>BOS 47721</td>
<td>VFFN</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>H5803</td>
<td>VFFNP</td>
<td>24</td>
<td>BOS</td>
<td>52295</td>
<td>VFFNP</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>H8892</td>
<td>VFFN</td>
<td>25</td>
<td>BOS</td>
<td>7025</td>
<td>VFFNP</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>H9665</td>
<td>VFFNP</td>
<td>26</td>
<td>Seminis</td>
<td>PX 345</td>
<td>VFFNP</td>
</tr>
<tr>
<td>9</td>
<td>Orsetti</td>
<td>Halley 3155</td>
<td>VFF</td>
<td>27</td>
<td>Sunseeds</td>
<td>SUN 6365</td>
<td>VFFNP</td>
</tr>
<tr>
<td>10</td>
<td>Rogers</td>
<td>LaRossa</td>
<td>VFF</td>
<td>28</td>
<td></td>
<td>SUN 6366</td>
<td>VFFNP</td>
</tr>
<tr>
<td>11</td>
<td>Seminis</td>
<td>PS296</td>
<td>VFFNP</td>
<td>29</td>
<td>Unilever</td>
<td>U 232</td>
<td>VFFNP</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>PS607</td>
<td>VFFN</td>
<td>30</td>
<td></td>
<td>U258</td>
<td>VFFNP</td>
</tr>
<tr>
<td>13</td>
<td>Sunseeds</td>
<td>SUN 6119</td>
<td>VFFN</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>SUN 6360</td>
<td>VFFNP</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>RED SKY</td>
<td>VFFP</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Unilever</td>
<td>U 005 EFS</td>
<td>VFFNP</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>U941</td>
<td>VFFN</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>United Genetics</td>
<td>UG 151</td>
<td>VFFN</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plot layout:

```
18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 28 29 30
4 13 1 18 16 10 2 7 12 3 6 11 9 15 17 8 14 5 25 26 27
12 15 6 16 2 7 13 11 14 1 8 4 10 17 5 3 18 9 22 23 24
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
```
Methods:

Seeded: March 8 and 9, 2004. LaBar’s greenhouse.
Transplanted: May 8, 2004. 100 ft plots.
Harvest: September 13, 2004. Hand harvest 10 ft from each plot.

Results:

Yield and fruit quality results for the replicated and observation varieties are shown in Tables 1 and 2, respectively. This field did not have to be commercially harvested because the grower had already met his contract obligations prior to field maturity. As a result, the plots were hand harvested by cutting plants from 10 feet of each plot (Fig 1). The field was actually over-mature by the time we harvested, and color separation was unnecessary. Rather, many plots were going down to powdery mildew and phytophthora, and yield loss occurred to dehydration and rot. These problems coupled with the inherit greater variability with a hand harvest resulted in a higher than normal coefficient of variation for yield.

Fruit samples were taken 2 weeks prior to harvest before any significant deterioration of the plots had occurred.

Even with a delayed harvest, yields were excellent in this field, with almost every variety > 40 tons/A. Heinz dominated in yields with this trial, capturing five of the top 6 slots. H9665, H5803 EFS, H2601, and H2401 averaged more than 2.5 tons/A soluble solids, however, there was no significant separation in Brix yield for the top 13 varieties.

In the observational trial, best yield occurred with Seminis PX 345 with an outstanding 74 tons/A. This yield reflects a spot in the plot with a strong healthy canopy and may not be indicative of the whole plot, however. U 232, HMX 3859, and HMX 3863 also both yielded more than 50 tons/A with brix yields > 2.5 tons/A.

Overall state results are shown in Table 3. Participating counties included Yolo, Colusa, Stanislaus, Fresno, Kern, and Merced.

Acknowledgements: Many thanks to Dan Burns with San Juan Ranch for his help and cooperation with this trial, CTRI for financial assistance, and participating seed companies.
Table 1. Processing tomato variety trial yield results, Merced 2004.

<table>
<thead>
<tr>
<th>REPLICATED</th>
<th>Plot</th>
<th>Company</th>
<th>Variety</th>
<th>Disease Resistance</th>
<th>Yield Tons/A</th>
<th>SS %</th>
<th>Color</th>
<th>pH Tons/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Heinz</td>
<td>H9665</td>
<td>VFFNP</td>
<td>56.388</td>
<td>a</td>
<td>4.6</td>
<td>24</td>
<td>4.36</td>
</tr>
<tr>
<td>2</td>
<td>Heinz</td>
<td>H2401</td>
<td>VFFNP</td>
<td>54.461</td>
<td>a b</td>
<td>4.6</td>
<td>24</td>
<td>4.28</td>
</tr>
<tr>
<td>4</td>
<td>Heinz</td>
<td>H2601</td>
<td>VFFNP</td>
<td>52.141</td>
<td>a b c</td>
<td>4.9</td>
<td>25</td>
<td>4.42</td>
</tr>
<tr>
<td>3</td>
<td>Heinz</td>
<td>H2501</td>
<td>VFFNP</td>
<td>50.029</td>
<td>a b c d</td>
<td>5.0</td>
<td>23</td>
<td>4.40</td>
</tr>
<tr>
<td>6</td>
<td>Heinz</td>
<td>H5803</td>
<td>VFFNP</td>
<td>49.985</td>
<td>a b c d</td>
<td>5.1</td>
<td>23</td>
<td>4.44</td>
</tr>
<tr>
<td>17</td>
<td>Unilever</td>
<td>U941</td>
<td>VFFN</td>
<td>49.495</td>
<td>a b c d e</td>
<td>4.8</td>
<td>25</td>
<td>4.44</td>
</tr>
<tr>
<td>13</td>
<td>Sunseeds</td>
<td>SUN 6119</td>
<td>VFFN</td>
<td>48.177</td>
<td>a b c d e</td>
<td>5.1</td>
<td>28</td>
<td>4.42</td>
</tr>
<tr>
<td>7</td>
<td>Heinz</td>
<td>H8892</td>
<td>VFFN</td>
<td>48.096</td>
<td>a b c d e</td>
<td>4.5</td>
<td>24</td>
<td>4.42</td>
</tr>
<tr>
<td>1</td>
<td>CTRI/CPL</td>
<td>CPL 4863-N</td>
<td>VFFN</td>
<td>47.388</td>
<td>a b c d e</td>
<td>4.5</td>
<td>24</td>
<td>4.42</td>
</tr>
<tr>
<td>16</td>
<td>Unilever</td>
<td>U 005 EFS</td>
<td>VFFNP</td>
<td>46.468</td>
<td>b c d e f</td>
<td>4.9</td>
<td>26</td>
<td>4.34</td>
</tr>
<tr>
<td>14</td>
<td>Sunseeds</td>
<td>SUN 6360</td>
<td>VFFNP</td>
<td>45.890</td>
<td>c d e f</td>
<td>4.8</td>
<td>23</td>
<td>4.45</td>
</tr>
<tr>
<td>18</td>
<td>United Genetics</td>
<td>UG 151</td>
<td>VFFN</td>
<td>45.814</td>
<td>c d e f</td>
<td>4.8</td>
<td>24</td>
<td>4.45</td>
</tr>
<tr>
<td>5</td>
<td>Heinz</td>
<td>H5503</td>
<td>VFFNP</td>
<td>43.957</td>
<td>a b c d e f</td>
<td>4.7</td>
<td>23</td>
<td>4.44</td>
</tr>
<tr>
<td>15</td>
<td>Sunseeds</td>
<td>RED SKY</td>
<td>VFP</td>
<td>43.418</td>
<td>d e f</td>
<td>4.9</td>
<td>23</td>
<td>4.49</td>
</tr>
<tr>
<td>11</td>
<td>Seminis</td>
<td>PS296</td>
<td>VFFNP</td>
<td>42.384</td>
<td>d e f</td>
<td>5.4</td>
<td>26</td>
<td>4.37</td>
</tr>
<tr>
<td>9</td>
<td>Orsetti</td>
<td>Halley 3155</td>
<td>VFF</td>
<td>41.377</td>
<td>e f g</td>
<td>5.3</td>
<td>25</td>
<td>4.40</td>
</tr>
<tr>
<td>12</td>
<td>Seminis</td>
<td>PS607</td>
<td>VFFN</td>
<td>38.311</td>
<td>f g</td>
<td>5.3</td>
<td>25</td>
<td>4.45</td>
</tr>
<tr>
<td>10</td>
<td>Rogers</td>
<td>LaRossa</td>
<td>VFF</td>
<td>33.835</td>
<td>g f</td>
<td>4.8</td>
<td>25</td>
<td>4.45</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td>46.534</td>
<td></td>
<td>4.9</td>
<td>24.5</td>
<td>4.41</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td></td>
<td></td>
<td></td>
<td>8.197</td>
<td></td>
<td>0.4</td>
<td>1.8</td>
<td>0.09</td>
</tr>
<tr>
<td>CV, %</td>
<td></td>
<td></td>
<td></td>
<td>12.4</td>
<td></td>
<td>5</td>
<td>4.5</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Yield results estimated from hand harvest of 10 ft.

