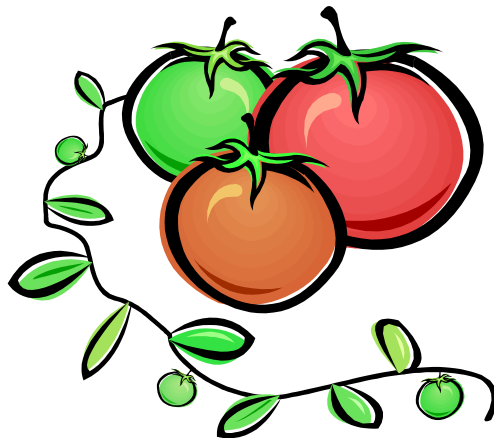
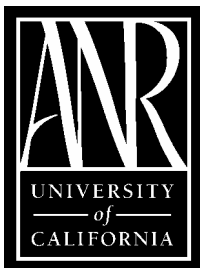


**2003**  
**Fresh Market Tomato**  
*Statewide Uniform Variety Trial Report*  
*Field and Postharvest Evaluations*  
**South San Joaquin Valley**



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# 2003 Fresh Market Tomato Variety Trial Research Report South San Joaquin Valley

*Michelle Le Strange, Farm Advisor, Tulare & Kings Counties*

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## ACKNOWLEDGMENTS

I would like to express my gratitude to a few individuals for their assistance in conducting these field trials. Without their help, this information would not be available for use by the fresh market tomato industry.

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- i The commercial seed companies that supplied seed and support for the variety trial;
- i Michael Vietti of Edwards Nursery in Visalia for raising the transplants for the variety trial;
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# 2003 Fresh Market Tomato Variety Trial Report - Kings County

*Michelle Le Strange, Farm Advisor*

## Introduction

Fresh market tomato trials are conducted by UCCE in Kings/Tulare, Merced, and San Joaquin counties. These trials assist in evaluation of the performance of new varieties and breeding lines from commercial plant breeding programs. To assess performance under various climatic conditions, soil types, and cultural practices, the same varieties are planted at each location but with different transplant dates: early, mid, and late season for Kings, Merced, and San Joaquin, respectively.

Two tests are conducted at the same time and location. A replicated test consists of varieties or lines which have previously been in trials and grown commercially. An observed test evaluates the plant breeder's most promising lines for California's commercial growing conditions and markets. This report summarizes both the replicated and observed variety test conducted in Kings County.

## Trial Procedure

The 2003 variety trial was established in a fresh market tomato field near Kettleman City in Kings County. Seeds were planted in the greenhouse on February 26 and set in the field with a commercial three-row planter on April 16 for a midsummer harvest. Specific information about the field and the research trial is presented in Table 1. Ten varieties were replicated four times, and 13 varieties were observed in single plots. Variety names, code numbers, and sources of seed are listed in Table 2. The tomato variety trial was grown under subsurface drip irrigation and the grower's standard cultural practices.

The varieties were hand harvested on July 17, 92 days after transplanting. Ten consecutive feet of row were harvested from each plot, though plot size was larger. Red fruit were picked into

buckets and weighed separately before they were sorted by size and quality with the mature green fruit. Yields and market grades of the replicated and observed varieties are presented in Tables 3A, 3B, 5 and Figures 1 and 2, while Tables 4 and 6 are summaries of the fruit quality characteristics.

Reported yields may appear extraordinarily high compared to commercial averages. Under these experimental conditions, one goal is to ascertain "potential" yield of varieties and to make relative comparisons between varieties. We tend to pick and grade more fruit than commercial harvesters, who are more discriminating in what goes to market. Also, converting pounds per plot to tons per acre exaggerates yield because drive rows, roadways, etc., and other poor areas in the field are not considered.

Some key terms used in data analysis are defined and listed on the back page of this report.

## Summary

Weather conditions were unseasonably cool during the first month after transplanting, then, became unseasonably hot for the remainder of the season. Crown set was good but later fruit set was affected by the high temperatures. Vine growth became excessively rank during the three weeks prior to harvest. At harvest vines were huge and crossed over furrows. Perhaps for this reason variation within the experiment was higher than is desirable.

Average marketable yield was almost 2 tons/acre higher than in 2002, however total yield averaged almost 9 tons/acre less.

### Trial Averages By Year

	Yield Tons/A		%
	Market	Total	Red
2003	30.6	36.8	19.7
2002	28.7	45.6	21.7
2001	21.1	31.9	21.1
2000	24.9	36.5	11.4

### REPLICATED VARIETIES

#### Yields and Grades (Tables 3A & 3B) and Figure 1.

Market Yield: Market yield ranged from a high of 40.9 tons (3274 boxes) to a low of 22.8 tons (1827 boxes) with an average of 30.6 tons (2448 boxes) per acre for the ten replicated varieties.

BHN 499, Sun King, BHN 358, Shady Lady, and L-312 were the top performers. BHN 499, Sun King, and BHN 358, out performed QualiT 21, which ranked lowest in marketable yield. In past years QualiT 21 had been a top performer and Shady Lady was average.

Total Yield: Small and cull fruit combined averaged 5.8 tons per acre. Total yield ranged from 49 tons to 28.2 tons per acre. The varietal ranking shifted insignificantly when sorted by total yield (Table 3-B); the same five varieties remained on top.

Fruit Grades: The trial averaged 49.6, 36.2, and 14.2% extra large, large, and medium size fruit, respectively. This is very similar to the averages from last year (2002), which were considered higher than usual in extra-large fruit and lower than usual in medium size fruit.

Percent Red Fruit at Harvest: The trial's average maturity at harvest was 19.7% red fruit. Shady Lady was the earliest at 45% red followed by BHN 499 and RFT 6047. The field variety was QualiT 23 which was at 15.3% reds in this trial. Fruit maturity ranged from 44.9 to 4.0% red fruit. QualiT 21 had the fewest red fruit.

### Fruit and Vine Characteristics (Table 4)

Fruit shape ranged from flat globe to deep globe. In general fruit shape of most varieties was not as round as usual, though still very acceptable in appearance.

Shoulder smoothness and blossom end size was variable among the varieties, which is typical. Shady Lady had tighter blossom ends than is usually seen in this trial. Vine size was ranked relative to each other and all tended to be large.

Overall quality is based on visual appeal and represents a general conclusion based on all quality characteristics. Overall appearance ranged from good to poor. No variety was extremely outstanding in high quality though most were acceptable. L-312, a high yielding variety, was too flat and the blossom end was too large for this market.

### OBSERVED VARIETIES

Single plot observations are useful to obtain an indication of a variety's potential. However, yield and other data are not an average of several plots, so there is more room for error. For this reason the absolute numbers are not as meaningful as in replicated trials. Case in point is Shady Lady. In the replicated trial it averaged 33 tons, whereas a single plot of it in the observed trial yielded ten tons less.

#### Yields and Grades (Table 5)

Marketable yield ranged from 32.4 tons (2592 boxes) to 13.1 tons (1052 boxes) with an average yield of 22.2 tons (1780 boxes) per acre. Non market yield accounted for approximately 6.5 tons and total yields did not change the ranking of most varieties.

Fruit grades were approximately 40-40-20 for extra large, large, and medium size fruit. Percent red fruit at harvest ranged from 42.3 to 3.2%. Shady Lady was the earliest followed by XTM 0113 and BHN 623. L-311, BHN 502, and BHN 526 were the latest.

### Fruit and Vine Characteristics (Table 6)

Fruit were flatter in shape than in most other years. Blossom ends were nice and tight in many lines. Shoulder smoothness was not as round and smooth as is desirable in most cases, although there were a few exceptions. Most stem scars

were not exceedingly obvious. The lower yielding varieties tended to have the most rank and large size vines. All experimental lines were acceptable in overall appearance.

**2003 Fresh Market Tomato Variety Trial  
South San Joaquin Valley – Kings County**

Table 1

**Trial Specifics**

<b>Cooperators</b>	Jones Farms – Richard Newton, grower; Joe Fabry, ag consultant; Andy Murphy, O.P. Murphy & Sons
<b>Trial Location</b>	Highway 41 and Quail Avenue, Kettleman City
<b>Soil Type</b>	Panoche fine sandy loam
<b>Previous Crop</b>	Cotton
<b>Transplant Date</b>	April 16, 2003                      Greenhouse Seeded: Feb. 26, 2003
<b>Plot Size</b>	One 60-inch bed x 45-foot row; 25 plants per plot
<b>Plant Spacing</b>	22 inches between plants; single row per bed
<b>Field Variety</b>	QualiT 23
<b>Pesticides</b>	Admire® and Ridomil® at planting; Asana®
<b>Fertilization</b>	~140 lbs N, 75 lbs P <sub>2</sub> O <sub>5</sub> and 85 lbs K <sub>2</sub> O
<b>Irrigation</b>	Subsurface drip irrigation
<b>Harvest Date</b>	July 17, 2003 - 92 days after transplant
<b>Harvest Plot Size</b>	One 60-inch bed x 10-foot row
<b>Experimental Design</b>	Randomized Complete Block (4 replications: A, B, C, D)

**2003 Fresh Market Tomato Variety Trial**  
**South San Joaquin Valley – Kings County**

Table 2

**Seed Sources and Varieties**

<b>Source</b>	<b>Replicated</b>		<b>Observed</b>	
BHN	1	BHN 358	21	BHN 502
	2	BHN 464	22	BHN 526
	3	BHN 499	23	BHN 581
			24	BHN 611
			25	BHN 623
Harris Moran			26	HMX 2807
LSL	4	L-312	27	L-310
			28	L-311
			29	B-807
Rogers/Syngenta	5	QualiT 21		
	6	QualiT 23		
	7	Bobcat		
	8	RFT 6047		
Sakata			30	XTM 0113
			31	XTM 0115
			32	XTM 0230
			33	STM 0231
Seminis	9	Sun King (XP 150410)		
Sunseeds	10	Shady Lady		

Table 3-A

**2003 YIELDS AND GRADES OF FRESH MARKET TOMATO VARIETIES**  
**South San Joaquin Valley - Kettleman City, Kings County**  
**Replicated Varieties**  
**SORTED BY MARKETABLE YIELD**

Code Variety	Market ..... Yield/Acre <sup>1*</sup> .....			% Market Yield <sup>2</sup>			Nonmarket ... Yield ...		TOTAL Yield <sup>5</sup>	% Reds <sup>6</sup>
	Tons	Boxes		X-L	Large	Med	Small <sup>3</sup> T/A	Culls <sup>4</sup> T/A		
3 BHN 499	40.9	3274	a	48.5	39.4	12.2	3.3	4.2	49.0	34.0
9 Sun King	36.3	2904	ab	48.5	35.5	16.1	3.1	3.1	42.8	13.1
1 BHN 358	36.0	2876	ab	50.8	35.2	14.0	2.4	2.5	41.3	15.2
10 Shady Lady	33.0	2639	abc	55.5	34.1	10.4	2.9	3.0	39.4	44.9
4 L-312	31.9	2548	abc	48.3	37.6	14.2	2.6	6.6	41.6	12.6
7 Bobcat	27.3	2187	bc	61.4	28.4	10.2	1.8	3.1	32.5	18.8
6 QualiT 23	26.7	2139	bc	46.3	37.5	16.3	1.7	2.2	30.9	15.3
8 RFT 6047	25.9	2069	bc	57.3	29.4	13.3	1.8	2.6	30.6	24.6
2 BHN 464	25.2	2013	bc	40.0	42.4	17.7	3.0	3.0	31.6	14.7
5 QualiT 21	22.8	1827	c	39.7	42.3	18.0	2.9	1.9	28.2	4.0
<b>Average</b>	<b>30.6</b>	<b>2447.8</b>		<b>49.6</b>	<b>36.2</b>	<b>14.2</b>	<b>2.6</b>	<b>3.2</b>	<b>36.8</b>	<b>19.7</b>
LSD .05	11.6	930.0		14.0	8.3	8.4	1.8	2.8	13.7	8.9
CV %	26.2	26.2		19.4	15.9	40.8	48.2	59.0	25.6	26.3

- 1 - Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit.
  - 2 - Percent Market Yield = the percentage of each fruit size of the market yield.
  - 3 - Small fruit were considered unmarketable this year.
  - 4 - Culls = all unsalable fruit (catfaced, diseased, misshapen, wormy, sunburned, etc.) and extra small fruit in tons per acre (This year there were NO extra small fruit at harvest.)
  - 5 - Total Yield = Marketable Yield plus small fruit and culls.
  - 6 - Percent Red = percent reds by weight of the TOTAL yield including culls to indicate maturity relative to all of the tested varieties.
- \* - Varieties followed by the same letter are not statistically different from each other.

## Fruit Sizes:

XL = 2 7/8 to 3 15/16 inches in diameter  
L = 2 17/32 to 2 7/8 inches in diameter  
M = 2 9/32 to 2 17/32 inches in diameter  
S = 2 1/8 to 2 9/32 inches in diameter

LSD 0.05 = Least significant difference at the 95% probability level.

NS = Not significant at the 95% probability level.

CV % = Coefficient of variation, a measure of the variability in the experiment.

Table 3-B

**2003 YIELDS AND GRADES OF FRESH MARKET TOMATO VARIETIES**  
**South San Joaquin Valley - Kettleman City, Kings County**  
**Replicated Varieties**  
**SORTED BY TOTAL YIELD**

#	Variety	Market			% Market Yield <sup>2</sup>			Nonmarket ... Yield ...		TOTAL Yield <sup>5*</sup>	% Reds <sup>6</sup>	
		..... Yield/Acre <sup>1*</sup> .....	Tons	Boxes	X-L	Large	Med	Small <sup>3</sup> T/A	Culls <sup>4</sup> T/A			
3	BHN 499	40.9	3274	a	48.5	39.4	12.2	3.3	4.2	<b>49.0</b>	<b>a</b>	34.0
9	Sun King	36.3	2904	ab	48.5	35.5	16.1	3.1	3.1	<b>42.8</b>	<b>ab</b>	13.1
4	L-312	31.9	2548	abc	48.3	37.6	14.2	2.6	6.6	<b>41.6</b>	<b>abc</b>	12.6
1	BHN 358	36.0	2876	ab	50.8	35.2	14.0	2.4	2.5	<b>41.3</b>	<b>abc</b>	15.2
10	Shady Lady	33.0	2639	abc	55.5	34.1	10.4	2.9	3.0	<b>39.4</b>	<b>abc</b>	44.9
7	Bobcat	27.3	2187	bc	61.4	28.4	10.2	1.8	3.1	<b>32.5</b>	<b>bc</b>	18.8
2	BHN 464	25.2	2013	bc	40.0	42.4	17.7	3.0	3.0	<b>31.6</b>	<b>bc</b>	14.7
6	QualiT 23	26.7	2139	bc	46.3	37.5	16.3	1.7	2.2	<b>30.9</b>	<b>bc</b>	15.3
8	RFT 6047	25.9	2069	bc	57.3	29.4	13.3	1.8	2.6	<b>30.6</b>	<b>bc</b>	24.6
5	QualiT 21	22.8	1827	c	39.7	42.3	18.0	2.9	1.9	<b>28.2</b>	<b>c</b>	4.0
	<b>Average</b>	<b>30.6</b>	<b>2447.8</b>		<b>49.6</b>	<b>36.2</b>	<b>14.2</b>	<b>2.6</b>	<b>3.2</b>	<b>36.8</b>		<b>19.7</b>
	LSD .05	11.6	930.0		14.0	8.3	8.4	1.8	2.8	13.7		8.9
	CV %	26.2	26.2		19.4	15.9	40.8	48.2	59.0	25.6		26.3

- 1 - Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit.
- 2 - Percent Market Yield = the percentage of each fruit size of the market yield.
- 3 - Small fruit were considered unmarketable this year.
- 4 - Culls = all unsalable fruit (catfaced, diseased, misshapen, wormy, sunburned, etc.) and extra small fruit in tons per acre (This year there were NO extra small fruit at harvest.)
- 5 - Total Yield = Marketable Yield plus small fruit and culls.
- 6 - Percent Red = percent reds by weight of the TOTAL yield including culls to indicate maturity relative to all of the tested varieties.
- \* - Varieties followed by the same letter are not statistically different from each other.