SS = soluble solids
Color = lower values indicate redder fruit.
SS yield = soluble solids yield, in tons/A
Disease resistance: V = Verticillium, FF = Fusarium race 1 and 2, N = nematodes, P = bacterial speck.

LSD 0.05 = Least Significant Difference at the 95% probability level. Means within each column separated by less than this amount are not significantly different.
For yield, LSD is designated by a letter.
CV, % = coefficient of variation, a measure of the variability in the experiment.
Table 2. Observational varieties. Merced County 2004.

<table>
<thead>
<tr>
<th>Plot</th>
<th>Company</th>
<th>Variety</th>
<th>Disease Resistance</th>
<th>Yield</th>
<th>SS</th>
<th>PTAB</th>
<th>Color</th>
<th>pH</th>
<th>SS Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Seminis</td>
<td>PX 345</td>
<td>VFFNP</td>
<td>73.965</td>
<td>4.6</td>
<td>27</td>
<td>4.42</td>
<td>3.402</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Unilever</td>
<td>U 232</td>
<td>VFFNP</td>
<td>58.153</td>
<td>4.6</td>
<td>26</td>
<td>4.52</td>
<td>2.675</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Harris Moran</td>
<td>HMX 3863</td>
<td>VFFNP</td>
<td>54.276</td>
<td>4.6</td>
<td>26</td>
<td>4.56</td>
<td>2.497</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Unilever</td>
<td>U258</td>
<td>VFFNP</td>
<td>48.787</td>
<td>4.6</td>
<td>24</td>
<td>4.53</td>
<td>2.244</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Sunseeds</td>
<td>SUN 6365</td>
<td>VFFNP</td>
<td>47.720</td>
<td>5.5</td>
<td>25</td>
<td>4.36</td>
<td>2.625</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Orsetti</td>
<td>BOS 52295</td>
<td>VFFNP</td>
<td>44.126</td>
<td>4.5</td>
<td>26</td>
<td>4.46</td>
<td>1.986</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Harris Moran</td>
<td>HMX 3859</td>
<td>VFFNP</td>
<td>43.865</td>
<td>5.7</td>
<td>25</td>
<td>4.52</td>
<td>2.500</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Orsetti</td>
<td>BOS 47721</td>
<td>VFFN</td>
<td>38.115</td>
<td>5.2</td>
<td>25</td>
<td>4.42</td>
<td>1.982</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Orsetti</td>
<td>BOS 7025</td>
<td>VFFNP</td>
<td>35.153</td>
<td>5.7</td>
<td>23</td>
<td>4.46</td>
<td>2.004</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Nippon Del Monte</td>
<td>NDM 0098</td>
<td>VFFN</td>
<td>34.521</td>
<td>4.9</td>
<td>24</td>
<td>4.52</td>
<td>1.692</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Campbell's</td>
<td>CXD 236</td>
<td>VFFN</td>
<td>29.664</td>
<td>5.5</td>
<td>23</td>
<td>4.49</td>
<td>1.632</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Sunseeds</td>
<td>SUN 6366</td>
<td>VFFNP</td>
<td>26.027</td>
<td>5.1</td>
<td>25</td>
<td>4.55</td>
<td>1.327</td>
<td></td>
</tr>
</tbody>
</table>

Average: 44.531  5.042  24.917  4.484  2.214

Yield results estimated from hand harvest of 10 ft.
SS = soluble solids
Color = lower values indicate redder fruit.
SS yield = soluble solids yield, in tons/A
Disease resistance: V = Verticillium, FF = Fusarium race 1 and 2, N = nematodes, P = bacterial speck.

Observation data from 1 plot only.
Table 3. Combined location means for yield, Brix, Brix yield, color, and pH for the replicated midseason maturity processing tomato varieties in 2004.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield (Tons/A)</th>
<th>Brix (%)</th>
<th>Brix Yield, Tons/A</th>
<th>Color</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>U 941</td>
<td>45.1 (01) A</td>
<td>5.2 (12)</td>
<td>2.31 (01)</td>
<td>24.5  (09)</td>
<td>4.38 (12)</td>
</tr>
<tr>
<td>H 8892</td>
<td>43.2 (02) A B</td>
<td>5.2 (15)</td>
<td>2.18 (05)</td>
<td>24.5  (08)</td>
<td>4.36 (09)</td>
</tr>
<tr>
<td>H 5503</td>
<td>43.0 (03) A B</td>
<td>5.1 (17)</td>
<td>2.18 (06)</td>
<td>23.5  (04)</td>
<td>4.36 (08)</td>
</tr>
<tr>
<td>H 2401</td>
<td>42.9 (04) A B C</td>
<td>5.2 (10)</td>
<td>2.20 (04)</td>
<td>24.8  (12)</td>
<td>4.27 (01)</td>
</tr>
<tr>
<td>H 9665</td>
<td>42.4 (05) A B C D</td>
<td>5.2 (16)</td>
<td>2.14 (09)</td>
<td>24.3  (07)</td>
<td>4.32 (05)</td>
</tr>
<tr>
<td>H 5803</td>
<td>40.9 (06) B C D E</td>
<td>5.7 (01)</td>
<td>2.30 (02)</td>
<td>23.8  (06)</td>
<td>4.32 (04)</td>
</tr>
<tr>
<td>Sun 6360</td>
<td>40.3 (07) B C D E</td>
<td>5.2 (11)</td>
<td>2.05 (11)</td>
<td>23.4  (03)</td>
<td>4.40 (16)</td>
</tr>
<tr>
<td>PS 296</td>
<td>40.1 (08) C D E</td>
<td>5.7 (03)</td>
<td>2.28 (03)</td>
<td>25.7  (17)</td>
<td>4.27 (02)</td>
</tr>
<tr>
<td>H 2501</td>
<td>39.9 (09) D E</td>
<td>5.5 (05)</td>
<td>2.15 (08)</td>
<td>22.8  (01)</td>
<td>4.35 (07)</td>
</tr>
<tr>
<td>H 2601</td>
<td>39.6 (10) D E</td>
<td>5.2 (12)</td>
<td>2.03 (12)</td>
<td>25.2  (15)</td>
<td>4.39 (14)</td>
</tr>
<tr>
<td>Red Sky</td>
<td>39.2 (11) E</td>
<td>5.4 (07)</td>
<td>2.08 (10)</td>
<td>23.8  (05)</td>
<td>4.42 (17)</td>
</tr>
<tr>
<td>UG 151</td>
<td>38.9 (12) E</td>
<td>5.3 (09)</td>
<td>1.99 (13)</td>
<td>23.3  (02)</td>
<td>4.45 (18)</td>
</tr>
<tr>
<td>Halley 3155</td>
<td>38.7 (13) E</td>
<td>5.7 (02)</td>
<td>2.17 (07)</td>
<td>24.8  (13)</td>
<td>4.33 (06)</td>
</tr>
<tr>
<td>CPL 4863-N</td>
<td>38.7 (14) E</td>
<td>5.0 (18)</td>
<td>1.91 (16)</td>
<td>24.7  (10)</td>
<td>4.37 (10)</td>
</tr>
<tr>
<td>U 005</td>
<td>38.3 (15) E</td>
<td>5.2 (14)</td>
<td>1.97 (15)</td>
<td>25.5  (16)</td>
<td>4.31 (03)</td>
</tr>
<tr>
<td>Sun 6119</td>
<td>38.1 (16) E F</td>
<td>5.4 (06)</td>
<td>1.98 (14)</td>
<td>27.1  (18)</td>
<td>4.38 (11)</td>
</tr>
<tr>
<td>La Rossa</td>
<td>35.4 (17) F G</td>
<td>5.4 (08)</td>
<td>1.85 (18)</td>
<td>24.8  (11)</td>
<td>4.40 (15)</td>
</tr>
<tr>
<td>PX 607</td>
<td>34.0 (18) G</td>
<td>5.6 (04)</td>
<td>1.87 (17)</td>
<td>25.2  (14)</td>
<td>4.38 (13)</td>
</tr>
</tbody>
</table>