Fruit Sizes:

- XL = 2 7/8 to 3 15/16 inches in diameter
- L = 2 17/32 to 2 7/8 inches in diameter
- M = 2 9/32 to 2 17/32 inches in diameter
- S = 2 1/8 to 2 9/32 inches in diameter

LSD 0.05 = Least significant difference at the 95% probability level.

NS = Not significant at the 95% probability level.

CV % = Coefficient of variation, a measure of the variability in the experiment.

Table 4

**TOMATO FRUIT & VINE CHARACTERISTICS**  
**2003 Replicated Varieties**  
**South San Joaquin Valley - Kettleman City, KINGS County**

Code	Variety	Fruit shape	Shoulder smooth	Blos end	Stem scar	Vine size	Leaf cover	Overall	Comments
3	<b>BHN 499</b>	FG-G	med	2 - 4	sm - med	VL		F	nice uniform green color
9	<b>Sun King</b>	FG-DG	med-r	1 - 3	med	L		F	good blossom end, shoulders a little rough, green color is sometimes striated, some fruit blemish, some incipient blossom end rot
1	<b>BHN 358</b>	G	sm	1	sm - med	VL		G	smooth fruit, very tight blossom ends, some pointed ends, many reds
10	<b>Shady Lady</b>	FG	med - r	1 - 2	med	M - ML		F	huge yield, smooth fruit, shoulders a little rough, good blossom end
4	<b>L-312</b>	FG-G	med	4	med	ML - L		P	bad blossom end large fruit are very flat
7	<b>Bobcat</b>	FG-G	sm	1 - 3	sm	L		F	blossom end is ok, fruit is ok, shape is flatter than usual
6	<b>QualiT 23</b>	FG-G	sm	3 - 4	sm	ML - L		F - P	shoulders pretty smooth, blos end a little large, variable fruit shape, low yield
8	<b>RFT 6047</b>	G-FG	r	2 - 3	sm	ML - L		F - P	too immature, poor yield
2	<b>BHN 464</b>	G	sm	1 - 2	sm - med	VL		G - F	smooth fruit, some gold fleck
5	<b>QualiT 21</b>	FG-G	sm	1 - 2	sm	VL		G	nice blossom end, nice green color, smooth shoulders and fruit, low yield

- |                          |                                  |                 |                              |                               |
|--------------------------|----------------------------------|-----------------|------------------------------|-------------------------------|
| 1 - Fruit Shape:         | FG = flat globe                  | G = globe       | DG = deep globe              | var = variable                |
| 2 - Shoulder Smoothness: | Vsm = very smooth                | sm = smooth     | med = medium                 | r = rough                     |
| 3 - Blossom End:         | 1 = tight                        | 2 = slight scar | 3 = medium scar              | 4 = big scar                  |
| 4 - Stem Scar:           | small = great, hardly noticeable |                 | med = ok                     | large = hugely noticeable     |
| 5 - Vine Size:           | VL = very large                  | L = large       | M = medium                   | s = small, relative to others |
| 6 - Leaf Cover:          | XLNT - excellent cover of fruit  |                 | VG = very good               | G = good                      |
|                          | F = fair                         |                 | P = poor, much exposed fruit |                               |
| 7 - Overall appearance:  | VG = very good                   | G = good        | F = fair                     | P = poor                      |

Table 5  
**2003 YIELDS AND GRADES OF FRESH MARKET TOMATO VARIETIES**  
 South San Joaquin Valley - Kettleman City, KINGS County  
 Observed Varieties

Code	Variety	Market .. Yield/Acre <sup>1</sup> ..		.....% Market Yield <sup>2</sup> .....			Nonmarket ....Yield ....		TOTAL Yield <sup>5</sup> T/A	% Red <sup>6</sup>
		Tons	Boxes	X-Large	Large	Medium	Small <sup>3</sup> T/A	Culls <sup>4</sup> T/A		
29	<b>B-807</b>	32.4	2592	49.2	33.7	17.1	2.4	2.4	37.3	10.4
25	<b>BHN 623</b>	30.5	2442	54.3	25.8	19.9	5.9	2.4	38.9	24.8
28	<b>L-311</b>	28.5	2280	52.2	35.3	12.5	1.7	2.8	33.1	9.5
27	<b>L-310</b>	25.9	2070	44.0	42.6	13.4	2.3	2.4	30.6	12.2
22	<b>BHN 526</b>	25.3	2023	55.0	34.5	10.6	1.6	9.6	36.5	3.2
23	<b>BHN 581</b>	23.3	1865	46.1	37.3	16.6	2.5	9.2	35.1	14.3
10	<b>Shady Lady</b>	23.0	1839	44.9	34.6	20.5	2.6	2.3	28.0	42.3
30	<b>XTM 0113</b>	21.4	1715	40.0	47.2	12.8	1.8	2.1	25.4	31.5
21	<b>BHN 502</b>	21.1	1685	32.6	43.7	23.7	3.6	2.5	27.2	9.6
31	<b>XTM 0115</b>	18.1	1450	39.3	45.2	15.5	2.4	1.6	22.1	12.0
33	<b>STM 0231</b>	18.0	1437	29.8	39.1	31.2	4.0	2.0	24.0	13.2
32	<b>XTM 0230</b>	16.8	1343	25.2	44.0	30.8	5.3	3.0	25.1	17.1
26	<b>HMX 2807</b>	14.0	1120	24.3	43.7	32.0	2.7	1.5	18.2	13.8
24	<b>BHN 611</b>	13.1	1052	46.0	32.4	21.6	1.6	4.0	18.7	12.2
	<b>Average</b>	<b>22.2</b>	<b>1779</b>	<b>41.6</b>	<b>38.5</b>	<b>19.9</b>	<b>2.9</b>	<b>3.4</b>	<b>28.6</b>	<b>16.1</b>

1 - Market Yield = average weight in pounds of four replications converted to tons & boxes per acre of all marketable extra large, large, and medium sized fruit.

2 - Percent Market Yield = the percentage of each fruit size of the market fruit.

3 - Small fruit were considered unmarketable this year.

4 - Culls = all unsalable fruit (catfaced, diseased, misshapen, wormy, sunburned, etc.) and extra small fruit in tons per acre. (This year there were NO extra small fruit at harvest.)

5 - Total Yield = Marketable Yield + Nonmarketable Yield

6 - Percent Red = percent reds by weight of the TOTAL yield including culls to indicate maturity relative to all tested varieties.

FRUIT SIZES:

XL = 2 7/8 to 3 15/16 inches diameter

L = 2 17/32 to 2 7/8 "

M = 2 9/32 to 2 17/32 "

S = 2 1/8 to 2 9/32 "

Table 6

**TOMATO FRUIT & VINE CHARACTERISTICS**  
**2003 Observed Varieties**  
**South San Joaquin Valley - Kettleman City, KINGS County**

Code	Variety	Wall	Fruit shape	Shoulder Smooth	Blos End	Stem Scar	Vine Size	Overall	Comments
29	<b>B-807</b>		FG - G	med - r	2-4	med	ML	F	rough shoulders and variable shape
25	<b>BHN 623</b>		G	sm	1-3	sm-med	M	G	smooth fruit, looks good, tight blossom ends
28	<b>L-311</b>		FG - G	med - sm	2-4	sm-med	ML	F-G	looks much better than L-312
27	<b>L-310</b>		FG - G	r - med	2-3	sm-med	ML	F	not uniform, not as consistent as L-311
22	<b>BHN 526</b>		FG	med - r	1-4	sm-med	ML	F	many big blossom end scars, too immature, culls have big blossom end
23	<b>BHN 581</b>		FG	med	2	sm-med	ML	F-G	nice dark green, some gold fleck
10	<b>Shady Lady</b>		FG	med - r	1-2		M	F-G	many large fruit are red
30	<b>XTM 0113</b>		G	sm - med	2-4	sm-med	L	F-G	pretty nice, could be more yield? Variable
21	<b>BHN 502</b>		G	sm	1-2	sm-med	ML	G	nice looking, good green color, uniform
31	<b>XTM 0115</b>		G	sm	1-3	sm-med	L	F-G	nicer than XTM 0113 (a little bit), has a tighter blossom end
33	<b>STM 0231</b>		G	med - sm	2-4	med-lg	ML	F-G	blossom end needs improving, nice shape
32	<b>XTM 0230</b>		FG - G	var	2-4	med-lg	Huge	F	
26	<b>HMX 2807</b>		G	med - r	1-3	sm-med	Huge	F-G	nice smooth sides, sort of small, yield? not that many large fruit
24	<b>BHN 611</b>		var	med	1-2	sm	Huge	F	too immature, white fruit, hard to evaluate

Wall Thickness:	VTH = very thick	TH = Thick	MTH = medium thick
Fruit Shape:	FG = flat globe	G = globe	DG = deep globe
Shoulder Smoothness:	Vsm = very smooth	sm = smooth	med = medium
Blossom End:	1 = tight	2 = slight scar	3 = medium scar
Stem Scar:	small = great, hardly noticeable	med = ok	large = very noticeable
Vine Size:	VL = very large	L = large	M = medium
Leaf Cover:	XLNT - excellent cover of fruit		VG = very good
	F = fair	Split = split open vines	P = poor, much exposed fruit
Overall appearance:	VG = very good	G = good	F = fair
			P = poor

***Statewide  
Fresh Market Tomato  
Variety Trials  
FIELD and POSTHARVEST  
Evaluations***

# Statewide Variety Trials FIELD EVALUATIONS

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Farm Advisors, Tulare & Kings, Merced & Madera, San Joaquin, and Stanislaus Counties*

## Introduction

Fresh market tomato variety trials are conducted in major tomato-growing regions in California to evaluate the performance of new varieties and breeding lines from commercial plant breeder programs and universities. Variety trials provide the opportunity to evaluate and compare fruit quality characteristics and yield under the same field conditions.

It is important to test the varieties in several areas to assess performance under different climatic conditions and soils. The objective is to identify dependable, higher yielding and higher quality variety releases that can be grown over a wide geographic area under varying environmental conditions.

To determine which varieties/lines are tested, growers/packers/shippers and seed company representatives are surveyed throughout the state. Replicated varieties have been previously tested in grower fields in California. Observed lines usually represent the plant breeder's most promising lines for California's commercial growing conditions and markets.

## Trial Locations

County farm advisors conduct the statewide variety trials in a uniform fashion so that local results can be compared with other locations. Three round variety trials and one roma variety trial were grown and harvested in commercial fields in 2003.

- **Kings County: April 16 - July 17** (92 days) with Jones Farms (O.P. Murphy & Sons) near Kettleman City (Michelle Le Strange).

- **Merced County: May 13 - August 4** (83 days) with Live Oak Farms in LeGrand (Scott Stoddard).
- **San Joaquin County: June 16 - Sept. 15** (90 days) with George Perry & Sons (San Joaquin Tomato) on Stewart Tract; round and roma tomato variety trials (Bob Mullen and Jan Mickler).

Approximately 10 varieties were replicated and 13-27 lines/varieties were grown under single plot observation at each site, representing ten commercial seed companies.

The three round tomato variety trials had 7 replicated and 15 observed (non-replicated) varieties in common. These are listed on the next page. Production results are presented in a series of tables which are described below.

Postharvest samples from all replicated varieties were collected from all trials at the time of harvest and transported to the Mann Laboratory at UC Davis for color, firmness, and composition evaluations at the table-ripe stage. Fruit were harvested as mature greens, but some cultivars were also harvested as vine ripe. A complete summary of the postharvest results follows this field evaluation report.

Each farm advisor prepares a research progress report that lists the production and postharvest performance of the varieties in their county location. These reports are mailed to the tomato industry and interested persons. They are available upon request and should be obtained and consulted with regard to variety performance in market yield, fruit sizing data, and fruit quality observations for that particular trial location.

## Varieties in Common at Kings, Merced, and San Joaquin Counties 2003 Fresh Market Tomato Uniform Trials

Seed Company	Replicated	Observed
BHN	BHN 464 (VFFNT) BHN 499 (VFF)	BHN 502 (VFFT) BHN 526 (VFFT) BHN 581 (VFFT) BHN 611 (VFF) BHN 623 (VFFT)
Harris Moran		HMX 2807 (VFFN)
LSL Plant Science	L-312 (VFFNT)	B-807 (VFFT) L-310 (VFFN) L-311 (VFFT)
Sakata		XTM 0113 (VFFAS) XTM 0115 (VFFAS) XTM 0230 (VFFAS) STM 0231 (VFFAS)
Seminis	Sun King (VFFTAAscStTylcv)	
Sunseeds	Shady Lady (VFF) SRT 6718 (VFFN) SRT 6719 (VFFN) SRT 6722 (VFFN) SXT 6624 (VFF)	Shady Lady (VFF)
Syngenta	QualiT 21 (VFFN TMV St) QualiT 23 (VFF TMV St) Bobcat (VFF St)	RFT 6047 (VFF St)

Verticillium, Fusarium race 1, Fusarium race 2, Nematode, T or TMV Tobacco Mosaic Virus, Alternaria, Stemphyllium leafspot

### Results

#### Combined Summary Tables

Tables 1 and 2 summarize the data. Tables A-B-C contain equivalent information and rank the varieties from highest to lowest. Tables 1-D and 2-D reflect the size grade percentages of marketable yield. Figures 1 and 2 depict size grades as boxes of marketable yield.