| VARIETY X LOCATION LSD @ 0.05= | 7.1 | 0.5 | 0.39 | 2.1 | N.S. |

Brix is an estimate of soluble solids.

LSD 0.05 = least significant difference at the 95% probability level. Yields followed by the same letter are not significantly different.

CV = coefficient of variation.

Variety by location LSD = least significant difference for comparing means of the same variety at different locations. NS = not significant. For pH, this indicates that a variety maintained a certain pH regardless of location.

Numbers in parentheses ( ) indicate relative rank of a variety within the same column.
UCCE Fresh Market Tomato Variety Trial 2004, Merced County

UCCE Merced and Madera Counties

Location: Live Oak Farms. Field located behind shop, off Mariposa Way about 1/2 mile east of Plainsberg Rd. Honcut silt loam (HtA) grading to Wyman clay loam.
Cooperator: Bob Giampaoli

Varieties:

**REPLICATED**

1. BHN 580 BHN Seed
2. L-312 LSL Plant Science
3. Bobcat Rogers/Syngenta
4. Miroma " "
5. Quali T-21 " "
6. SVR 2935 Seminis
16. Catalyst Rogers/Syngenta

**OBSERVATION**

7. BHN 654 BHN Seed
8. BHN 681 " "
9. BHN 682 " "
10. L-310 LSL Plant Science
11. L-311 " "
12. QualiT-23 Rogers/Syngenta
13. RFT 500 305 " "
14. RFT 500 311 " "
15. RFT 500 312 " "
17. Martian Giant Seeds of Change
18. 3 Sisters " "
19. Crimson Sprinter " "

Plot Plan:

<table>
<thead>
<tr>
<th>Rep</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Rep</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Replotted Observed: March 17, 19, and 24 at LaBar’s greenhouse

Field day: July 22, 2004


Results:

Yield and size results for the replicated trial is shown in Table 1. Fruit and vine characteristics are presented in Table 2. Yields were good in 2004, and the variation within each variety was similar, as shown in Figure 1. Because Miroma is a roma type tomato, it was hand sorted into only the S, M, and L categories. QualiT-21 had significantly better yields and %XL fruit than the other varieties. L-312 had significantly less marketable yield than all the other lines, mainly because it had a very high cull rate of almost 47%. L-312 fruit were misshapen, had zippers, and “measles”, or small waxy spots on the skin. Both BHN 580 and SVR 2935 had nice fruit with good uniformity. There were no significant yield differences between the other varieties.

Observational results are listed in Tables 3 and 4. RFT 500 305 looked especially good in this trial, with best overall yields. Fruit were large and attractive, but did have a large blossom end. BHN 654 also looked very promising. All varieties from Seeds of Change were indeterminate and out of place in this trial. Vines were overly large and fruit load small.

Acknowledgements:

Thanks to Bob Giampaoli of Live Oak Farms, Daniel Acevedo of LaBar’s Greenhouse, and the participating seed companies for their support for this project.
Figure 1. Total marketable yield (M, L, and XL fruit) for each replicated variety in the Merced fresh market tomato variety trial, 2004.
Table 1. Fresh market tomato variety trial yield and grade results, 2004. Replicated varieties, Merced County.

<table>
<thead>
<tr>
<th>Var #</th>
<th>Variety</th>
<th>Company</th>
<th>Market Yield</th>
<th>XL % of marketable yield</th>
<th>L</th>
<th>M</th>
<th>S</th>
<th>Market yield = XL + L + M size fruit, average of four replications. One box = 25 lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tons/A</td>
<td>Boxes/A</td>
<td></td>
<td></td>
<td></td>
<td>XL, L, M% = weight of respective fruit sizes divided by marketable yield. Miroma not classed as XL.</td>
</tr>
<tr>
<td>5</td>
<td>Quali T-21</td>
<td>Syngenta</td>
<td>42.5</td>
<td>3398</td>
<td>52.6</td>
<td>36.9</td>
<td>10.5</td>
<td>3.9</td>
</tr>
<tr>
<td>4</td>
<td>Miroma</td>
<td>Syngenta</td>
<td>37.5</td>
<td>2999</td>
<td>0.0</td>
<td>39.6</td>
<td>60.4</td>
<td>7.1</td>
</tr>
<tr>
<td>6</td>
<td>SVR 2935</td>
<td>Seminis</td>
<td>36.4</td>
<td>2915</td>
<td>37.8</td>
<td>43.7</td>
<td>18.5</td>
<td>8.5</td>
</tr>
<tr>
<td>16</td>
<td>Catalyst</td>
<td>Syngenta</td>
<td>33.1</td>
<td>2646</td>
<td>39.2</td>
<td>41.2</td>
<td>19.6</td>
<td>5.5</td>
</tr>
<tr>
<td>3</td>
<td>Bobcat</td>
<td>Syngenta</td>
<td>33.0</td>
<td>2639</td>
<td>37.8</td>
<td>46.7</td>
<td>15.6</td>
<td>5.6</td>
</tr>
<tr>
<td>1</td>
<td>BHN 580</td>
<td>BHN Seed</td>
<td>32.7</td>
<td>2616</td>
<td>41.2</td>
<td>42.5</td>
<td>16.3</td>
<td>6.6</td>
</tr>
<tr>
<td>2</td>
<td>L-312</td>
<td>LSL Plant Science</td>
<td>20.7</td>
<td>1657</td>
<td>45.1</td>
<td>42.5</td>
<td>12.4</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td></td>
<td>2695</td>
<td>42%</td>
<td>41.8</td>
<td>22%</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LSD 0.05</td>
<td></td>
<td>488</td>
<td>7.7</td>
<td>NS</td>
<td>5.4</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CV, %</td>
<td></td>
<td>12.2</td>
<td>12.1</td>
<td>11.2</td>
<td>16.5</td>
<td>20.5</td>
<td></td>
</tr>
</tbody>
</table>

Culls, %: Any fruit so disfigured (due to rot, cat facing, insect damage, etc.) as to be unmarketable.

XL = 3 inches and larger in diameter
L = 2.5 to 3"
M = 2.25 to 2.5"
S = 2 to 2.25" Fruit smaller than 2" were not harvested.

LSD 0.05 = least significant difference at the 95% probability level.
Yields followed by the same letter are not significantly different.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.
Table 2. Fresh market tomato fruit and vine characteristics. Merced County, 2004. REPLICATED varieties.