#### Replicated Varieties (3 locations)

Table 1: Yield and Maturity Summary  
 Table 1-A: Market Yield  
           Tons/Acre and Boxes/Acre  
 Table 1-B: Total Yield  
           Tons/Acre and Boxes/Acre  
 Table 1-C: Percent Reds  
 Table 1-D: Size Grades - % Market Yield  
 Figure 1: Market Yield  
           Boxes/Acre and Fruit Sizes

#### Observed Varieties (3 locations)

Table 2: Yield and Maturity Summary  
 Table 2-A: Market Yield  
           Tons/Acre and Boxes/Acre  
 Table 2-B: Total Yield  
           Tons/Acre and Boxes/Acre  
 Table 2-C: Percent Reds  
 Table 2-D: Size Grades - % Market Yield  
 Figure 2: Market Yield  
           Boxes/Acre and Fruit Sizes

#### Roma Trial (1 location)

#### Replicated & Observed Varieties

Table 3: Complete Results Summary

## Discussion

### Weather and growing conditions

**Kings County Trial** – Cool weather early in the season slowed vegetative growth. Crown set was extremely good, but exceedingly hot weather in mid to late growth stages limited fruit set. Vines were pushed and grew wild and rank in part because later fruit set was affected by the hot weather.

**Merced County Trial** – Hot weather prevailed from planting through harvest. Vines were medium in size.

**San Joaquin County Trial** – Some stand problems were encountered at planting and hot temperatures affected crown set. Vines were small. Most fruit was set later in the growing season. Yields were extremely light and plots were skimpy at harvest.

*The summary tables are included as an aid to assess and compare performances among varieties at the different locations. In this report the same data is sorted and presented in many different ways. This is at the request of the California Tomato Commission, since individuals select a variety for different reasons.*

### REPLICATED VARIETIES

**Market Yield – Tables 1, 1A, & Figure 1:** Market yield of the seven replicated varieties ranged from 28.1 to 20.8 tons (2250 to 1663 boxes) per acre, a difference of 7.3 tons. (Last year in 2002 yields ranged from 31.5 to 27.3 tons per acre with a difference of 4.2 tons separating 11 replicated varieties.) The Least Significant difference (LSD) was 1.8 tons (140 boxes). The average marketable yield at all locations was 24.9 tons/acre (1992 boxes). The same seven varieties averaged 30.2 tons in Kings, 32.1 in Merced, and 12.4 tons per acre in San Joaquin County.

BHN 499 and Sun King yielded more marketable fruit than Bobcat and QualiT 21. All varieties exceeded the performance of BHN 464.

**Total Yield – Tables 1 and 1B:** Total yield of the seven replicated varieties ranged from 39.7 to 30.8 tons per acre and averaged 34.3 tons (2745 boxes). Total yield includes all small sized and culled fruit. QualiT 23 was the only variety to change in rank. It placed lower in total yield but higher in marketable yield, indicating fewer fruit were small or culled compared to L-312 and Bobcat.

BHN 499 was the top producer in both the Kings and Merced trial, whereas L-312 and Bobcat were the high yielders in the San Joaquin trial and BHN 499 was the lowest. QualiT 21 was the low performer in Kings county, whereas in previous years it has been a high yielding performer. There was little difference between varieties at the Merced trial. Shady Lady was only replicated in Kings and Merced where it had comparable yields to Sun King.

**Percent Reds – Table 1 and 1C:** BHN 499 was the earliest of the seven varieties and QualiT 21 was the latest. Sun King, L-312, QualiT 23 and Bobcat were of the same maturity class. When Shady Lady is included in the comparison it is the earliest of all the tested varieties.

**Percent Size Grades- Table 1, 1D & Figure 1:** The seven replicated varieties averaged 38-40-22% extra large, large, and medium size fruit. Kings county had significantly more extra large fruit and significantly fewer medium fruit than the other two trials, which reflected its high crown set yield and subsequent reduced fruit set yield as the season progressed. The San Joaquin County trial had a higher percentage of medium fruit reflecting that hot weather affected the crown set.

### OBSERVED VARIETIES

The observed varieties from each location were combined and analyzed as a replicated field trial. There was much variability within varieties between locations, so the results should be viewed with less confidence than replicated

tests.

### **Market Yield – Table 2, 2A, & Figure 2:**

Market yield of the 15 observed varieties ranged from 26.4 tons (2112 boxes) to 15.6 tons (1238 boxes) and averaged 21.5 tons (1719 boxes) per acre. Because there is variability within varieties and only 3 locations (replications) statistics indicate that it takes an 8.8 ton difference to recognize a real market yield difference.

**Total Yield – Tables 2 and 2B:** As in the replicated test small sizes and culled fruit accounted for approximately 10 tons of fruit per variety. Total yield ranged from 40.7 to 24.0 tons (3256 to 1920 boxes) per acre. BHN 623, XTM 0230, and STM 0231 ranked higher in total yield than in market yield indicating higher nonmarketable fruit than the other lines.

### **Percent Red Fruit at Harvest – Table 2 & 2C:**

There was a lot of variability between trials in % red fruit at harvest. Shady Lady and XTM 0113 tended to be early and RFT 6047, BHN 611, HMX 2807, BHN 502, and BHN 526 tended to be later. All other lines were in between.

Assuming that Kings is early, Merced is midseason, and San Joaquin is late, then under the growing conditions of this year, in general:

#### **Some perform better EARLY than LATE:**

Market yield: B-807, BHN 623, L-311, L-310  
Total yield: B-807, BHN 623, BHN 526  
Percent red: BHN 623, XTM 0113

#### **Some perform better LATE than EARLY:**

Market yield: BHN 581, STM 0231, HMX 2807  
Total yield: BHN 581, STM 0231, HMX 2807  
Percent red: L-311, B-807

#### **Some perform BETTER in MIDSEASON:**

Market yield: XTM 0230, BHN 611  
Total yield: XTM 0230  
Percent red: XTM 0115

#### **Some perform CONSISTENTLY at all sites:**

Market yield: RFT 6047, XTM 0113  
Total yield: RFT 6047, XTM 0113  
Percent red: RFT 6047, Shady Lady, BHN502, BHN 526, L-310, XTM 0230

### **ROMA TRIAL – Table 3**

Performance results of the 6 replicated and 6 observed varieties are listed in Table 3. For a complete report and discussion of this trial please contact Bob Mullen in San Joaquin County.

#### **Replicated Varieties**

Market yield of the replicated varieties ranged from 9.6 to 6.7 tons with an average of 8.1 tons (651 boxes) per acre. The vast majority of fruit were medium and small sizes. Immature fruit averaged 6.4 tons and culls averaged 2.6 tons per acre. Total yield ranged from 18.8 to 15.5 tons (1506 to 1242 boxes) per acre. Percent red fruit at harvest ranged from 43.1 to 2.3% and averaged 25.7%. BHN 621 had the most red fruit and Monica had the least.

#### **Observed Varieties**

The market yield of the six observed lines ranged from 8.1 tons (648 boxes) to 0.7 tons (56 boxes) per acre. HA 3821 had a substantial amount of extra large and large fruit compared to all other lines including the replicated varieties. Immature fruit averaged 7.8 tons and culled fruit averaged 1.7 tons per acre. Total yield ranged from 20.8 to 8.1 tons (1664 to 648 boxes) per acre. Percent red fruit at harvest averaged 23.1%; UG 8105 had the most and SUPRA had the least amount of reds.

### **Final Remarks**

*Determining what variety to plant for a complex fresh market industry is outside the scope of this evaluation. The purpose of this research is to assist growers, packers, shippers, and the seed industry with variety selections and evaluations.*

*The strength of the farm advisors' variety trial is in side-by-side comparisons of yields and quality characteristics in a commercial setting across a range of conditions. The ultimate test of variety performance is commercial scale success on individual farms over a number of seasons.*

Table 1

**YIELD & MATURITY\* of Fresh Market Tomatoes - REPLICATED Varieties**  
**Results Summary of Three Fresh Market Tomato Trials - 2003**  
**SORTED BY MARKETABLE YIELD**

Variety	Company	Combined Results			Kings Co. (early season)			Merced Co. (midseason)			San Joaquin Co. (late season)		
		Yield T/A Market	% Total	% Reds	Yield T/A Market	% Total	% Reds	Yield T/A Market	% Total	% Reds	Yield T/A Market	% Total	% Reds
<b>BHN 499</b>	BHN Seed	<b>28.1</b>	<b>39.7</b>	<b>24.0</b>	40.9	49.0	34.1	32.8	53.9	20.4	10.6	16.3	17.5
<b>Sun King</b>	Seminis	<b>26.7</b>	<b>36.3</b>	<b>16.0</b>	36.3	42.8	13.1	31.7	46.8	20.1	12.0	19.4	14.6
<b>QualiT 23</b>	Syngenta	<b>25.4</b>	<b>32.9</b>	<b>16.2</b>	26.7	30.9	15.3	37.4	50.9	23.4	11.9	16.9	9.8
<b>L-312</b>	LSL Plant Sci.	<b>25.0</b>	<b>35.5</b>	<b>16.0</b>	31.8	41.6	12.6	29.1	44.5	15.5	14.0	20.3	19.9
<b>Bobcat</b>	Syngenta	<b>24.5</b>	<b>33.4</b>	<b>17.3</b>	27.4	32.5	18.8	31.6	46.6	18.2	14.6	20.9	15.1
<b>QualiT 21</b>	Syngenta	<b>23.9</b>	<b>31.7</b>	<b>8.2</b>	22.8	28.2	4.0	34.6	48.4	14.5	14.2	18.5	6.0
<b>BHN 464</b>	BHN Seed	<b>20.8</b>	<b>30.8</b>	<b>13.1</b>	25.2	31.6	20.0	27.5	44.1	13.0	9.7	16.8	6.3
<b>Average</b>		<b>24.9</b>	<b>34.3</b>	<b>15.8</b>	<b>30.2</b>	<b>36.7</b>	<b>16.8</b>	<b>32.1</b>	<b>47.9</b>	<b>17.9</b>	<b>12.4</b>	<b>18.4</b>	<b>12.7</b>
LSD .05		1.8	2.1	1.9									
CV %		24.3	20.8	41.7									
Shady Lady**					33.0	39.4	44.9	31.0	46.6	27.4			
Variety x Location Interaction		S	NS	S									

Variety by Location Interaction - When this statistic is significant, it means that the varieties did not behave consistently at each location.

S = significant difference    NS = not significantly different

\* Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit. Small fruit were considered unmarketable this year.

TOTAL Yield = Marketable Yield plus small sized and cull fruit.

Percent Red = % reds by weight of TOTAL yield including culls to indicate maturity relative to all tested varieties.

\*\* Shady Lady was not replicated in the San Joaquin County trial.

Table 1-A

**Marketable Yield (TONS/Boxes per Acre)\* - REPLICATED Varieties  
Summary of Three Fresh Market Tomato Trials - 2003**

Variety	Company	Combined Market Yield/Acre			Kings Co. (early season)		Merced Co. (midseason)		San Joaquin Co. (late season)	
		Tons	Boxes		Tons	Boxes	Tons	Boxes	Tons	Boxes
<b>BHN 499</b>	BHN Seed	<b>28.1</b>	<b>2250</b>	a	40.9	3274	32.8	2625	10.6	850
<b>Sun King</b>	Seminis	<b>26.7</b>	<b>2134</b>	ab	36.3	2904	31.7	2537	12.0	960
<b>QualiT 23</b>	Syngenta	<b>25.4</b>	<b>2030</b>	bc	26.7	2139	37.4	2996	11.9	954
<b>L-312</b>	LSL Plant Sci.	<b>25.0</b>	<b>1998</b>	bc	31.8	2548	29.1	2327	14.0	1118
<b>Bobcat</b>	Syngenta	<b>24.5</b>	<b>1961</b>	c	27.4	2187	31.6	2527	14.6	1168
<b>QualiT 21</b>	Syngenta	<b>23.9</b>	<b>1910</b>	c	22.8	1827	34.6	2768	14.2	1136
<b>BHN 464</b>	BHN Seed	<b>20.8</b>	<b>1663</b>	d	25.2	2013	27.5	2199	9.7	776
<b>Average</b>		<b>24.9</b>	<b>1992</b>		<b>30.2</b>	<b>2413</b>	<b>32.1</b>	<b>2568</b>	<b>12.4</b>	<b>995</b>
LSD .05		1.8	140.4							
CV %		24.3	24.3							
Shady Lady**					33.0	2639	31.0	2484		
Variety x Location Interaction		S	S							

Variety by Location Interaction - When this statistic is significant, it means that the varieties did not behave consistently at each location.  
S = significant difference NS = not significantly different

\* Marketable Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit. Small fruit were considered unmarketable this year.

\*\* Shady Lady was not replicated in the San Joaquin County trial.

Table 1-B

**TOTAL Yield (TONS/Boxes per Acre)\* - REPLICATED Varieties  
Summary of Three Fresh Market Tomato Trials - 2003**

Variety	Company	Combined TOTAL Yield/Acre			Kings Co. (early season)		Merced Co. (midseason)		San Joaquin Co. (late season)	
		Tons	Boxes		Tons	Boxes	Tons	Boxes	Tons	Boxes
<b>BHN 499</b>	BHN Seed	<b>39.7</b>	<b>3176</b>	a	49.0	3920	53.9	4312	16.3	1304
<b>Sun King</b>	Seminis	<b>36.3</b>	<b>2904</b>	b	42.8	3424	46.8	3744	19.4	1552
<b>L-312</b>	LSL Plant Sci.	<b>35.5</b>	<b>2840</b>	b	41.6	3328	44.5	3560	20.3	1624
<b>Bobcat</b>	Syngenta	<b>33.3</b>	<b>2664</b>	c	32.5	2600	46.6	3728	20.9	1672
<b>QualiT 23</b>	Syngenta	<b>32.9</b>	<b>2632</b>	cd	30.9	2472	50.9	4072	16.9	1352
<b>QualiT 21</b>	Syngenta	<b>31.7</b>	<b>2536</b>	cd	28.2	2256	48.4	3872	18.5	1480
<b>BHN 464</b>	BHN Seed	<b>30.8</b>	<b>2464</b>	d	31.6	2528	44.1	3528	16.8	1344
<b>Average</b>		<b>34.3</b>	<b>2745</b>		<b>36.7</b>	<b>2933</b>	<b>47.9</b>	<b>3831</b>	<b>18.4</b>	<b>1475</b>
LSD .05		2.1	168							
CV %		20.8	20.8							
Shady Lady**					39.4	3152	46.6	3728		
Variety x Location Interaction		NS	NS							

Variety by Location Interaction - When this statistic is significant, it means that the varieties did not behave consistently at each location.  
S = significant difference    NS = not significantly different

\* TOTAL Yield = Marketable Yield plus small sized and cull fruit.

\*\* Shady Lady was not replicated in the San Joaquin County trial.

Table 1-C

**Percent (%) Red Fruit at Harvest\* - REPLICATED Varieties  
Summary of Three Fresh Market Tomato Trials - 2003**

Variety	Company	Combined	Kings (early)	Merced (mid)	San Joaquin (late)
<b>BHN 499</b>	BHN Seed	<b>24.0</b>	34.0	20.4	17.5
<b>Bobcat</b>	Syngenta	<b>17.3</b>	18.8	18.2	15.1
<b>QualiT 23</b>	Syngenta	<b>16.2</b>	15.3	23.5	9.8
<b>L-312</b>	LSL Plant Sci.	<b>16.0</b>	12.6	15.5	19.9
<b>Sun King</b>	Seminis	<b>16.0</b>	13.1	20.1	14.6
<b>BHN 464</b>	BHN Seed	<b>13.1</b>	20.0	13.0	6.3
<b>QualiT 21</b>	Syngenta	<b>8.2</b>	4.0	14.5	6.0
<b>Average</b>		<b>15.8</b>	<b>16.8</b>	<b>17.9</b>	<b>12.7</b>
LSD .05		<b>1.9</b>			
CV %		41.7			
Shady Lady**			44.9	27.4	
Variety x Location Interaction		S			

Variety by Location Interaction - When this statistic is significant, it means that the varieties did not behave consistently at each location. S = significant difference NS = not significantly different

\* Percent Red = % reds by weight of TOTAL yield including culls to indicate maturity relative to all tested varieties.