<table>
<thead>
<tr>
<th>Var #</th>
<th>Variety</th>
<th>Vine Size</th>
<th>Leaf cover</th>
<th>Leaf Roll</th>
<th>Fruit Shape</th>
<th>Roughness</th>
<th>Blossom End</th>
<th>Sunburn</th>
<th>Cat-facing</th>
<th>Zipper</th>
<th>Maturity</th>
<th>Disease resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BHN 580</td>
<td>L</td>
<td>G</td>
<td>N</td>
<td>G</td>
<td>S</td>
<td>T</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td>VFFN</td>
</tr>
<tr>
<td>2</td>
<td>L-312</td>
<td>M</td>
<td>OK</td>
<td>S</td>
<td>FG</td>
<td>S</td>
<td>T</td>
<td>SL</td>
<td>N</td>
<td>N</td>
<td>+</td>
<td>VFFTN</td>
</tr>
<tr>
<td>3</td>
<td>Bobcat</td>
<td>ML</td>
<td>G</td>
<td>S</td>
<td>DG</td>
<td>M</td>
<td>T</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Miroma</td>
<td>M</td>
<td>G</td>
<td>SL</td>
<td>ROMA</td>
<td>S</td>
<td>T</td>
<td>SL</td>
<td>N</td>
<td>N</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Quali T-21</td>
<td>L</td>
<td>G</td>
<td>N</td>
<td>DG</td>
<td>M</td>
<td>SL</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SVR 2935</td>
<td>ML</td>
<td>G</td>
<td>N</td>
<td>G</td>
<td>S</td>
<td>SL</td>
<td>N</td>
<td>N</td>
<td>SL</td>
<td>0</td>
<td>VFFNA</td>
</tr>
<tr>
<td>16</td>
<td>Catalyst</td>
<td>ML</td>
<td>G</td>
<td>N</td>
<td>G</td>
<td>M</td>
<td>T</td>
<td>N</td>
<td>N</td>
<td>SL</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Vine Size: M = medium, ML = medium large, L = large, VL = very large
Leaf Cover: P = poor, OK = adequate, G = good
Leaf Roll: N = none, SL = slight, S = some
Fruit Shape: DG = deep globe, G = globe, FG = flat globe
Shoulder roughness: S = smooth, M = medium, MR = medium rough, R = rough
Blossom End: T = tight, SL = slight scar, M = medium size scar
Cat Facing: N = none, SL = slight, S = some
Maturity: - = earlier than T-21, 0 = same as T-21, + = later than T-21
Sunburn: N = none, SL = slight, S = some
Zipper: N = none, SL = slight, S = some
Disease: disease resistance provided by company
V = verticillium wilt
FF = Fusarium wilt race 1 and 2
N = nematodes
T = tobacco mosaic virus
Asc = Alternaria stem canker, St = Stemphyllian, Sw = Spotted Wilt, Ty = tomato yellow leaf curl
Table 3. Fresh market tomato variety trial yield and grade results, 2003. Observational varieties, Merced County.

<table>
<thead>
<tr>
<th>Var #</th>
<th>Variety</th>
<th>Company</th>
<th>Market Yield</th>
<th>XL % of marketable yield</th>
<th>L % of marketable yield</th>
<th>M % of marketable yield</th>
<th>S % of marketable yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>RFT 500 305</td>
<td>Syngenta</td>
<td>38.5 Tons/A</td>
<td>45.8</td>
<td>40.5</td>
<td>13.7</td>
<td>7.6</td>
</tr>
<tr>
<td>15</td>
<td>RFT 500 312</td>
<td>Syngenta</td>
<td>38.1 Tons/A</td>
<td>38.1</td>
<td>51.1</td>
<td>10.8</td>
<td>4.3</td>
</tr>
<tr>
<td>7</td>
<td>BHN 654</td>
<td>BHN Seed</td>
<td>37.2 Tons/A</td>
<td>43.1</td>
<td>44.8</td>
<td>12.0</td>
<td>3.9</td>
</tr>
<tr>
<td>9</td>
<td>BHN 682</td>
<td>BHN Seed</td>
<td>33.7 Tons/A</td>
<td>50.0</td>
<td>32.9</td>
<td>17.1</td>
<td>3.4</td>
</tr>
<tr>
<td>14</td>
<td>RFT 500 311</td>
<td>Syngenta</td>
<td>33.0 Tons/A</td>
<td>36.4</td>
<td>49.0</td>
<td>14.6</td>
<td>5.8</td>
</tr>
<tr>
<td>12</td>
<td>Quali T-23</td>
<td>Syngenta</td>
<td>29.3 Tons/A</td>
<td>53.7</td>
<td>35.5</td>
<td>10.8</td>
<td>4.7</td>
</tr>
<tr>
<td>10</td>
<td>L-310</td>
<td>LSL Plant Science</td>
<td>27.0 Tons/A</td>
<td>45.4</td>
<td>38.8</td>
<td>15.8</td>
<td>3.6</td>
</tr>
<tr>
<td>11</td>
<td>L-311</td>
<td>LSL Plant Science</td>
<td>27.0 Tons/A</td>
<td>45.9</td>
<td>42.5</td>
<td>11.6</td>
<td>2.1</td>
</tr>
<tr>
<td>8</td>
<td>BHN 681</td>
<td>BHN Seed</td>
<td>21.6 Tons/A</td>
<td>36.8</td>
<td>43.4</td>
<td>19.7</td>
<td>3.4</td>
</tr>
<tr>
<td>19</td>
<td>Crimson Sprinter</td>
<td>Seeds of Change</td>
<td>15.2 Tons/A</td>
<td>3.6</td>
<td>50.3</td>
<td>46.1</td>
<td>12.7</td>
</tr>
<tr>
<td>17</td>
<td>Martian Giant</td>
<td>Seeds of Change</td>
<td>4.5 Tons/A</td>
<td>78.0</td>
<td>22.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>18</td>
<td>3 sisters</td>
<td>Seeds of Change</td>
<td>1.5 Tons/A</td>
<td>0.0</td>
<td>0.0</td>
<td>100.0</td>
<td>10.9</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td></td>
<td><strong>25.5</strong> Tons/A</td>
<td><strong>39.7</strong></td>
<td><strong>37.6</strong></td>
<td><strong>22.7</strong></td>
<td><strong>5.2</strong></td>
</tr>
</tbody>
</table>

Market yield = XL + L + M size fruit, from one plot. One box = 25 lbs.
XL, L, M% = weight of respective fruit sizes divided by marketable yield.
Red% = weight of all red fruit divided by total yield. Indicates relative maturity among tested varieties.
Culls, %: Any fruit so disfigured (due to rot, cat facing, insect damage, etc.) as to be unmarketable.

XL = 3 inches and larger in diameter
L = 2.5 to 3"
M = 2.25 to 2.5"
S = 2 to 2.25" Fruit smaller than 2" were not harvested.

**L varieties**

<table>
<thead>
<tr>
<th>Vine Size</th>
<th>Leaf cover</th>
<th>Leaf roll</th>
<th>Fruit shape</th>
<th>Roughness</th>
<th>Blossom end</th>
<th>Sunburn</th>
<th>Cat-facing</th>
<th>Zippers</th>
<th>Maturity resistance</th>
<th>disease comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML G N DG S T SL N N 0 VFFT</td>
<td>good</td>
<td>rough fruit, zippers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML OK N G M SL SL N S - VFF</td>
<td>rough fruit, zippers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L G N DG S T N N SL 0 VFF</td>
<td>rough fruit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML G SL G M T SL SL SL 0 VFFN</td>
<td>leaf curl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M OK S G/FG M T SL N SL - VFFTN</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML G SL DG S SL N SL SL -</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05 L G N DG MR M N N N 0</td>
<td>good size, lg blossom scar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 M G SL G S T N N N 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 L G SL G M SL N N SL +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1nt VL OK N FG R M N lots S mixed</td>
<td>indeterminant, heirloom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VL G N G S T N S S mixed</td>
<td>indeterminant, heirloom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>printer VL G N FG M SL N S S mixed</td>
<td>indeterminant, heirloom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- M = medium
- ML = medium large
- L = large
- VL = very large
- P = poor
- OK = adequate
- G = good
- N = none
- SL = slight
- S = some
- DG = deep globe
- G = globe
- FG = flat globe
- Shoulder roughness:
- S = smooth
- M = medium
- MR = medium rough
- R = rough
- T = tight
- SL = slight scar
- M = medium size scar
- N = none
- SL = slight
- S = some
- - = earlier than T-21
- 0 = same as T-21
- + = later than T-21
- disease resistance provided by company
- V = verticillium wilt
- FF = Fusarium wilt race 1 and 2
- N = nematodes
- T = tobacco mosaic virus
In 2004, we evaluated 7 and 8 round fresh market tomato varieties from the replicated trials in Fresno and San Joaquin Counties, respectively, for color, firmness and composition at the table-ripe stage. Fruit were harvested as mature-greens (MG) and vine-ripes (VR, 30-40% color). We also evaluated an additional 13 varieties (harvested MG) from the observational trial in Fresno County (data not shown). Roma fresh market tomato varieties were harvested from both the Fresno (4 varieties) and San Joaquin County (6 varieties) trials at the MG and VR stages.