\*\* Shady Lady was not replicated in the San Joaquin County trial.

Table 1-D

**Size Grades of Fresh Market Tomatoes - REPLICATED Varieties  
Results Summary of Three Fresh Market Tomato Trials - 2003  
Sorted by Market Yield**

Variety	Company	COMBINED RESULTS			Kings Co. (early season)			Merced Co. (midseason)			San Joaquin Co. (late season)		
		% Market Yield			% Market Yield			% Market Yield			% Market Yield		
		XL	L	Med	XL	L	Med	XL	L	Med	XL	L	Med
<b>BHN 499</b>	BHN Seed	<b>35.9</b>	<b>38.3</b>	<b>25.8</b>	48.5	39.3	12.2	34.3	35.8	29.8	24.8	39.9	35.4
<b>Sun King</b>	Seminis	<b>30.6</b>	<b>43.1</b>	<b>26.3</b>	48.5	35.5	16.0	23.0	44.1	33.1	20.4	49.8	29.9
<b>QualiT 23</b>	Syngenta	<b>37.5</b>	<b>43.5</b>	<b>19.0</b>	46.3	37.5	16.3	39.1	44.5	16.4	27.1	48.7	24.2
<b>L-312</b>	LSL Plant Sci.	<b>44.2</b>	<b>38.0</b>	<b>17.7</b>	48.3	37.5	14.2	50.3	38.8	10.9	34.2	37.8	28.1
<b>Bobcat</b>	Syngenta	<b>48.4</b>	<b>33.7</b>	<b>17.9</b>	61.5	28.4	10.3	34.6	41.7	23.8	49.2	31.1	19.8
<b>QualiT 21</b>	Syngenta	<b>39.9</b>	<b>42.9</b>	<b>17.2</b>	39.7	42.3	18.0	36.2	42.6	21.3	43.8	43.8	12.4
<b>BHN 464</b>	BHN Seed	<b>30.5</b>	<b>40.3</b>	<b>29.2</b>	40.0	42.3	17.7	27.9	38.6	33.6	23.6	39.9	36.5
<b>Average</b>		<b>38.1</b>	<b>40.0</b>	<b>21.9</b>	<b>47.5</b>	<b>37.5</b>	<b>21</b>	<b>35.1</b>	<b>40.9</b>	<b>24.1</b>	<b>31.9</b>	<b>41.6</b>	<b>26.6</b>
LSD .05		2.6	1.9	2.1									
CV %		23.7	16.8	33.6									
Shady Lady**					55.5	34.1	10.4	28.1	41.6	30.3			
Variety x Location Interaction		S	NS	S									

Variety by Location Interaction - When this statistic is significant, it means that the varieties did not behave consistently at each location.  
S = significant difference    NS = not significantly different

\* Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit. Small fruit were considered unmarketable this year.

FRUIT SIZES:

XL = 2 7/8 to 3 15/16 inches diameter

L = 2 17/32 to 2 7/8 "

M = 2 9/32 to 2 17/32 "

S = 2 1/8 to 2 9/32 "

\*\* Shady Lady was not replicated in the San Joaquin County trial.

**Figure 1**  
**FRESH MARKET TOMATO 2003**  
**Average of Three Locations**

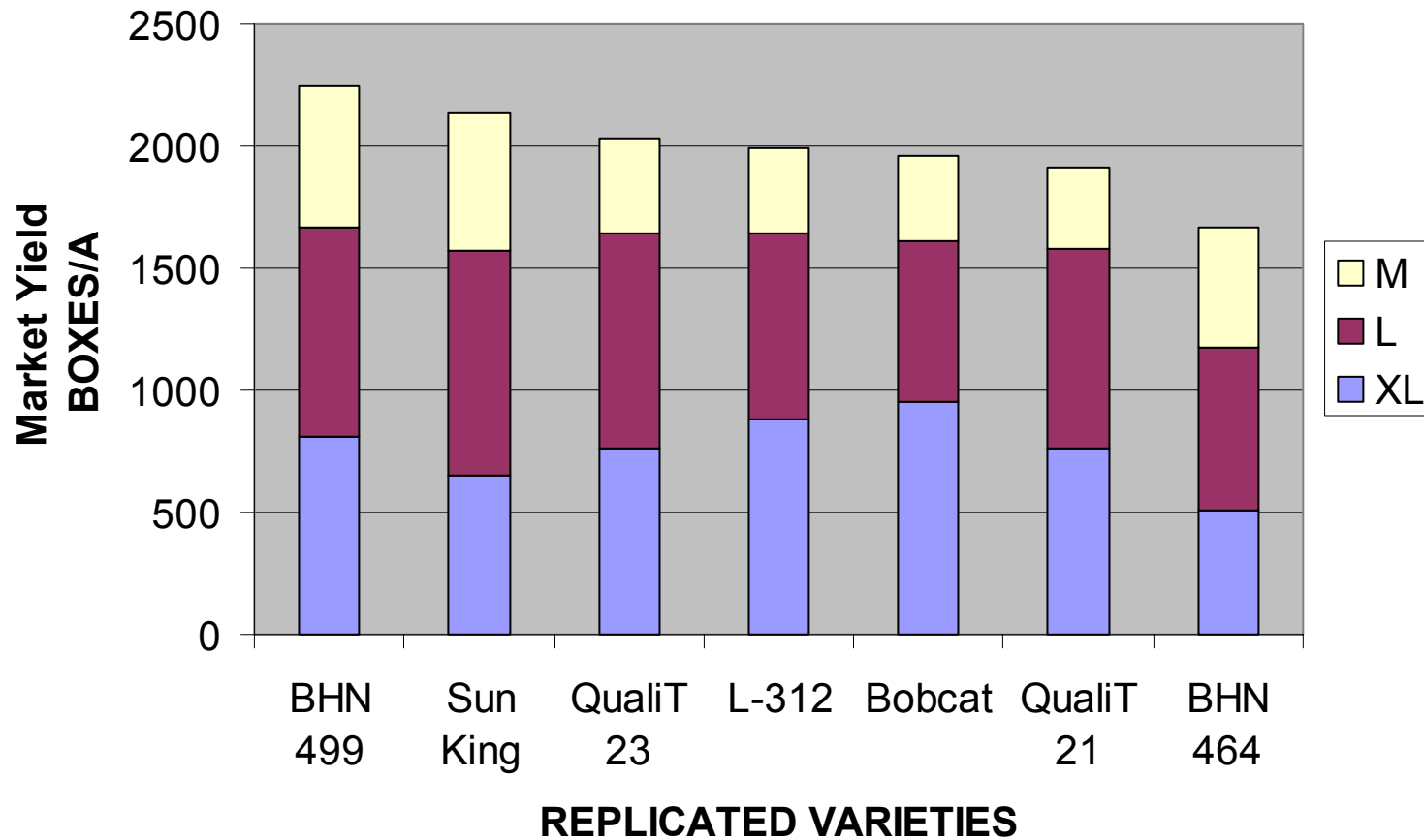


Table 2

**YIELD & MATURITY\* of Fresh Market Tomatoes - OBSERVED Varieties  
Combined Results of Three Fresh Market Tomato Trials - 2003  
Sorted by Market Yield**

Variety	Company	Combined Results			Kings Co. (early season)			Merced Co. (midseason)			San Joaquin Co. (late season)		
		Yield T/A		%	Yield T/A		%	Yield T/A		%	Yield T/A		%
		Market	Total	Reds	Market	Total	Reds	Market	Total	Reds	Market	Total	Reds
<b>BHN 581</b>	BHN Seed	<b>26.4</b>	<b>40.7</b>	<b>18.5</b>	23.3	35.1	14.3	36.2	58.4	15.7	19.6	28.6	25.6
<b>Shady Lady</b>	Sunseeds	<b>26.0</b>	<b>35.8</b>	<b>35.7</b>	23.0	28.0	42.3	34.5	51.3	39.5	20.4	28.1	25.2
<b>RFT 6047</b>	Syngenta	<b>23.4</b>	<b>33.8</b>	<b>12.7</b>	24.3	31.1	11.4	31.8	50.2	11.3	14.1	20.0	15.4
<b>BHN 502</b>	BHN Seed	<b>23.0</b>	<b>32.6</b>	<b>9.9</b>	21.1	27.2	9.6	33.7	47.2	6.6	14.2	23.4	13.4
<b>BHN 526</b>	BHN Seed	<b>22.6</b>	<b>33.1</b>	<b>6.0</b>	25.3	36.5	3.2	34.0	49.7	6.5	8.5	13.1	8.2
<b>L-311</b>	LSL Plant Sci.	<b>22.0</b>	<b>31.7</b>	<b>17.7</b>	28.5	33.1	9.5	28.2	46.0	22.6	9.4	16.1	20.9
<b>BHN 623</b>	BHN Seed	<b>21.8</b>	<b>33.8</b>	<b>15.7</b>	30.5	38.9	24.8	26.7	48.0	14.4	8.3	14.4	7.9
<b>B-807</b>	LSL Plant Sci.	<b>21.5</b>	<b>29.6</b>	<b>21.1</b>	32.4	37.3	10.4	24.2	37.6	33.5	7.9	14.0	19.3
<b>L-310</b>	LSL Plant Sci.	<b>21.0</b>	<b>29.7</b>	<b>19.3</b>	25.9	30.6	12.2	27.5	40.7	32.2	9.6	17.8	13.6
<b>XTM 0230</b>	Sakata	<b>20.5</b>	<b>32.8</b>	<b>18.3</b>	16.8	25.1	17.1	36.4	57.2	20.3	8.3	16.1	17.4
<b>BHN 611</b>	BHN Seed	<b>20.3</b>	<b>26.9</b>	<b>10.4</b>	13.1	18.7	12.2	35.7	46.6	8.2	12.0	15.3	10.9
<b>XTM 0115</b>	Sakata	<b>19.8</b>	<b>28.7</b>	<b>19.0</b>	18.1	22.1	12.0	30.8	48.2	40.9	10.5	15.9	4.2
<b>XTM 0113</b>	Sakata	<b>19.2</b>	<b>27.7</b>	<b>27.5</b>	21.4	25.4	31.5	24.7	43.2	41.0	11.5	14.6	10.1
<b>STM 0231</b>	Sakata	<b>19.2</b>	<b>30.1</b>	<b>14.9</b>	18.0	24.0	13.2	24.4	42.9	14.9	15.3	23.5	16.6
<b>HMX 2807</b>	Harris Moran	<b>15.6</b>	<b>24.0</b>	<b>10.2</b>	14.0	18.2	13.8	21.9	36.3	6.9	10.9	17.4	10.0
<b>Average</b>		<b>21.5</b>	<b>31.4</b>	<b>17.1</b>	<b>22.4</b>	<b>28.7</b>	<b>15.8</b>	<b>30.0</b>	<b>46.9</b>	<b>21.0</b>	<b>12.0</b>	<b>18.6</b>	<b>14.6</b>
LSD .05		8.8	9.5	14.8									
CV %		24.4	18.0	51.3									

\* Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit. Small fruit were considered unmarketable this year.

TOTAL Yield = Marketable Yield plus small sized and cull fruit.

Percent Red = % reds by weight of TOTAL yield including culls to indicate maturity relative to all tested varieties.

Table 2-A

**MARKETABLE Yield (Tons/Boxes per Acre)\* - OBSERVED Varieties  
Summary of Three Fresh Market Tomato Trials - 2003**

Variety	Company	Combined Market Yield/Acre			Kings Co. (early season)		Merced Co. (midseason)		San Joaquin Co. (late season)	
		Tons	Boxes		Tons	Boxes	Tons	Boxes	Tons	Boxes
<b>BHN 581</b>	BHN Seed	<b>26.4</b>	<b>2112</b>	a	23.3	1865	36.2	2896	19.6	1568
<b>Shady Lady</b>	Sunseeds	<b>26.0</b>	<b>2080</b>	a	23.0	1839	34.5	2760	20.4	1632
<b>RFT 6047</b>	Syngenta	<b>23.4</b>	<b>1872</b>	ab	24.3	1944	31.8	2544	14.1	1128
<b>BHN 502</b>	BHN Seed	<b>23.0</b>	<b>1840</b>	ab	21.1	1685	33.7	2696	14.2	1136
<b>BHN 526</b>	BHN Seed	<b>22.6</b>	<b>1808</b>	ab	25.3	2023	34.0	2720	8.5	680
<b>L-311</b>	LSL Plant Sci.	<b>22.0</b>	<b>1760</b>	ab	28.5	2280	28.2	2256	9.4	752
<b>BHN 623</b>	BHN Seed	<b>21.8</b>	<b>1744</b>	ab	30.5	2442	26.7	2136	8.3	664
<b>B-807</b>	LSL Plant Sci.	<b>21.5</b>	<b>1720</b>	ab	32.4	2592	24.2	1936	7.9	632
<b>L-310</b>	LSL Plant Sci.	<b>21.0</b>	<b>1680</b>	ab	25.9	2070	27.5	2200	9.6	768
<b>XTM 0230</b>	Sakata	<b>20.5</b>	<b>1640</b>	ab	16.8	1343	36.4	2912	8.3	664
<b>BHN 611</b>	BHN Seed	<b>20.3</b>	<b>1624</b>	ab	13.1	1052	35.7	2856	12.0	960
<b>XTM 0115</b>	Sakata	<b>19.8</b>	<b>1584</b>	ab	18.1	1450	30.8	2464	10.5	840
<b>XTM 0113</b>	Sakata	<b>19.2</b>	<b>1536</b>	ab	21.4	1715	24.7	1976	11.5	920
<b>STM 0231</b>	Sakata	<b>19.2</b>	<b>1536</b>	ab	18.0	1437	24.4	1952	15.3	1224
<b>HMX 2807</b>	Harris Moran	<b>15.6</b>	<b>1248</b>	b	14.0	1120	21.9	1752	10.9	872
<b>Average</b>		<b>21.5</b>	<b>1719</b>		<b>22.4</b>	<b>1790</b>	<b>30.0</b>	<b>2404</b>	<b>12.0</b>	<b>963</b>
LSD .05		8.8	704.0							
CV %		24.4	24.4							

\* Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra-large, large, and medium sized fruit. Small fruit were considered unmarketable this year.