The quality measurements carried out on fruit at the table-ripe stage are described in Table 1. Fruit were sorted and washed with chlorinated water. A minimum of 45 fruit (3 reps of 15 each) were ripened under standard conditions: 3-4 days 100 ppm ethylene at 20°C (68°F) and high relative humidity followed by placement on trays (overwrapped with food wrap to reduce but not eliminate water loss) to complete ripening at 20°C. Fruit that did not show color change within 3-4 days of ethylene treatment were discarded. VR fruit were placed on trays to complete ripening at 20°C (68°F). Fruit were evaluated when they reached the table-ripe stage (color stage 6 on USDA scale + 1-2 days).

A summary of the results for round tomato varieties are presented in Table 2. The 2004 round variety fruit generally had lower soluble solids (4.2% average for all varieties and both trials) than 2003 fruit (4.9% average), whereas % titratable acidity values were in the usual range of 0.3-0.4%. VR harvested fruit generally have the same % soluble solids but higher % titratable acidity than MG harvested fruit. Fruit in 2004 were firmer on average than fruit evaluated in 2003. Shady Lady was consistently low in firmness but had good color development, whereas L-311 or L-312 fruit were consistently firmer but had poorer red color development. Roma tomato variety results are summarized in Table 3. The soluble solids averaged slightly less than 4.2% for 2004 Roma fruit, whereas the average for fruit evaluated in 2003 was 5.4%. The % titratable acidity was also lower in 2004 than 2003 for the Roma varieties. Red color and firmness were generally good for all varieties evaluated, although VR harvested fruit were not as firm as the ripened MG fruit.

Table 1. Ripe tomato quality measurements for 2004 variety trials.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Measurement</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Color</td>
<td>Objective color values using a Minolta Color meter</td>
<td>Data reported as Hue; this is the most useful single value to compare tomato color. Hue values from 35-40 indicate very good red color.</td>
</tr>
<tr>
<td>2. Texture</td>
<td>Compression test: the force to compress the fruit a distance of 5 mm</td>
<td>Computerized texture analyzer equipped with a 25 mm flat cylinder moving at 0.5 mm/sec. Very firm, firm, moderately firm, moderately soft, soft and very soft fruit correspond to &gt;25, 18-15, 15-18, 12-15, 8-12 and &lt;8 Newtons force, respectively. 1 N =9.81 kg-force or 4.45 lb.-force.</td>
</tr>
<tr>
<td>3. Composition</td>
<td>3a. Soluble solids (SS) are measured on a refractometer</td>
<td>Fruit are quartered, blended. The juice is filtered and used. 5 min per fruit for sample preparation and measurements of SS and TA. Values can range from 3.5-7.0%.</td>
</tr>
<tr>
<td></td>
<td>3b. Titratable acidity (TA); 10 mL juice are titrated with NaOH</td>
<td>pH of the juice is taken as a part of these measurements. Generally there is an inverse relationship between pH and T.A. Values can range from 0.2-0.6%.</td>
</tr>
</tbody>
</table>
Table 1. Quality characteristics of fresh market round tomatoes harvested MG and VR from the 2004 Kings County and San Joaquin County replicated trials. MG fruit were treated with ethylene. Fruit were ripened at 20°C (68°F). Fruit were evaluated at the table-ripe stage as determined visually. F=Fresno County Trial; SJ=San Joaquin County Trial.

<table>
<thead>
<tr>
<th>Cultivar &amp; Company</th>
<th>Number of trials</th>
<th>Red Color, Hue</th>
<th>Firmness, Newtons</th>
<th>Soluble solids, %</th>
<th>pH</th>
<th>Titratable acidity, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MG Harvested Fruit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHN 580 (BHN)</td>
<td>2</td>
<td>40.5</td>
<td>22.2</td>
<td>4.28</td>
<td>4.82</td>
<td>0.32</td>
</tr>
<tr>
<td>Bobcat (Syngenta)</td>
<td>2</td>
<td>39.8</td>
<td>22.1</td>
<td>4.20</td>
<td>4.32</td>
<td>0.31</td>
</tr>
<tr>
<td>Catalyst</td>
<td>1 SJ</td>
<td>40.9</td>
<td>26.0</td>
<td>4.21</td>
<td>4.70</td>
<td>0.38</td>
</tr>
<tr>
<td>L-311 (LSL Pl Sci.)</td>
<td>1 F</td>
<td>46.3</td>
<td>28.7</td>
<td>4.22</td>
<td>4.57</td>
<td>0.30</td>
</tr>
<tr>
<td>L-312 (LSL Pl Sci.)</td>
<td>1 SJ</td>
<td>41.2</td>
<td>20.6</td>
<td>4.22</td>
<td>4.53</td>
<td>0.28</td>
</tr>
<tr>
<td>QualiT 21 (Syngenta)</td>
<td>2</td>
<td>41.0</td>
<td>23.7</td>
<td>4.23</td>
<td>4.78</td>
<td>0.30</td>
</tr>
<tr>
<td>QualiT 23 (Syngenta)</td>
<td>2</td>
<td>39.8</td>
<td>22.2</td>
<td>4.16</td>
<td>4.45</td>
<td>0.32</td>
</tr>
<tr>
<td>Shady Lady (Sunseeds)</td>
<td>2</td>
<td>39.2</td>
<td>19.1</td>
<td>4.20</td>
<td>4.53</td>
<td>0.32</td>
</tr>
<tr>
<td>SVR2935 (Seminis)</td>
<td>2</td>
<td>40.6</td>
<td>25.4</td>
<td>4.32</td>
<td>4.64</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>MG</strong></td>
<td><strong>41.1</strong></td>
<td><strong>23.3</strong></td>
<td><strong>4.23</strong></td>
<td><strong>4.59</strong></td>
<td><strong>0.31</strong></td>
</tr>
<tr>
<td><strong>VR Harvested Fruit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHN 580 (BHN)</td>
<td>2</td>
<td>43.2</td>
<td>22.1</td>
<td>4.22</td>
<td>4.80</td>
<td>0.38</td>
</tr>
<tr>
<td>Bobcat (Syngenta)</td>
<td>2</td>
<td>43.4</td>
<td>21.2</td>
<td>4.17</td>
<td>3.93</td>
<td>0.30</td>
</tr>
<tr>
<td>L-311 (LSL Pl Sci.)</td>
<td>1 F</td>
<td>45.8</td>
<td>23.1</td>
<td>4.18</td>
<td>4.18</td>
<td>0.35</td>
</tr>
<tr>
<td>Catalyst</td>
<td>1 SJ</td>
<td>42.7</td>
<td>23.7</td>
<td>4.22</td>
<td>4.43</td>
<td>0.35</td>
</tr>
<tr>
<td>QualiT 21 (Syngenta)</td>
<td>1 F</td>
<td>44.4</td>
<td>17.9</td>
<td>4.15</td>
<td>4.20</td>
<td>0.32</td>
</tr>
<tr>
<td>QualiT 23 (Syngenta)</td>
<td>2</td>
<td>43.6</td>
<td>19.8</td>
<td>4.14</td>
<td>4.53</td>
<td>0.38</td>
</tr>
<tr>
<td>Shady Lady (Sunseeds)</td>
<td>2</td>
<td>42.6</td>
<td>18.4</td>
<td>4.19</td>
<td>4.45</td>
<td>0.36</td>
</tr>
<tr>
<td>SVR2935 (Seminis)</td>
<td>2</td>
<td>42.7</td>
<td>22.4</td>
<td>4.24</td>
<td>4.68</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>VR</strong></td>
<td><strong>43.6</strong></td>
<td><strong>21.1</strong></td>
<td><strong>4.19</strong></td>
<td><strong>4.40</strong></td>
<td><strong>0.35</strong></td>
</tr>
</tbody>
</table>