Table 2-B

**TOTAL Yield (TONS/Boxes per Acre)\* - OBSERVED Varieties**  
**Summary of Three Fresh Market Tomato Trials - 2003**

Variety	Company	Combined TOTAL Yield/Acre			Kings Co. (early season)		Merced Co. (midseason)		San Joaquin Co. (late season)	
		Tons	Boxes		Tons	Boxes	Tons	Boxes	Tons	Boxes
<b>BHN 581</b>	BHN Seed	<b>40.7</b>	<b>3256</b>	a	35.1	2806	58.4	4672	28.6	2288
<b>Shady Lady</b>	Sunseeds	<b>35.8</b>	<b>2864</b>	ab	28.0	2237	51.3	4104	28.1	2248
<b>BHN 623</b>	BHN Seed	<b>33.8</b>	<b>2704</b>	ab	38.9	3109	48.0	3840	14.4	1152
<b>RFT 6047</b>	Syngenta	<b>33.8</b>	<b>2704</b>	ab	31.1	2488	50.2	4016	20.0	1600
<b>BHN 526</b>	BHN Seed	<b>33.1</b>	<b>2648</b>	abc	36.5	2918	49.7	3976	13.1	1048
<b>XTM 0230</b>	Sakata	<b>32.8</b>	<b>2624</b>	abc	25.1	2011	57.2	4576	16.1	1288
<b>BHN 502</b>	BHN Seed	<b>32.6</b>	<b>2608</b>	abc	27.2	2172	47.2	3776	23.4	1872
<b>L-311</b>	LSL Plant Sci.	<b>31.7</b>	<b>2536</b>	abc	33.1	2644	46.0	3680	16.1	1288
<b>STM 0231</b>	Sakata	<b>30.1</b>	<b>2408</b>	bc	24.0	1917	42.9	3432	23.5	1880
<b>L-310</b>	LSL Plant Sci.	<b>29.7</b>	<b>2376</b>	bc	30.6	2448	40.7	3256	17.8	1424
<b>B-807</b>	LSL Plant Sci.	<b>29.6</b>	<b>2368</b>	bc	37.3	2982	37.6	3008	14.0	1120
<b>XTM 0115</b>	Sakata	<b>28.7</b>	<b>2296</b>	bc	22.1	1764	48.2	3856	15.9	1272
<b>XTM 0113</b>	Sakata	<b>27.7</b>	<b>2216</b>	bc	25.4	2030	43.2	3456	14.6	1168
<b>BHN 611</b>	BHN Seed	<b>26.9</b>	<b>2152</b>	bc	18.7	1499	46.6	3728	15.3	1224
<b>HMX 2807</b>	Harris Moran	<b>24.0</b>	<b>1920</b>	c	18.2	1458	36.3	2904	17.4	1392
<b>Average</b>		<b>31.4</b>	<b>2512</b>		<b>28.7</b>	<b>2299</b>	<b>46.9</b>	<b>3752</b>	<b>18.6</b>	<b>1484</b>
LSD .05		9.5	760							
CV %		18.0	18							

\* TOTAL Yield = Marketable Yield plus small sized and cull fruit.

Table 2-C

**Percent (%) RED FRUIT at Harvest\* - OBSERVED Varieties  
Summary of Three Fresh Market Tomato Trials - 2003**

<b>Variety</b>	<b>Company</b>	<b>COMBINED</b>	<b>Kings early</b>	<b>Merced mid</b>	<b>San Joaquin late</b>
<b>Shady Lady</b>	Sunseeds	<b>35.7</b> a	42.3	39.5	25.2
<b>XTM 0113</b>	Sakata	<b>27.5</b> ab	31.5	41.0	10.1
<b>B-807</b>	LSL Plant Sci.	<b>21.1</b> abc	10.4	33.5	19.3
<b>L-310</b>	LSL Plant Sci.	<b>19.3</b> bcd	12.2	32.2	13.6
<b>XTM 0115</b>	Sakata	<b>19.0</b> bcd	12.0	40.9	4.2
<b>BHN 581</b>	BHN Seed	<b>18.5</b> bcd	14.3	15.7	25.6
<b>XTM 0230</b>	Sakata	<b>18.3</b> bcd	17.1	20.3	17.4
<b>L-311</b>	LSL Plant Sci.	<b>17.7</b> bcd	9.5	22.6	20.9
<b>BHN 623</b>	BHN Seed	<b>15.7</b> bcd	24.8	14.4	7.9
<b>STM 0231</b>	Sakata	<b>14.9</b> bcd	13.2	14.9	16.6
<b>RFT 6047</b>	Syngenta	<b>12.7</b> cd	11.4	11.3	15.4
<b>BHN 611</b>	BHN Seed	<b>10.4</b> cd	12.2	8.2	10.9
<b>HMX 2807</b>	Harris Moran	<b>10.2</b> cd	13.8	6.9	10.0
<b>BHN 502</b>	BHN Seed	<b>9.9</b> cd	9.6	6.6	13.4
<b>BHN 526</b>	BHN Seed	<b>6.0</b> d	3.2	6.5	8.2
<b>Average</b>		<b>17.1</b>	<b>15.8</b>	<b>21.0</b>	<b>14.6</b>
LSD .05		14.8			
CV %		51.3			

\* Percent Red = % reds by weight of TOTAL yield including culls to indicate maturity relative to all tested varieties.

Table 2-D

**Size Grades of Fresh Market Tomatoes - OBSERVED Varieties**  
**Summary of Three Fresh Market Tomato Trials - 2003**  
**Sorted by Market Yield**

Variety	Company	COMBINED RESULTS			Kings Co. (early season)			Merced Co. (midseason)			San Joaquin Co. (late season)		
		% Market Yield			% Market Yield			% Market Yield			% Market Yield		
		X-Large	Large	Med	X-Large	Large	Med	X-Large	Large	Med	X-Large	Large	Med
<b>BHN 581</b>	BHN Seed	<b>39.8</b>	<b>39.0</b>	<b>21.2</b>	46.1	37.3	16.6	31.2	41.8	27.1	42.2	37.8	20.0
<b>Shady Lady</b>	Sunseeds	<b>41.6</b>	<b>34.3</b>	<b>24.0</b>	44.9	34.6	20.5	32.1	35.1	32.7	47.8	33.3	18.9
<b>RFT 6047</b>	Syngenta	<b>36.1</b>	<b>40.9</b>	<b>23.0</b>	45.0	38.2	16.8	39.4	42.7	17.9	23.9	41.9	34.2
<b>BHN 502</b>	BHN Seed	<b>29.8</b>	<b>42.6</b>	<b>27.5</b>	32.6	43.7	23.7	14.3	44.3	41.4	42.6	39.9	17.5
<b>BHN 526</b>	BHN Seed	<b>41.2</b>	<b>33.6</b>	<b>25.2</b>	55.0	34.5	10.6	39.8	41.1	19.1	28.9	25.3	45.8
<b>L-311</b>	LSL Plant Sci.	<b>33.9</b>	<b>45.4</b>	<b>20.7</b>	52.2	35.3	12.5	22.4	54.0	23.6	27.2	46.8	26.0
<b>BHN 623</b>	BHN Seed	<b>34.7</b>	<b>36.0</b>	<b>29.4</b>	54.3	25.8	19.9	26.0	31.0	43.0	23.7	51.1	25.2
<b>B-807</b>	LSL Plant Sci.	<b>36.5</b>	<b>38.3</b>	<b>25.2</b>	49.2	33.7	17.1	9.7	47.6	42.7	50.7	33.6	15.7
<b>L-310</b>	LSL Plant Sci.	<b>28.9</b>	<b>50.7</b>	<b>20.4</b>	44.0	42.6	13.4	12.6	57.8	29.6	30.1	51.6	18.3
<b>XTM 0230</b>	Sakata	<b>23.2</b>	<b>48.1</b>	<b>28.7</b>	25.2	44.0	30.8	28.1	35.6	36.3	16.2	64.7	19.1
<b>BHN 611</b>	BHN Seed	<b>35.0</b>	<b>42.7</b>	<b>22.3</b>	46.0	32.4	21.6	29.6	45.2	25.2	29.4	50.4	20.2
<b>XTM 0115</b>	Sakata	<b>29.0</b>	<b>46.5</b>	<b>24.5</b>	39.3	45.2	15.5	24.0	41.8	34.2	23.8	52.5	23.7
<b>XTM 0113</b>	Sakata	<b>29.3</b>	<b>38.7</b>	<b>32.0</b>	40.0	47.2	12.8	8.2	37.2	54.6	39.8	31.6	28.6
<b>STM 0231</b>	Sakata	<b>32.9</b>	<b>39.7</b>	<b>27.4</b>	29.8	39.1	31.2	28.7	33.8	37.5	40.3	46.1	13.6
<b>HMX 2807</b>	Harris Moran	<b>21.8</b>	<b>42.3</b>	<b>35.9</b>	24.3	43.7	32.0	5.7	41.5	52.8	35.4	41.7	22.9
<b>Average</b>		<b>32.9</b>	<b>41.3</b>	<b>25.8</b>	<b>41.6</b>	<b>38.5</b>	<b>19.9</b>	<b>23.5</b>	<b>42.0</b>	<b>34.5</b>	<b>33.5</b>	<b>43.2</b>	<b>23.3</b>
LSD .05		18.0	13.4	NS									
CV %		24.0	19.3	38.4									

\* Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit. Small fruit were considered unmarketable this year.

TOTAL Yield = Marketable Yield plus small sized and cull fruit.

Percent Red = % reds by weight of TOTAL yield including culls to indicate maturity relative to all tested varieties.

FRUIT SIZES:

XL = 2 7/8 to 3 15/16 inches diameter

L = 2 17/32 to 2 7/8 "

M = 2 9/32 to 2 17/32 "

S = 2 1/8 to 2 9/32 "

**Figure 2**  
**FRESH MARKET TOMATO 2003**  
**Average of Three Locations**

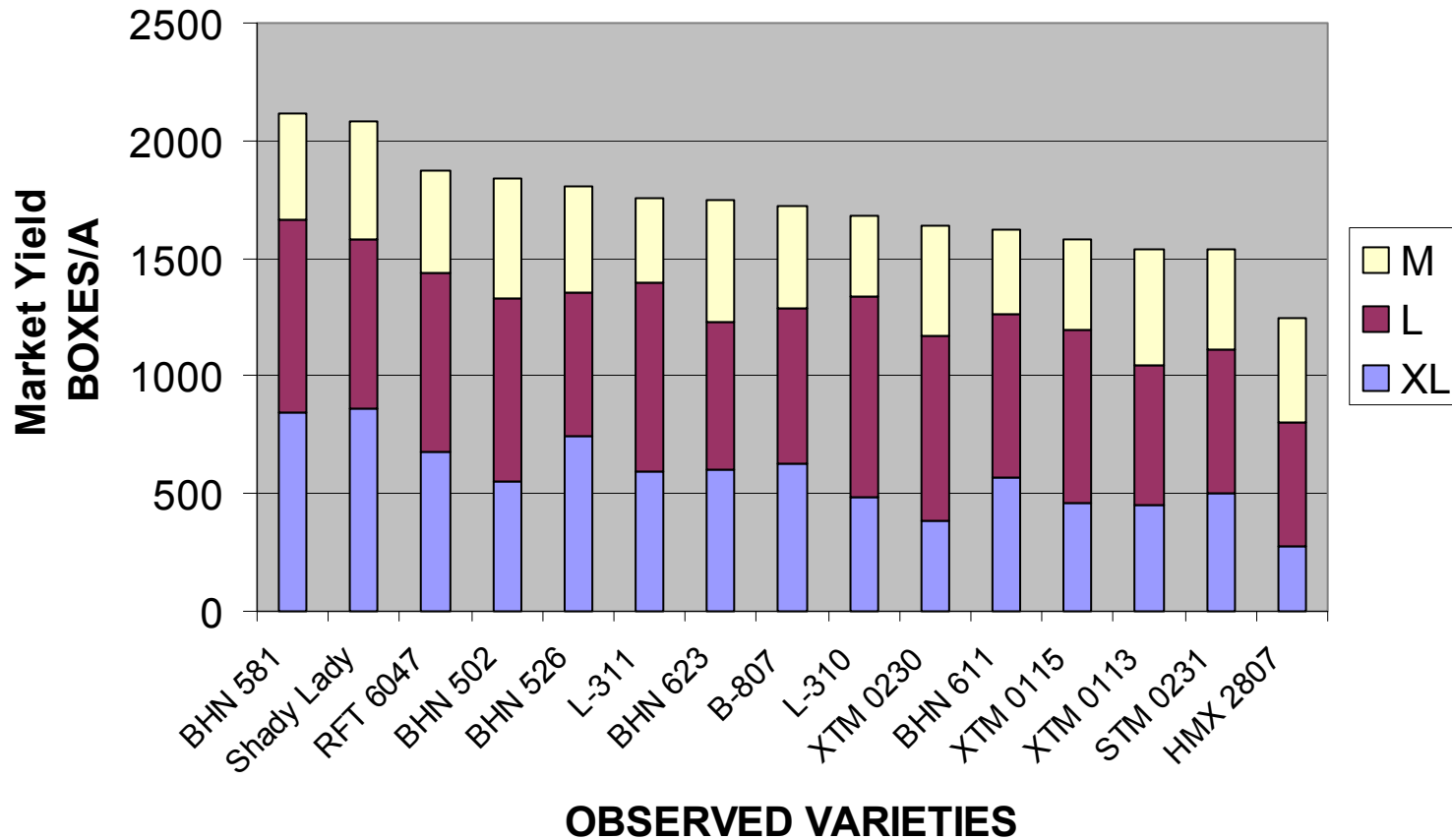


Table 3

**ROMA Variety Trial – San Joaquin County – 2003  
Summary of Results**

	Market Yield/Acre		% Market Yield				Nonmarket Yield Tons/Acre		Total Yield/Acre		% Red
	Tons	Boxes	X-L	L	Med	Sm	Immature	Culls	Tons	Boxes	
<b>Replicated Varieties</b>											
Miroma	9.6	770	0.0	2.8	50.0	47.2	5.9	1.9	17.5	1396	26.2
SD 257	8.4	672	0.0	0.5	42.2	57.3	5.2	2.2	15.8	1260	13.2
BHN 621	8.4	670	0.0	2.6	38.1	59.3	6.2	4.2	18.8	1506	43.1
BHN 523	8.3	666	0.0	1.2	37.4	61.4	6.0	2.8	17.2	1374	31.5
Mariana	7.4	590	0.0	2.8	33.3	63.9	8.0	2.8	18.2	1458	37.8
Monica	6.7	536	0.7	0.0	28.5	70.8	7.2	1.7	15.5	1242	2.3
<b>Averages</b>	<b>8.14</b>	<b>651</b>	<b>0.1</b>	<b>1.7</b>	<b>38.3</b>	<b>60.0</b>	<b>6.4</b>	<b>2.6</b>	<b>17.2</b>	<b>1373</b>	<b>25.7</b>
LSD@0.05	2.2	172									
C.V.=	17.6%	17.6%									
<b>Observation Varieties</b>											
HA 3816	8.1	648	0.0	5.7	58.2	36.1	10.0	2.7	20.8	1664	25.1
HA 3817	7.0	560	0.0	0.0	35.2	64.8	7.5	1.3	15.8	1264	26.3
HA 3821	6.0	480	10.6	11.4	36.8	41.2	6.1	1.3	13.4	1072	18.2
SD 256	5.2	416	0.0	2.6	49.6	47.8	9.6	2.0	16.8	1344	13.3
SUPRA	3.7	296	0.0	0.0	58.8	41.2	7.2	2.2	13.1	1048	5.9
UG 8105	0.7	56	0.0	0.0	54.5	45.5	6.6	0.8	8.1	648	50.0
<b>Averages</b>	<b>5.2</b>	<b>409</b>	<b>1.8</b>	<b>3.3</b>	<b>48.9</b>	<b>46.1</b>	<b>7.8</b>	<b>1.7</b>	<b>14.8</b>	<b>1173</b>	<b>23.1</b>

Roma Sizing Criteria:

Extra Large =&gt;165 grams

Large = 130 to 165 grams

Medium = 90 to 120 grams

Small = 50 to 90 grams

# Statewide Tomato Variety Trials POSTHARVEST EVALUATIONS for 2003

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*Xunli Nie, Research Associate, Mann Laboratory, Dept. Veg. Crops, UC Davis*  
*Carolina Henriquez and Marina Santos, Student Assistants, Mann Laboratory, UC Davis*  
*Michelle LeStrange, Scott Stoddard, Bob Mullen and Jan Mickler*  
*Farm Advisors, Tulare & Kings, Merced & Madera, San Joaquin, and Stanislaus Counties*

## Objective of Research

To evaluate quality characteristics of ripened fresh market tomatoes (round and roma types) from known varieties and new experimental lines.

## Executive Summary

We evaluated 10, 8 and 9 round fresh market tomato varieties from the replicated trials in Kings, Merced and San Joaquin Counties, respectively, for color, firmness and composition at the table-ripe stage. We also evaluated an additional 13, 6, and 7 varieties from the observational trials at each location, respectively, and 6 Roma varieties from the San Joaquin Trial. Fruit were harvested as mature-greens (MG) and vine-ripes (VR, 30-40% color).

The quality measurements conducted are described in **Tables 1-3**. Data for the individual trials are presented in **Tables 4 - 10** and summaries comparing cultivars in the 3 trials are in **Tables 11-13**. **Table 14** provides a summary of the color, firmness, soluble solids and titratable acidity values for the 9 varieties ranked in Table 15. An overall ranking of the varieties is provided in **Table 15** based on color, firmness and composition values for 2003 evaluations.

Cultivar HMX 2807 was ranked the highest in overall quality, and BHN 464 ranked the lowest. HMX 2807 ranked the best in flavor score and QualiT 23 ranked the lowest in overall flavor score. Bobcat, QualiT 21 and Shady Lady ranked top in overall red color score and L-312 ranked the lowest. Overall firmness score was

highest for L-312 and lowest for Shady Lady. The 2003 fruit generally had higher contents of soluble solids and titratable acidity than the fruit harvested in 2002, but color and firmness values were similar between the two years.

## Trial Locations

County farm advisors conduct the statewide variety trials in a uniform fashion so that local results can be compared with other locations. Three round variety trials and one roma variety trial were grown and harvested in commercial fields in 2003.

**Kings County: April 16 – July 17** (92 days) with Jones Farms (O.P. Murphy & Sons) near Kettleman City (Michelle Le Strange).

**Merced County: May 13 – August 4** (83 days) with Live Oak Farms, LeGrand (Scott Stoddard).

**San Joaquin County: June 16 – Sept. 15** (90 days) with George Perry & Sons (San Joaquin Tomato) on Stewart Tract; round and roma tomato variety trials (Bob Mullen and Jan Mickler).

## Experimental Procedures

**Fruit Sampling** - We harvested mature-green (MG) fruit from the 3 trials for 11 or 12 replicated varieties. For 2 of 3 trials, vine-ripe (VR) fruit were harvested with 30-50% color. Typically 80 MG fruit or more were harvested in buckets, placed in plastic trays for transport to the lab, and well-formed large (5x5 or 5x6) fruit were selected for ripening and evaluation.

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 plastic-wrapped trays to complete ripening at 20°C. Fruit that did not show color change within 3-4 days of ethylene treatment were discarded.

Fruit were evaluated when they reached the **table-ripe stage** or color stage 6 on the USDA scale + 1-2 days. This 1-2 day interval does not affect results.

## Defining Quality Measurements Tables 1-3

The minimum quality evaluation of different tomato varieties should include data on firmness, color and composition at the table-ripe stage (Table 1). Flavor can be estimated measuring soluble solids (sugars) and acid contents. Table 1 describes the measurements useful to assess the postharvest potential of different fresh market tomato varieties. For firmness, it would also be useful to evaluate fruits about 1 week after reaching table-ripe to determine which varieties maintain firmness during a simulated marketing period. Typical values for color and firmness measurements are described in Tables 2 and 3.

**Table 1. Ripe tomato quality measurements for 2003 variety trials.**

Attribute	Measurement	Additional Information
<b>1. Color</b>	Objective color values using a Minolta Color meter	Data reported as “Hue”; this is a calculated color value and the most useful single value to compare tomato color; see <b>Table 2</b> for typical values for a range of tomato stages. Hue values from 35-40 usually indicate good red color.
<b>2. Texture</b>	<b>2a.</b> Compression test: compression of the fruit with a given load.	A compression test simulates hand/finger compression when consumers test tomatoes; the higher the mm of compression, the softer the fruit. <b>Table 3</b> describes typical values.
	<b>2b.</b> Compression test: the force to compress the fruit a distance of 5 mm is measured	Computerized texture analyzer equipped with a 25 mm flat cylinder moving at 0.5 mm/sec ; value is inversely related to values in 2a. Data expressed in Newtons (1 N =9.81 kg-force or 4.45 lb.-force) ; typical range 15-25 N ( <b>Table 3</b> ).
<b>3. Composition</b>	<b>3a.</b> Soluble solids (SS) are measured on a refractometer	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%.
	<b>3b.</b> Titratable acidity (TA); 10 mL juice are titrated with NaOH	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%.

**Table 2. Example of color changes during the ripening of fresh market tomato fruits.**

Stage of Development/Color	USDA Color Chart Stage	L*	a*	b*	chroma	hue
Mature-Green	1	62.7	-16.0	34.4	37.9	115.0
Breaker	2	55.8	-3.5	33.0	33.2	83.9
Pink-Orange	4	49.6	16.6	30.9	35.0	61.8
Orange-Red	5	46.2	24.3	27.0	36.3	48.0
Bright Red; Table-ripe	6	41.8	26.4	23.1	35.1	41.3
Dark Red	6+	39.6	27.5	20.7	34.4	37.0

L\* indicates lightness (high value) to darkness (low value); a\* changes from green (negative value) to red, b\* changes from blue to yellow (high value). Chroma and hue are calculated  $[(a^{*2} + b^{*2})^{1/2}]$  and  $\tan^{-1}(b^*/a^*)$  and indicate intensity and color, respectively. The lower the hue value, the redder the tomato. Hue is the single most useful color value.

**Table 3. Textural characteristics of tomatoes based on subjective and objective tests.**

Firmness Class	Description based on hand and finger pressure	Manual Firmness (mm compression) <sup>1</sup>	Texture Analyzer Newtons Force <sup>2</sup>
Very Firm	Fruit yields only slight to considerable pressure	0.5-1.0	>25
Firm	Fruit yields slightly to moderate pressure	1.0-1.5	18-25
Moderately Firm	--	1.5-2.0	15-18
Moderately Soft	--	2.0-2.5	12-15
Soft	Fruit yields readily to slight pressure	2.5-3.0	8-12
Very Soft	Fruits yields very readily to slight pressure	>3.0	<8

<sup>1</sup> Measured by placing a 500 g weight for 10 seconds on the equator of the fruit; see 2a in Table 1.

<sup>2</sup> Measured by compressing fruit at the equator with a 25 mm flat cylindrical probe to a distance of 5 mm on a computerized texture analyzer. 1 Newton force = 9.81 kg-force or 4.45 pound-force.

### Kings Co. Trial Summary - Tables 4 & 5

**Replicated Trial** - Ten cultivars from the replicated trial were evaluated from MG harvested fruit (Table 4). No VR fruit were harvested in this trial. Final red color was excellent in all cultivars as reflected in low hue color values (<40, indicating more red color). Firmness values were generally similar among the 10 ripened cultivars, but Shady Lady was notably less firm than the other 9 cultivars. The concentration of soluble solids was also generally similar among the cultivars although there were small differences that were significant. BHN 358

has the lowest % SS (4.60%) and cv BHN 499 had the highest (5.10%) concentrations. The % titratable acidity varied from 0.34 to 0.40% and again there were significant differences but differences were generally small among the cultivars.

Using Bobcat as a reference cultivar, no other variety had fruit with significantly better red color or firmness. Bobcat had intermediate % soluble solids and % titratable acidity.

**Observational Trial** - In the fruit harvested from the observational trial (**Table 5**), all had good *red color* development, although L-310 had the highest hue values (indicating that the fruit were the least red among the 13 cultivars evaluated). *Firmness* values averaged slightly higher than for the fruit from the replicated trial. BHN526 fruit were the firmest and XTM 0115 were the least firm at the table-ripe stage. The *% soluble solids* contents varied considerably, from 4.60 to 5.63%. BHN 526 had the highest *% soluble solids* while fruit from L310 had the lowest values. The *% titratable acidity* varied from 0.33 to 0.46%. BHN 526 had the highest titratable acid content and L-310 had the lowest.

The combination of the high soluble solids and high acid contents for BHN526 would likely indicate a tomato with significantly better flavor than fruit from L310 with the lowest soluble solids and acid contents.

**Merced Co. Trial Summary - Tables 6 & 7 Replicated Trial** - Eight cultivars from the replicated trial were evaluated from MG and VR harvested fruit (Table 6). *Final red color* was generally good but there were several cultivars (BHN 464, BHN 499, Sun King) harvested VR had hue color values higher than 40 (higher values indicate less red color development). The MG harvested L-312 also had red color values higher than 40. *Firmness* values for all cultivars (minus L-312) averaged 16.4 N when harvested VR compared to 19.6 N when harvested MG. The MG harvested L-312 was very firm at the table ripe stage (359 N), but no VR were in the field at harvest time. Fruit from Shady Lady averaged the lowest firmness values for both the MG and VR harvested fruit. The *% soluble solids* varied from 3.90 to 4.37% for MG harvested fruit and from 3.93 to 4.63% for VR harvested fruit. VR harvested L-312 fruit had the highest *% soluble solids*. The *% titratable acidity* was significantly higher for the VR harvested fruit compared to the MG harvested fruit (0.31 vs 0.27%). VR harvested fruit from BHN 464 had the highest *% titratable acidity* (0.36%) while MG harvested fruit from Sun King had the lowest *%* (0.23%).

Using Bobcat as reference variety, 6 varieties had higher *% soluble solids*, and 2 had higher average *% titratable acidity*. Bobcat firmness was only surpassed by that of L-312 fruit for MG-harvested fruit; for VR-harvested fruit, Bobcat firmness was similar to that of 3 cultivars and was significantly firmer than 3 cultivars. Fruit of 3 cultivars were significantly less red than Bobcat fruit.

**Observational Trial** - In the fruit from the 6 cultivars harvested VR from the observation trial (**Table 7**), all had excellent *red color* development at the table-ripe stage. *Firmness* values averaged the same as VR harvested fruit from the replicated trial. Fruit of GVS 51-193 were notably softer than fruit from other cultivars. Average *% soluble solids* were higher than for fruit from the replicated trial (4.51% vs 4.25%). HMX 2807 fruit had the highest *% soluble solids* (4.63%) and fruit from RFT 6047 has the lowest (4.03%). The *% titratable acidity* varied from 0.285 to 0.358% and was on average higher than for fruit from the replicated trial. Fruit from RFT 6047 had the lowest acidity (0.285%) while fruit from BHN 623 had the highest acidity (0.358%).

Based on the low soluble solids and acidity contents, fruit of RFT 6047 likely would have less flavor than fruit of the other cultivars evaluated.

### **San Joaquin Co. Round Tomato Trial Summary - Tables 8 & 9**

**Replicated Trial** - Eight cultivars from the replicated trial were evaluated from MG and VR harvested fruit and 1 cultivar was harvested only at the MG stage (**Table 8**). *Final red color* was excellent in all cultivars except for L-312 as reflected in higher hue color values (indicating less red color). Both MG and VR harvested fruit of L-312 had inferior color development at the table-ripe stage. Fruit of this cultivar were, however, notably firmer than fruit of the other 8 cultivars. For the other 8 cultivars, there was no difference in final red color (hue value) between the MG and VR harvested fruit. For MG harvested fruit, *soluble solids* were highest in BHN464 and BHN499 (5.7 and 5.6%) and lowest in Bobcat (5.0%). For VR harvested fruit, soluble solids were highest in DT 03-07 and Sun King

(5.6 and 5.6%) and lowest in Bobcat (4.9%). The pH values of the fruits tended to be lower for the VR harvested fruit, but this varied depending on cultivar. As expected, this corresponded to a higher titratable acid content. In all cultivars, the % titratable acidity was notably higher in the VR fruit.

### Observational Trial

In the fruit harvested from the observation trial (**Table 9**), all had good *red color* development except L-311 (higher hue value reflects less red color development). *Firmness* values were higher for the MG-harvested fruit than the VR harvested fruit (20.2 vs 18.3 Newtons). Shady Lady and XTM 0115 fruits were the least firm as were VR harvested SDT-01-6 fruits. The % *soluble solids* was highest in both the MG and VR harvested fruit from BHN 611 and lowest in L-311 MG fruit and fruit of Shady Lady. The % *titratable acidity* averaged 0.42% for the VR harvested fruit compared to 0.38% for the MG harvested fruit.

### San Joaquin Co. Roma Tomato Trial - Table 10

Six cultivars of Roma tomatoes were harvested at the MG and VR stages (**Table 10**) in the replicated Roma trial. Final *red color* (hue color value) was similar among varieties and between the MG and VR harvested fruit. Fruit from all 6 cultivars harvested MG and ripened were firmer than fruit harvested as VR (**Table 4**). *Firmness* values were similar among the 6 cultivars, with only minor differences. The % *soluble solids* varied significantly among cultivars but not between MG and VR harvested fruit. Mariana fruit had the highest average soluble solids (5.60%) and SD 257 had the lowest average content. The pH was generally slightly lower in the VR harvested fruit, and correspondingly the % *titratable acidity* was generally higher in these fruits. Fruit from BHN 523 had the highest average % titratable acidity, while SD 257 had the lowest average acid content.

### Three Trial Summaries - Tables 11 – 14:

**Table 11** compares 11 varieties harvested as MG in the 3 replicated or observational trials.

Quality results were generally similar for a given cultivar between the Kings County and San Joaquin County Trials, but the results for the Merced trial were often considerably different. In general MG-harvested fruit from the Merced trial were softer (lower firmness value), had lower % soluble solids and lower % titratable acidity. Color development was similar in fruit from the Merced and San Joaquin trials, but was sometimes better developed in fruit from the Kings trial (lower hue value). These results are similar to those summarized in **Table 13**, which included varieties present in the 3 locations, but only in the replicated trial.