“LSD.05” 1.0 2.1 0.06 0.35 0.04

Color and firmness data are from 3 replicates of 15 fruits; composition data are from 3 replicates of composite samples of 15 fruit. Data were analyzed as 2-way ANOVA for each trial. The “LSD.05” value provides an estimate and is from the average LSD.05 values for the 2 maturity stages for the 2 trials. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.
Table 2. Quality characteristics of fresh market Roma tomatoes harvested MG and VR from the 2004 San Joaquin County replicated trial and ripened at 20°C (68°F). Fruit were evaluated at the table-ripe stage as determined visually. See Tables 1-3 for explanation of measurements. Varieties are listed in alphabetically. F=Fresno County Trial; SJ=San Joaquin County Trial.

<table>
<thead>
<tr>
<th>Cultivar &amp; Company</th>
<th>Number of trials</th>
<th>Red Color, Hue</th>
<th>Firmness, Newtons</th>
<th>Soluble solids, %</th>
<th>pH</th>
<th>Titratable acidity, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MG Harvested Fruit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHN 523 (BHN)</td>
<td>2</td>
<td>38.6</td>
<td>26.6</td>
<td>4.13</td>
<td>4.80</td>
<td>0.35</td>
</tr>
<tr>
<td>Mariana (Sakata)</td>
<td>1 SJ</td>
<td>40.5</td>
<td>29.0</td>
<td>4.24</td>
<td>5.20</td>
<td>0.35</td>
</tr>
<tr>
<td>Miroma (Syngenta)</td>
<td>2</td>
<td>39.5</td>
<td>22.9</td>
<td>4.18</td>
<td>4.44</td>
<td>0.33</td>
</tr>
<tr>
<td>Monica (Sakata)</td>
<td>1 SJ</td>
<td>38.8</td>
<td>27.8</td>
<td>4.21</td>
<td>5.50</td>
<td>0.38</td>
</tr>
<tr>
<td>PX 2626 (Seminis)</td>
<td>1 F</td>
<td>38.7</td>
<td>25.0</td>
<td>4.19</td>
<td>4.53</td>
<td>0.29</td>
</tr>
<tr>
<td>RFT 8109 (Syngenta)</td>
<td>1 SJ</td>
<td>39.3</td>
<td>25.3</td>
<td>4.20</td>
<td>5.37</td>
<td>0.36</td>
</tr>
<tr>
<td>SD 257 (LSL Pl Sci)</td>
<td>2</td>
<td>37.8</td>
<td>26.1</td>
<td>4.18</td>
<td>4.70</td>
<td>0.34</td>
</tr>
<tr>
<td><strong>Average MG</strong></td>
<td></td>
<td><strong>39.0</strong></td>
<td><strong>26.1</strong></td>
<td><strong>4.19</strong></td>
<td><strong>4.93</strong></td>
<td><strong>0.34</strong></td>
</tr>
<tr>
<td><strong>VR Harvested Fruit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHN 523 (BHN)</td>
<td>2</td>
<td>42.0</td>
<td>21.6</td>
<td>4.06</td>
<td>4.88</td>
<td>0.42</td>
</tr>
<tr>
<td>Mariana (Sakata)</td>
<td>1 SJ</td>
<td>40.3</td>
<td>23.3</td>
<td>4.25</td>
<td>5.47</td>
<td>0.41</td>
</tr>
<tr>
<td>Miroma (Syngenta)</td>
<td>2</td>
<td>42.6</td>
<td>19.3</td>
<td>4.20</td>
<td>4.80</td>
<td>0.36</td>
</tr>
<tr>
<td>Monica (Sakata)</td>
<td>1 SJ</td>
<td>39.3</td>
<td>18.7</td>
<td>4.26</td>
<td>5.67</td>
<td>0.42</td>
</tr>
<tr>
<td>PX 2626 (Seminis)</td>
<td>1 F</td>
<td>42.6</td>
<td>21.2</td>
<td>4.17</td>
<td>4.43</td>
<td>0.31</td>
</tr>
<tr>
<td>RFT 8109 (Syngenta)</td>
<td>1 SJ</td>
<td>41.1</td>
<td>19.7</td>
<td>4.20</td>
<td>5.40</td>
<td>0.38</td>
</tr>
<tr>
<td>SD 257 (LSL Pl Sci)</td>
<td>2</td>
<td>41.6</td>
<td>21.2</td>
<td>4.20</td>
<td>4.86</td>
<td>0.37</td>
</tr>
<tr>
<td><strong>Average VR</strong></td>
<td></td>
<td><strong>41.3</strong></td>
<td><strong>20.7</strong></td>
<td><strong>4.19</strong></td>
<td><strong>5.07</strong></td>
<td><strong>0.38</strong></td>
</tr>
<tr>
<td><strong>“LSD.05”</strong></td>
<td></td>
<td><strong>0.6</strong></td>
<td><strong>2.4</strong></td>
<td><strong>0.09</strong></td>
<td><strong>0.19</strong></td>
<td><strong>0.03</strong></td>
</tr>
</tbody>
</table>

Color and firmness data are from 3 replicates of 10-15 fruits; composition data are from 3 replicates of composite samples of 10-15 fruit. Data were analyzed as 2-way ANOVA for each trial. The “LSD.05” value provides an estimate and is from the average LSD.05 values for the maturity stages for the 2 trials. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.
TITLE: Evaluation of variety tolerance to herbicide control of yellow nutsedge and nightshade in a processing tomato/cotton production system in salty soil.

Summary. Certain processing tomato varieties were found to be sensitive to the new nutsedge herbicide Sandea (halosulfuraon-methyl), and phytotoxicity was exasperated when Matrix (rimsulfuron, for nightshade control) was added to the tank-mix. SUN 6119 and H9780 had more than 50% phytotoxicity one week after spraying, however, there was no significant effect on yield. No significant phytotoxicity was seen with the other herbicide treatments. Results from 2003 show that the Sandea + Matrix combination gives excellent weed control in fields with nutsedge and nightshade weed problems. It is important for growers to know that while Sandea may cause some yellowing of the plants, this effect is temporary and will not impact yield.

RESULTS AND DISCUSSION: This trial was established in a field near Los Banos, CA, to evaluate current nightshade and nutsedge herbicides on weed efficacy and crop performance in different varieties. Five processing tomato varieties and six herbicide treatments were used in this trial. The herbicide treatments consisted of:

1. Dual Magnum (metolachlor) PPI – grower applied at label rate (UTC)
2. Dual + Sandea (halosulfuron-methyl) 1 oz/A + NIS
3. Dual + Matrix (rimsulfuron) 2 oz/A + NIS
4. Dual + Sencor (metribuzin) 2/3 lb broadcast
5. Dual + Sandea 1 oz/A + Matrix 2 oz/A + NIS
6. Dual + Matrix 2 oz/A + NIS + Sencor 2/3 lb broadcast

The varieties used were:

1. Halley 3155
2. H9665
3. PS 296
4. SUN 6119
5. H9780

A split-plot design was used, with herbicide as the main treatment and variety the split plot treatment. Plot was located within a commercial production field, furrow irrigated. The field had already received an pre-plant incorporated (PPI) application of Dual Magnum. Varieties were transplanted May 8, 2004. Herbicide applications were broadcast applied June 16, 2004 over-the-top when plants were at full bloom. Treatments were slightly delayed because I was waiting to see if irrigation would bring a flush of weeds, which did not occur. Post application phytotoxicity ratings were based on yellowing, stunting, and leaf necrosis using a scale of 0 to 10. Values were transformed using the arcsin transformation for statistical analysis. For phytotoxicity ratings, the control plots were arbitrarily assigned a value of zero and used as a
comparison to the other treatments within a block. As such, UTC treatments were not included in the statistical analysis (phytotoxicity ratings only).