Nine cultivars were harvested as VR fruit in the Merced and San Joaquin replicated or observational trials (**Table 12**). The differences are similar to those of the MG-harvested fruit. Fruit from the Merced trial were generally softer, had lower % soluble solids and lower % titratable acidity than fruit from the San Joaquin trial. On average, red color development was slightly better in fruit from the San Joaquin trial. These results are also similar to the summary from the varieties in the replicated trial only (**Table 13**).

**Table 14** summarizes average values for color, firmness, % soluble solids and titratable acidity for 9 varieties that were evaluated on at least 4 occasions. Tomatoes were evaluated from MG- or VR-harvested fruit. **Table 15** provides an overall ranking of the varieties based on color, firmness and composition values for 2003 evaluations. Cultivar HMX 2807 was ranked the highest in overall quality, and BHN 464 ranked the lowest. HMX 2807 ranked the best in flavor score and QualiT 23 ranked the lowest in overall flavor score. Bobcat, QualiT 21 and Shady Lady ranked top in overall red color score and L-312 ranked the lowest. Overall firmness score was highest for L-312 and lowest for Shady Lady. In 2003, the fruit generally had higher contents of soluble solids and titratable acidity than the fruit harvested in 2002.

## Results in Tables

Quality characteristics of fresh market tomatoes harvested **MG** and **VR** and ripened at 20°C (68°F). Fruit were treated with ethylene for 3-4 days and were evaluated at the table-ripe stage. See Tables 1-3 for explanation of measurements; lower color values indicate redder fruit, lower firmness values indicate softer fruit. Varieties are listed in alphabetical order.

### Kings County Trial – Harvested July 17, 2003

**Table 4. Replicated Varieties**

Cultivar & Company		Red Color Intensity, Chroma	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>BHN 358</b>	(BHN)	25.7	35.5	18.1	4.60	4.39	0.40
<b>BHN 464</b>	(BHN)	25.1	32.4	19.2	5.00	4.46	0.40
<b>BHN 499</b>	(BHN)	26.6	31.9	18.4	5.10	4.50	0.39
<b>Bobcat</b>	(Syngenta)	24.1	31.3	19.9	4.83	4.51	0.38
<b>L-312</b>	(Syngenta)	25.4	38.5	19.4	5.07	4.49	0.36
<b>QualiT 21</b>	(Syngenta)	24.0	32.7	18.7	5.07	4.49	0.38
<b>QualiT 23</b>	(Syngenta)	28.2	34.7	20.3	4.77	4.46	0.37
<b>RFT 6047</b>	(Syngenta)	22.9	30.4	19.9	5.07	4.52	0.41
<b>Sun King</b>	(Seminis)	23.4	32.2	20.4	4.70	4.56	0.34
<b>Shady Lady</b>	(Sunseeds)	24.8	30.9	15.4	4.93	4.61	0.35
<b>Average</b>		<b>25.0</b>	<b>32.4</b>	<b>19.0</b>	<b>4.91</b>	<b>4.50</b>	<b>0.38</b>
LSD.05		1.2	1.1	1.1	0.27	0.07	0.05

Color & firmness data are from 3 reps of 15 fruit; composition data are from 3 reps of composite samples of 15 fruit.

**Table 5. Observed Varieties**

Cultivar & Company		Red Color Intensity, Chroma	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>B-807</b>	(LSL)	30.2	36.4	20.3	4.67	4.45	0.41
<b>BHN 502</b>	(BHN)	23.3	34.8	19.3	5.23	4.43	0.46
<b>BHN 526</b>	(BHN)	24.7	35.1	23.3	5.63	4.41	0.46
<b>BHN 581</b>	(BHN)	23.0	34.8	18.7	4.93	4.49	0.41
<b>BHN 611</b>	(BHN)	22.7	33.3	21.8	5.30	4.54	0.39
<b>BHN 623</b>	(BHN)	21.1	33.9	20.4	4.87	4.37	0.42
<b>HMX 2807</b>	(Harris Moran)	22.2	30.8	19.7	5.30	4.58	0.38
<b>L-310</b>	(LSL)	30.5	40.0	21.7	4.60	4.62	0.33
<b>L-311</b>	(LSL)	32.2	37.6	19.8	4.63	4.52	0.37
<b>XTM 0113</b>	(Sakata)	24.7	33.2	19.3	4.97	4.48	0.43
<b>XTM 0115</b>	(Sakata)	23.5	32.0	17.0	4.90	4.53	0.39
<b>XTM 0230</b>	(Sakata)	26.6	31.0	18.8	4.83	4.48	0.39
<b>XTM 0231</b>	(Sakata)	26.3	31.4	20.0	5.33	4.44	0.42
<b>Average</b>		<b>25.5</b>	<b>34.2</b>	<b>20.00</b>	<b>5.01</b>	<b>4.49</b>	<b>0.40</b>
LSD.05		1.2	1.1	1.1	0.27	0.07	0.05

Color & firmness data are from 3 reps of 15 fruit; composition data are from 3 reps of composite samples of 15 fruit.

## Merced County Trial – Harvested August 4, 2003

**Table 6. Replicated Varieties**

Cultivar & Company	Stage at Harvest	Red Color Intensity, Chroma	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>BHN 464</b> (BHN)	MG	34.2	38.7	19.3	4.37	4.44	0.29
	VR	39.4	43.7	16.2	4.33	4.43	0.36
<b>BHN 499</b> (BHN)	MG	32.9	36.6	20.0	4.20	4.55	0.29
	VR	38.0	41.7	16.8	4.50	4.50	0.33
<b>Bobcat</b> (Syngenta)	MG	32.6	34.9	19.8	3.90	4.55	0.26
	VR	32.3	36.8	18.0	3.93	4.54	0.30
<b>L-312</b> (LSL)	MG	36.1	41.1	35.9	4.27	4.54	0.27
	VR	--	--	--	4.63	4.52	0.28
<b>QualiT 21</b> (Syngenta)	MG	33.8	37.2	20.6	4.13	4.51	0.28
	VR	30.6	37.2	15.5	4.17	4.51	0.31
<b>QualiT 23</b> (Syngenta)	MG	34.8	36.7	19.3	3.97	4.50	0.26
	VR	32.9	37.9	17.7	4.03	4.39	0.29
<b>Sun King</b> (Seminis)	MG	33.5	37.1	20.9	4.17	4.65	0.23
	VR	40.4	41.9	16.9	4.30	4.56	0.26
<b>Shady Lady</b> (Sunseeds)	MG	34.3	34.7	16.6	4.23	4.57	0.28
	VR	33.0	37.4	13.6	4.13	4.53	0.31
<b>Average</b>	<b>MG</b>	<b>34.0</b>	<b>37.1</b>	<b>21.6</b>	<b>4.16</b>	<b>4.54</b>	<b>0.27</b>
<b>Average</b>	<b>VR</b>	<b>35.2</b>	<b>39.5</b>	<b>16.4</b>	<b>4.25</b>	<b>4.50</b>	<b>0.31</b>
<b>LSD.05</b>		1.6	1.4	1.6	0.25	0.07	0.03

Color & firmness data are from 3 reps of 15 fruits for MG and 3 reps of 8-15 fruits for VR.

Composition data are from 3 reps of composite samples of 15 fruit for MG and 8-15 fruits for VR.

**Table 7. Observed Varieties**

Cultivar & Company	Red Intensity, Chroma	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titrat. acidity
<b>BHN 623</b> (BHN)	32.2	35.1	17.2	4.40	4.46	0.36
<b>SDT 01-7</b> (D. Palmer)	32.1	32.7	16.6	4.37	4.48	0.34
<b>GVS 51-193</b> (Golden Valley Seed)	29.8	34.7	13.8	4.63	4.49	0.38
<b>HMX 2807</b> (Harris Moran)	31.1	35.8	15.2	4.63	4.58	0.30
<b>SW 100 103</b> (Southwestern)	31.4	34.9	17.3	4.57	4.52	0.31
<b>RFT 6047</b> (Syngenta)	32.1	37.8	18.7	4.03	4.53	0.28
<b>Average</b>	<b>31.4</b>	<b>35.2</b>	<b>16.5</b>	<b>4.44</b>	<b>4.51</b>	<b>0.33</b>
<b>LSD.05</b>	1.8	1.3	1.4	0.28	0.08	0.03

Color & firmness data are from 3 reps of 8; composition data are from 3 reps of composite samples of 7 fruits.

**San Joaquin County Trial – Harvested September 15, 2003**

**Table 8. Replicated Varieties**

<b>Cultivar &amp; Company</b>	<b>Stage at Harvest</b>	<b>Red Intensity, Chroma</b>	<b>Red Color, Hue</b>	<b>Firmness, Newtons</b>	<b>% Soluble solids</b>	<b>pH</b>	<b>% Titratable acidity</b>
<b>Replicated Trial</b>							
<b>BHN 464 (BHN)</b>	MG	35.3	37.1	21.6	5.70	4.30	0.39
	VR	--	--	--	--	--	--
<b>BHN 499 (BHN)</b>	MG	32.6	35.6	19.6	5.63	4.33	0.37
	VR	32.8	35.5	19.7	5.37	4.22	0.46
<b>Bobcat (Syngenta)</b>	MG	35.4	35.8	23.7	5.00	4.31	0.36
	VR	32.0	36.0	20.5	4.87	4.25	0.40
<b>DT 03-70 (D. Palmer)</b>	MG	34.2	34.4	19.5	5.23	4.33	0.33
	VR	33.2	32.8	18.6	5.60	4.33	0.41
<b>HMX 2807 (Harris Moran)</b>	MG	32.0	35.2	22.7	5.42	4.43	0.35
	VR	35.1	35.5	20.0	5.50	4.31	0.45
<b>L-312 (LSL)</b>	MG	35.1	41.2	28.8	5.20	4.34	0.33
	VR	34.4	40.0	21.0	5.37	4.32	0.35
<b>QualiT 21 (Syngenta)</b>	MG	32.8	36.2	20.9	5.27	4.31	0.34
	VR	33.9	37.3	17.7	5.33	4.24	0.38
<b>QualiT 23 (Syngenta)</b>	MG	36.0	34.8	19.1	5.27	4.31	0.35
	VR	35.4	35.6	17.7	5.40	4.22	0.43
<b>Sun King (Seminis) (XP 150410)</b>	MG	31.5	35.3	22.7	5.40	4.40	0.37
	VR	33.6	35.1	19.7	5.60	4.32	0.43
<b>Average</b>	<b>MG</b>	<b>33.9</b>	<b>36.2</b>	<b>22.1</b>	<b>5.35</b>	<b>4.34</b>	<b>0.35</b>
<b>Average</b>	<b>VR</b>	<b>33.8</b>	<b>36.0</b>	<b>19.4</b>	<b>5.38</b>	<b>4.28</b>	<b>0.41</b>
<b>LSD.05</b>		<b>1.2</b>	<b>0.9</b>	<b>1.2</b>	<b>0.29</b>	<b>0.09</b>	<b>0.04</b>

Color & firmness data are from 3 reps of 12 fruits for MG or VR fruits; composition data are from 3 reps of composite samples of 12 fruit for MG or VR.

**Table 9. Observed Varieties**

Cultivar & Company	Stage at Harvest	Red Color Intensity, Chroma	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>BHN 502</b> (BHN)	MG	33.4	37.8	19.0	5.37	4.31	0.36
	VR	--	--	--	--	--	--
<b>BHN 611</b> (BHN)	MG	33.1	37.0	21.4	5.70	4.31	0.41
	VR	33.9	35.8	19.6	5.73	4.38	0.44
<b>L-311</b> (LSL)	MG	34.7	40.9	24.5	5.13	4.29	0.32
	VR	--	--	--	--	--	--
<b>SDT-01-6</b> (D. Palmer)	MG	33.7	35.0	19.8	5.63	4.33	0.37
	VR	30.7	33.9	17.5	5.37	4.39	0.38
<b>Shady Lady</b> (Sunseeds)	MG	35.8	35.6	17.3	5.30	4.26	0.39
	VR	31.5	35.5	17.3	5.10	4.28	0.39
<b>XTM 0115</b> (Sakata)	MG	36.6	35.5	17.2	5.53	4.33	0.40
	VR	--	--	--	--	--	--
<b>XTM 0231</b> (Sakata)	MG	34.5	35.6	22.4	5.43	4.29	0.38
	VR	32.2	35.6	18.9	5.63	4.20	0.46
<b>Average</b> <b>Average</b> LSD.05	<b>MG</b>	<b>34.5</b>	<b>36.8</b>	<b>20.2</b>	<b>5.44</b>	<b>4.30</b>	<b>0.38</b>
	<b>VR</b>	<b>32.1</b>	<b>35.2</b>	<b>18.3</b>	<b>5.46</b>	<b>4.31</b>	<b>0.42</b>
		1.2	0.9	1.2	0.29	0.09	0.04

Data are from 3 reps 12 fruits for MG or VR fruits; composition data from 3 reps of composite samples of 12 fruits.

**Table 10. Roma Varieties**

Cultivar	Stage at Harvest	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>BHN 523</b> (BHN)	MG	35.6	24.0	5.42	4.21	0.42
	VR	35.8	21.8	5.47	4.08	0.53
<b>BHN 621</b> (BHN)	MG	35.6	22.6	5.37	4.18	0.41
	VR	36.8	20.1	5.30	4.11	0.44
<b>Mariana</b> (Sakata)	MG	36.0	24.9	5.60	4.24	0.40
	VR	36.9	19.7	5.60	4.16	0.44
<b>MiRoma</b> (Syngenta)	MG	36.9	23.8	5.43	4.22	0.42
	VR	35.1	20.1	5.43	4.21	0.42
<b>Monica</b> (Sakata)	MG	35.1	24.5	5.37	4.20	0.44
	VR	36.5	19.3	5.57	4.18	0.45
<b>SD 257</b> (LSL)	MG	34.1	24.5	5.33	4.25	0.41
	VR	36.7	19.7	5.10	4.26	0.42
<b>Average</b> <b>Average</b> LSD.05	<b>MG</b>	<b>35.7</b>	<b>24.0</b>	<b>5.42</b>	<b>4.22</b>	<b>0.42</b>
	<b>VR</b>	<b>35.6</b>	<b>20.1</b>	<b>5.41</b>	<b>4.17</b>	<b>0.45</b>
		0.6	1.1	0.27	0.07	0.04

Color & firmness data are from 3 reps of 15 fruits for MG and 8-10 fruits for VR; composition data are from 3 reps of composite samples of 15 fruit each for MG and 8-10 fruit for VR.

**Summary Table 11.** Quality characteristics of fresh market tomatoes harvested **MG** from the 2003 trials (replicated or observational). See Tables 1-3 for explanation of measurements; lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

<b>Cultivar &amp; Company</b>	<b>Trial</b>	<b>Red Color, Hue</b>	<b>Firmness, Newtons</b>	<b>% Soluble solids</b>	<b>pH</b>	<b>% Titratable acidity</b>
<b>BHN 464</b> (BHN)	Kings	32.4	19.2	5.00	4.46	0.40
	Merced	38.7	19.3	4.37	4.44	0.29
	San Joaq.	37.1	21.6	5.70	4.30	0.39
	<b>Average</b>	<b>36.1 + 3.3</b>	<b>20.0 + 1.4</b>	<b>5.0 + 0.7</b>	<b>4.40 + .09</b>	<b>0.36 + .06</b>
<b>BHN 499</b> (BHN)	Kings	31.9	18.4	5.10	4.50	0.39
	Merced	36.6	20.0	4.20	4.55	0.29
	San Joaq.	35.6	19.6	5.63	4.33	0.37
	<b>Average</b>	<b>34.7 + 2.5</b>	<b>19.3 + 0.8</b>	<b>5.0 + 0.7</b>	<b>4.53 + .02</b>	<b>0.35 + .05</b>
<b>Bobcat</b> (Syngenta)	Kings	31.3	19.9	4.83	4.51	0.38
	Merced	34.9	19.8	3.90	4.55	0.26
	San Joaq.	35.8	23.7	5.00	4.31	0.36
	<b>Average</b>	<b>34.0 + 2.4</b>	<b>21.1 + 2.2</b>	<b>4.6 + 0.6</b>	<b>4.46 + .13</b>	<b>0.33 + .06</b>
<b>HMX 2807</b> (Harris Moran)	Kings	30.8	19.7	5.30	4.58	0.38
	Merced	35.8	15.2	4.63	4.58	0.30
	San Joaq.	35.2	22.7	5.42	4.43	0.35
	<b>Average</b>	<b>33.9 + 2.7</b>	<b>19.2 + 3.8</b>	<b>5.1 + 0.4</b>	<b>4.53 + .09</b>	<b>0.34 + .04</b>
<b>L-312</b> (LSL)	Kings	38.5	19.4	5.07	4.49	0.36
	Merced	41.1	35.9	4.27	4.54	0.27
	San Joaq.	41.2	28.8	5.20	4.34	0.33
	<b>Average</b>	<b>40.3 + 1.5</b>	<b>28.0 + 8.3</b>	<b>4.8 + 0.5</b>	<b>4.49 + .13</b>	<b>0.32 + .04</b>
<b>QualiT 21</b> (Syngenta)	Kings	32.7	18.7	5.07	4.49	0.38
	Merced	37.2	20.6	4.13	4.51	0.28
	San Joaq.	36.2	20.9	5.27	4.31	0.34
	<b>Average</b>	<b>35.4 + 2.4</b>	<b>20.1 + 1.2</b>	<b>4.8 + 0.6</b>	<b>4.44 + .11</b>	<b>0.33 + .05</b>
<b>QualiT 23</b> (Syngenta)	Kings	34.7	20.3	4.77	4.46	0.37
	Merced	36.7	19.3	3.97	4.50	0.26
	San Joaq.	34.8	19.1	5.27	4.31	0.35
	<b>Average</b>	<b>35.4 + 1.1</b>	<b>19.6 + 0.6</b>	<b>4.7 + 0.6</b>	<b>4.42 + .10</b>	<b>0.33 + .06</b>
<b>RFT 6047</b> (Syngenta)	Kings	30.4	19.9	5.07	4.52	0.41
	Merced	37.8	18.7	4.03	4.53	0.28
	San Joaq.	--	--	--	--	--
	<b>Average</b>	<b>34.1 + 5.2</b>	<b>19.3 + 0.8</b>	<b>4.6 + 0.7</b>	<b>4.52 + .02</b>	<b>0.34 + .09</b>
<b>Shady Lady</b> (Sunseeds)	Kings	30.9	15.4	4.93	4.61	0.35
	Merced	34.7	16.6	4.23	4.57	0.28
	San Joaq.	35.6	17.3	5.30	4.26	0.39
	<b>Average</b>	<b>33.7 + 2.5</b>	<b>16.4 + 1.0</b>	<b>4.8 + 0.5</b>	<b>4.48 + .19</b>	<b>0.34 + .06</b>
<b>Sun King</b> (Seminis)	Kings	32.2	20.4	4.70	4.56	0.34
	Merced	37.1	20.9	4.17	4.65	0.23
	San Joaq.	35.3	22.7	5.40	4.40	0.37
	<b>Average</b>	<b>34.9 + 2.5</b>	<b>21.3 + 1.2</b>	<b>4.8 + 0.6</b>	<b>4.54 + .13</b>	<b>0.31 + .07</b>
<b>XTM 0231</b> (Sakata)	Kings	31.4	20.0	5.33	4.44	0.42
	Merced	--	--	--	--	--
	San Joaq.	35.6	22.4	5.43	4.29	0.38
	<b>Average</b>	<b>33.5 + 3.0</b>	<b>21.2 + 1.7</b>	<b>5.4 + 0.1</b>	<b>4.36 + .11</b>	<b>0.40 + .03</b>

Color & firmness data are from 3 reps of 8-15 fruits; composition data are from 3 reps of composite samples of 8-15 fruit each.

**Summary Table 12.** Quality characteristics of fresh market tomatoes harvested VR from two of the three 2003 trials. See Tables 1-3 for explanation of measurements.

Cultivar	Trial	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>BHN 464</b> (BHN)	Merced	43.7	16.2	4.33	4.43	0.36
	San	37.1	21.6	5.70	4.30	0.39
	Joaq.	<b>40.4</b>	<b>18.9</b>	<b>5.0</b>	<b>4.36</b>	<b>0.38</b>
	<b>Average</b>					
<b>BHN 499</b> (BHN)	Merced	41.7	16.8	4.50	4.50	0.33
	San	35.5	19.7	5.37	4.22	0.46
	Joaq.	<b>38.6</b>	<b>18.2</b>	<b>4.9</b>	<b>4.36</b>	<b>0.40</b>
	<b>Average</b>					
<b>Bobcat</b> (Syngenta)	Merced	36.8	18.0	3.93	4.54	0.30
	San	36.0	20.5	4.87	4.25	0.40
	Joaq.	<b>36.4</b>	<b>19.2</b>	<b>4.4</b>	<b>4.40</b>	<b>0.35</b>
	<b>Average</b>					
<b>HMX 2807</b> (Harris Moran)	Merced	35.8	15.2	4.63	4.58	0.30
	San	35.5	20.0	5.50	4.31	0.45
	Joaq.	<b>35.6</b>	<b>17.6</b>	<b>5.1</b>	<b>4.44</b>	<b>0.38</b>
	<b>Average</b>					
<b>L-312</b> (LSL)	Merced	41.1	35.9	4.63	4.52	0.28
	San	40.0	21.0	5.37	4.32	0.35
	Joaq.	<b>40.6</b>	<b>28.4</b>	<b>5.0</b>	<b>4.42</b>	<b>0.32</b>
	<b>Average</b>					
<b>QualiT 21</b> (Syngenta)	Merced	37.2	15.5	4.17	4.51	0.31
	San	37.3	17.7	5.33	4.24	0.38
	Joaq.	<b>37.2</b>	<b>16.6</b>	<b>4.8</b>	<b>4.38</b>	<b>0.34</b>
	<b>Average</b>					
<b>QualiT 23</b> (Syngenta)	Merced	37.9	17.7	4.03	4.39	0.29
	San	35.6	17.7	5.40	4.22	0.43
	Joaq.	<b>36.8</b>	<b>17.7</b>	<b>4.7</b>	<b>4.30</b>	<b>0.36</b>
	<b>Average</b>					
<b>Shady Lady</b> (Sunseeds)	Merced	37.4	13.6	4.13	4.53	0.31
	San	35.5	17.3	5.10	4.28	0.39
	Joaq.	<b>36.4</b>	<b>15.4</b>	<b>4.62</b>	<b>4.40</b>	<b>0.35</b>
	<b>Average</b>					
<b>Sun King</b> (Sakata)	Merced	41.9	16.9	4.30	4.56	0.26
	San	35.1	19.7	5.60	4.32	0.43
	Joaq.	<b>38.5</b>	<b>18.3</b>	<b>5.0</b>	<b>4.44</b>	<b>0.34</b>
	<b>Average</b>					
<b>Average Average</b>	Merced	39.3	18.4	4.3	4.51	0.30
	San	36.4	19.5	5.4	4.27	0.41
	Joaq.					

**Summary Table 13.** Average quality characteristics of fresh market tomatoes harvested **MG** or **VR** from three replicated trials in 2003. Fruit were ripened at 20°C (68°F) and evaluated at the table-ripe stage (USDA Color Chart stage 6). See Tables 1-3 for explanation of measurements.

Trial	# cultivars evaluated	Red Color, Hue	Firmness, Newtons	% Soluble solids	pH	% Titratable acidity
<b>Harvested MG</b>						
Kings Co.	10	32.4	19.0	4.91	4.50	0.38
Merced Co.	8	37.1	21.6	4.16	4.54	0.27
San Joaquin Co.	9	36.2	22.1	5.35	4.34	0.35
<b>Average</b>		<b>35.2 ± 2.5</b>	<b>20.9 ± 1.7</b>	<b>4.8 ± 0.6</b>	<b>4.46 ± .10</b>	<b>0.33 ± .06</b>
<b>Harvested VR</b>						
Kings Co.	0	--	--	--	--	--
Merced Co.	8	39.5	16.4	4.25	4.50	0.31
San Joaq.Co.	11	36.0	19.4	5.38	4.28	0.41
<b>Average</b>		<b>37.8 ± 2.5</b>	<b>17.9 ± 2.1</b>	<b>4.7 ± 0.4</b>	<b>4.39 ± .16</b>	<b>0.36 ± .07</b>

**Summary Table 14.** Average color, firmness and composition values for 9 varieties harvested as **MG** or **VR** from at least 4 harvests from at least 2 locations. Fruit completed ripening at 20°C (68°F) and evaluated at the table-ripe stage. See Tables 1-3 for explanation of measurements. Varieties are listed in order of their final ranking in Summary Table 15.

Variety	No. evaluations	Red Color, Hue	Firmness, Newtons	% Soluble solids	% Titratable acidity
<b>HMX 2807</b>	4	34.3 ± 2.4	19.4 ± 3.1	5.2 ± 0.4	0.37 ± 0.06
<b>QualiT 21</b>	5	36.1 ± 2.0	18.7 ± 2.2	4.8 ± 0.6	0.34 ± 0.04
<b>Bobcat</b>	5	35.0 ± 2.2	20.4 ± 2.1	4.5 ± 0.5	0.34 ± 0.06
<b>QualiT 23</b>	5	35.9 ± 1.4	18.8 ± 1.1	4.7 ± 0.7	0.34 ± 0.07
<b>Sun King</b>	5	36.3 ± 3.6	20.1 ± 2.1	4.8 ± 0.6	0.33 ± 0.08
<b>BHN 499</b>	5	36.3 ± 3.5	18.9 ± 1.3	5.0 ± 0.6	0.37 ± 0.06
<b>L-312</b>	5	38.7 ± 4.2	26.3 ± 7.6	4.9 ± 0.4	0.32 ± 0.04
<b>Shady Lady</b>	5	34.8 ± 2.4	16.0 ± 1.6	4.7 ± 0.5	0.34 ± 0.05
<b>BHN 464</b>	4	38.0 ± 4.7	19.1 ± 2.2	4.8 ± 0.6	0.36 ± 0.05

**Summary Table 15.** Overall scores of ripe round tomato varieties (includes **MG-** and **VR-** harvested fruits for which there were evaluations from at least 4 harvests from at least 2 locations) evaluated in 2003.

Variety	Number Evaluations	% SS Score	% TA Score	Flavor Score (Max = 3)	Red Color Score (Max = 3)	Firmness Score (Max = 3)	Total Quality Score (Max =9)
<b>HMX 2807</b>	4	2.75	2.25	<b>2.5</b>	<b>2.25</b>	<b>2.5</b>	<b>7.25</b>
<b>QualiT 21</b>	5	2.2	1.8	<b>2.0</b>	<b>2.2</b>	<b>2.4</b>	<b>6.60</b>
<b>Bobcat</b>	5	1.6	1.8	<b>1.7</b>	<b>2.4</b>	<b>2.4</b>	<b>6.50</b>
<b>QualiT 23</b>	5	2.0	1.8	<b>1.9</b>	<b>2.4</b>	<b>2.2</b>	<b>6.50</b>
<b>Sun King</b>	5	2.0	1.8	<b>1.9</b>	<b>2.0</b>	<b>2.6</b>	<b>6.50</b>
<b>BHN 499</b>	5	2.4	2.0	<b>2.25</b>	<b>2.0</b>	<b>2.2</b>	<b>6.45</b>
<b>L-312</b>	5	2.0	1.6	<b>1.8</b>	<b>1.6</b>	<b>2.8</b>	<b>6.20</b>
<b>Shady Lady</b>	5	2.0	1.6	<b>1.8</b>	<b>2.4</b>	<b>1.8</b>	<b>6.00</b>
<b>BHN 464</b>	4	1.75	1.75	<b>1.75</b>	<b>2.0</b>	<b>2.0</b>	<b>5.75</b>

Varieties are scored for each characteristic on a 3 point scale, where 1=low, 2=intermediate, and 3=high.

<b>Red color:</b>	score 1 = poor, with hue >40	score 2 = hue 35-40	score 3 = high with hue <35
<b>Firmness:</b>	score 1 = <15N force	score 2 = 15-18	score 3 = >18
<b>Soluble solids:</b>	score 1 = < 4.2 %SS	score 2 = 4.2-4.6 %SS	score 3 = >4.6 %SS
<b>Acidity:</b>	score 1 = < 0.28 %T.A.	score 2 = .28-.30 %TA	score 3 = >0.30 %T.A.

Flavor Score is the average of the soluble solids and titratable acidity scores.

Total score is based on the sum of the flavor, red color and firmness scores, and the higher the total score, the better the overall quality. Varieties are ordered based on total quality score (right column).

## DATA ANALYSIS TERMS

All data, such as total marketable yield, size grades, and vine and fruit characteristics, are statistically analyzed to determine significant differences between varieties. A significant difference is one that is too large to be the result of chance and that has a reasonably high probability of being a real difference.

A **Least Significant Difference (LSD)**, calculated from each set of data, indicates the smallest difference between treatment numbers that can be considered real. When two items differ by more than the LSD .05, we are 95 percent confident that the difference is real. If an LSD .01 is indicated then we are 99 percent confident that the difference is real and not just due to chance.

**Not Significant (NS)** indicates there is no significant difference between treatment numbers. OR There is no significance in the interaction between location and varieties, i.e. varieties followed similar trends in all locations. When the interaction is not significant then an LSD can be calculated and used to separate the varieties.

**Significant (S)** indicates there is a significant difference between varieties and a LSD is calculated. S also indicates there is significance in the interaction between variety and location, i.e. varieties did not follow similar trends in all locations. In this situation it is illogical to separate the varieties with an LSD.

The **Coefficient of Variation (CV)** is a measure of the variation among the data. The greater the variation in the data, the larger the differences must be to be considered significant. A coefficient of variation less than or equal to 10 is considered good.