Soil was a Dos Palos clay loam, moderately saline with an EC of 1.7 in the upper 12 inches. Soil analysis results are shown in Table 1.

Phytotoxicity ratings are shown in Table 2. Averaged across varieties, the Sandea + Matrix tank mix caused significantly greater phytotoxicity, almost 35% one week after application, as compared to the other treatments. The next most phytotoxic treatment was the Matrix + Sencor tank mix, at 8% (Figure 1).

A strong variety by herbicide interaction (significant at p < 0.001) indicated that the amount of phytotoxicity caused by the herbicide treatments was different between the varieties. SUN 6119 and H 9780 were both far more sensitive to Sandea and Sandea + Matrix than the other varieties (Figure 2). The Sandea + Matrix tank-mix resulted in far greater phytotoxicity than either chemical alone. SUN6119 had greater than 60% phytotoxicity one week post application.

By two weeks after herbicide application, almost no phytotoxicity symptoms could be seen.

Weed control ratings were very limited until the end of the season. The grower had preplant applied Dual Magnum to the whole field. Additionally, the field had been in Roundup Ready cotton the previous year, which had eliminated much of the nightshade and nutsedge pressure. As a result, there was no nightshade or nutsedge growing in any of the plots. By the end of the season, however, mallow, pigweed, and Johnson grass were present. The herbicide treatments did significantly reduce the amount of weed pressure as compared to the UTC (Figure 3).

Variety had a significant effect on yield, soluble solids, color, and pH, but there was no significant difference from herbicide treatments (Table 2). The Sandea + Matrix treatment yielded as well as the UTC in spite of the phytotoxicity symptoms earlier in the season (Figure 4).

This trial was shown at a field day on August 19, which was poorly attended, and results were presented at the IPM Update Class in Merced on October 12. Last January, results from the 2003 trial were shown and the Northern San Joaquin Processing Tomato Production meeting in Modesto.

Acknowledgements: Many thanks to CTRI for their financial assistance and Dan Burns, San Juan Ranch, for his cooperation with this trial.

<table>
<thead>
<tr>
<th>Table 1. Soil analysis results.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depth</strong></td>
</tr>
<tr>
<td>inches</td>
</tr>
<tr>
<td>0 – 12</td>
</tr>
<tr>
<td>12 – 24</td>
</tr>
</tbody>
</table>
Table 2. Crop phytotoxicity and weed control ratings as affected by herbicide treatment, Merced 2004.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Variety</th>
<th>1 week post Phyto, % Weeds</th>
<th>2 weeks post Phyto, % Weeds</th>
<th>19-Aug Weeds</th>
<th>yield</th>
<th>Color</th>
<th>SS, %</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 week post</td>
<td>2 weeks post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. UTC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7.3</td>
<td>40.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sandea</td>
<td>6.27</td>
<td>0</td>
<td>0.1</td>
<td>14.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Matrix</td>
<td>3.40</td>
<td>0.4</td>
<td>0</td>
<td>5.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Sencor</td>
<td>0.38</td>
<td>0</td>
<td>0</td>
<td>3.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Sandea + Matrix</td>
<td>34.76</td>
<td>3.4</td>
<td>0</td>
<td>8.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Matrix + Sencor</td>
<td>8.00</td>
<td>0</td>
<td>0</td>
<td>5.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Herb treatment LSD | 5.94 | --- | 1.5 | 1.5 | 5.8 | NS | NS | NS | NS |
| Variety LSD | 3.5 | --- | 1.3 | --- | --- | 5.40 | 4.70 | 1.12 | 0.21 | 0.06 |

| Treatment x Variety | *** | --- | ** | --- | --- | NS | --- | ---- | --- |
| CV, % | 52.6 | --- | 269.0 | 194.0 | 70.0 | 14.0 | 3.6 | 3.5 | 1.05 |

Herbicide application made June 16.
Phytotoxicity values as compared to the untreated control.
Weeds primarily mallow and pigweed. Values indicate weed pressure (0 = nothing). Ratings only made on herbicide treatments.

LSD = Least significant difference at the 95% probability level. Means separated by less than this amount are not significantly different.
NS = not significant
***, ** = interaction significant at p=0.001 and 0.01 respectively.
Figure 1. Box-plot showing phytotoxicity caused by herbicide treatments at one week after application.

Figure 2. Phytotoxicity showing the variety by herbicide treatment interaction one week after application. SUN 6119 and H9780 were more sensitive to the herbicides than the others.
Figure 3. Weed control as affected by herbicide treatment. At 2 weeks post application there were very few weeds in any of the plots. Towards the end of the season, weed control was significantly better in all herbicide treatments as compared to the UTC plot.

Figure 4. Average yield as affected by herbicide treatment. While there was a large variety effect, there was no significant difference in yield with the herbicide treatments.
Merced County, 2004

Associate Farm Advisor
Merced and Madera Counties
2245 Wardrobe Ave
Merced, CA 95340
209-385-7403
csstoddard@ucdavis.edu

OBJECTIVE: Evaluate different commercial processing tomato varieties in their tolerance to different rates of Sandea (halosulfuron-methyl) herbicide. A tank mix with Matrix (rimsulfuron) was also included for evaluation.

METHODS: A split plot, randomized block treatment design was utilized in a production tomato field located north of Dos Palos in Merced County. Eighteen different commercially available varieties were direct seeded April 23 (Table 1). Main plot size was 100 feet by one bed (5 feet wide), replicated 4 times. Plots were hand seeded using a Planter Jr into prepared beds. Dual Magnum had already been preplant incorporated for weed control. 80% emergence occurred by May 10.

On May 25, herbicide treatments were applied with a hand held CO$_2$ sprayer using 8002 nozzles at 35 psi and 30 gpa equivalent. A not-ionic surfactant (R11) was used with all treatments. Herbicides were broadcast applied over the top of the tomatoes, most of which were about 4 true leaves. Herbicide plots split the varieties, and were 25 feet long. Some pigweed was present in the plots at the time of application, but little to no nightshade nor nutsedge. Herbicide treatments are listed in Table 1. The recommended label rate for Sandea on tomatoes is 1 oz per acre, and for Matrix it is 2 oz/A.

Phytotoxicity evaluations began one week after herbicide application, on June 2, 2004. Plots were evaluated for a total of three weeks. Sprayed plots were compared to the untreated and given a rating from 0 to 5, where 0 = no phytotoxicity and 5 = complete death. Phytotoxicity symptoms included yellowing, twisting/distortion of leaves, necrotic spots, and stunting (complete death from the herbicide treatments was not observed in this trial).

Treatment effects on yield were estimated by hand harvesting 5 feet within each plot. Due to loss of plants/plots from cultivator damage, not all plots were harvested. Plots were harvested September 10.

At about the time of the first evaluation, the plots suffered mechanical damage from machine discing to control weeds. Some plots were completely lost. As a result, only 3 of the 4 reps could be used in the statistical analysis.

Treatment effects were analyzed using CoStat 6.3, using standard split-plot AOV procedures. The evaluation data were transformed using the arcsin transformation to improve the homogeneity of the variances. The transformed data result in phytotoxicity scores that are expressed as percentages of the untreated control. Because the check plots were used as a comparison to the other treatments that received herbicides, they were arbitrarily assigned a value of zero and therefore were not included in the statistical analysis.

RESULTS: Phytotoxicity scores are presented in Table 1 and Figures 1 – 4. Significant differences were found between the varieties regarding their sensitivity to Sandea, but there was no significant difference
between the treatments that received Sandea. Averaged across all varieties, Sandea at 1 oz per acre was no more phytotoxic than the 0.67 oz rate. Surprisingly, the addition of Matrix did not significantly increase phytotoxicity either as compared to Sandea alone (Figure 2). In a similar trial at a different location, the addition of Matrix to Sandea caused significantly more plant injury.

The varieties appear to break out into 2 groups: almost no observed phytotoxicity from the treatments, and those which showed levels > 25% at two weeks post-application. The varieties in the "sensitive" group were SUN 6119, H9780, H9557, HM830, SUN 6117, and HYPEEL 108. 3155, UG 113, and Hypeel 303 showed moderate sensitivity around 20% two weeks post application (Figure 1). All other varieties would be considered not sensitive or tolerant of Sandea.

Only at the first evaluation was the variety x herbicide interaction significant (Fig 3). The lack of a significant interaction indicates that each variety responded similarly to the herbicide treatments. For example, H9665 had very little phytotoxicity even as Sandea rate increased or Matrix was added. H9780 was much more sensitive to Sandea, but again the phytotoxicity was about the same for all treatments (Fig 4). Figure 6 shows the leaf symptoms of sensitive variety HyPeel 108.

Despite the wide difference in phytotoxicity, there were no significant yield differences observed between the herbicide treatments (Table 1). Significant differences were observed between varieties (Fig 5). Best yields occurred with H9665, followed closely by H9780, HyPeel 347, BOS S55, and H9557.

ACKNOWLEDGEMENTS: Many thanks to John Woodruff with Wolfson’s Ranch for his help and cooperation with this test, James Brazzle with Gowen Co. for product, and the following seed company reps for variety seed donations: Matt Leinfelder, Heinz; Roland Zeidler, Unilever; Jerry Tarry and Greg Orsetti, Orsetti; Justin Bream, United Genetics, Erik Kowes, Harris Moran; Steve Schroeder, Sunseeds; Hasaan Bolkan, Campbell’s; John Bill, Petoseed.
Table 1. Sandea variety evaluation on processing tomatoes. Merced 2004.

<table>
<thead>
<tr>
<th>Herbicide treatment</th>
<th>Variety</th>
<th>2-Jun-04</th>
<th>8-Jun</th>
<th>15-Jun</th>
<th>lbs/5 ft</th>
<th>tons/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UTC</td>
<td></td>
<td>13.3</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td>48.9</td>
</tr>
<tr>
<td>2. Sandea 0.66 oz/A</td>
<td></td>
<td>48.2</td>
<td>30.1</td>
<td>24.4</td>
<td>50.1</td>
<td>43.2</td>
</tr>
<tr>
<td>3. Sandea 1.0 oz/A</td>
<td></td>
<td>42.9</td>
<td>25.4</td>
<td>18.3</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>4. Sandea 0.66 oz + Matrix 2 oz/A</td>
<td></td>
<td>50.1</td>
<td>24.8</td>
<td>20.1</td>
<td>49.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Halley 3155</td>
<td>44.4</td>
<td>22.2</td>
<td>25.0</td>
<td>46.0</td>
<td>40.08</td>
</tr>
<tr>
<td></td>
<td>BOS S55</td>
<td>29.7</td>
<td>6.6</td>
<td>11.8</td>
<td>53.3</td>
<td>46.43</td>
</tr>
<tr>
<td></td>
<td>H9494</td>
<td>29.7</td>
<td>0.0</td>
<td>3.3</td>
<td>52.2</td>
<td>45.48</td>
</tr>
<tr>
<td></td>
<td>H9665</td>
<td>26.4</td>
<td>2.2</td>
<td>0.9</td>
<td>58.8</td>
<td>51.23</td>
</tr>
<tr>
<td></td>
<td>H8892</td>
<td>36.6</td>
<td>8.8</td>
<td>1.8</td>
<td>37.7</td>
<td>32.84</td>
</tr>
<tr>
<td></td>
<td>SUN 6119</td>
<td>60.3</td>
<td>36.6</td>
<td>47.1</td>
<td>50.7</td>
<td>44.17</td>
</tr>
<tr>
<td></td>
<td>H9780</td>
<td>63.3</td>
<td>44.0</td>
<td>43.2</td>
<td>55.5</td>
<td>48.35</td>
</tr>
<tr>
<td></td>
<td>H1100</td>
<td>28.4</td>
<td>15.3</td>
<td>29.5</td>
<td>40.6</td>
<td>35.37</td>
</tr>
<tr>
<td></td>
<td>H9557</td>
<td>43.2</td>
<td>25.8</td>
<td>47.1</td>
<td>52.8</td>
<td>46.00</td>
</tr>
<tr>
<td></td>
<td>H9494</td>
<td>26.4</td>
<td>18.8</td>
<td>24.0</td>
<td>50.6</td>
<td>44.08</td>
</tr>
<tr>
<td></td>
<td>H8892</td>
<td>36.6</td>
<td>8.8</td>
<td>1.8</td>
<td>37.7</td>
<td>32.84</td>
</tr>
<tr>
<td></td>
<td>SUN 6117</td>
<td>58.9</td>
<td>34.4</td>
<td>33.3</td>
<td>56.6</td>
<td>49.31</td>
</tr>
<tr>
<td></td>
<td>CXD 179</td>
<td>21.9</td>
<td>6.6</td>
<td>3.3</td>
<td>45.6</td>
<td>39.73</td>
</tr>
<tr>
<td></td>
<td>U447</td>
<td>25.0</td>
<td>8.1</td>
<td>9.1</td>
<td>50.8</td>
<td>44.26</td>
</tr>
<tr>
<td></td>
<td>APT 410</td>
<td>39.6</td>
<td>10.8</td>
<td>3.0</td>
<td>44.5</td>
<td>38.77</td>
</tr>
<tr>
<td></td>
<td>Hypeel 347</td>
<td>28.9</td>
<td>7.5</td>
<td>7.5</td>
<td>54.6</td>
<td>47.57</td>
</tr>
<tr>
<td></td>
<td>Hypeel 108</td>
<td>59.4</td>
<td>64.1</td>
<td>70.0</td>
<td>52.2</td>
<td>45.48</td>
</tr>
<tr>
<td></td>
<td>Hypeel 303</td>
<td>28.4</td>
<td>23.1</td>
<td>3.3</td>
<td>50.7</td>
<td>44.17</td>
</tr>
</tbody>
</table>

Herbicide LSD 0.05 = 6.75 NS NS NS NS
Variety LSD 0.05 = 23.24 22.9 21.6 8.8

Phytotoxicity ratings on a scale of 0 - 5. Ratings converted to % using arcsin method.
Yield measured by hand picking 5 ft within each plot.

LSD 0.05 = Least Significant Difference at the 95% confidence level. Means less than this amount are not significantly different. NS = not significant. UTC means for phytotoxicity ratings are not included in the statistical analysis.

* = interaction significant at p=0.1.
CV = coefficient of variation.
Figure 1. Tomato phytotoxicity by variety at three post application dates. Error bars are ± one standard error.

Figure 2. Tomato phytotoxicity rating for each treatment at three post application evaluation dates. Error bars are ± one standard error.
June 2, 2004
Treatment x Variety

Figure 3. Variety by treatment interaction for observed phytotoxicity on processing tomatoes on June 2 (1 week post-treatment). Error bars are one standard error.

June 8, 2004
Treatment x Variety

Figure 4. Variety by treatment interaction for observed phytotoxicity on processing tomatoes on June 8 (2 weeks post-treatment). Error bars are one standard error. Excluding the UTC, this interaction was not significant on this date.
Figure 5. Yield by variety, averaged across herbicide treatments. Error bars are ±1 standard error. Significant differences were found between varieties, but not herbicide treatments.

Figure 6. Photos of effects of Sandea on sensitive variety HyPeel 108.