Research Project Final Report
To the California Tomato Commission

2005

Statewide Fresh Market Tomato Variety Trials: Field and Postharvest Evaluations

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Statewide Fresh Market Tomato Variety Trials
Field Evaluations for 2005

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Summary
As part of a long-term project with the California Tomato Commission, fresh market tomato variety trials were conducted in commercial tomato production fields in Fresno, Merced, and San Joaquin Counties in 2005 to evaluate field and postharvest performance. At each location, "round" lines were grown in both replicated and observation plots, while "roma" lines were planted in Fresno and San Joaquin only. New varieties were compared to the standards Shady Lady QualiT-21, and Monica, and evaluated on marketable yield, size breakdown, color, and cull percentage. Varieties performed differently depending on location/time of planting. Averaged across locations, no significant yield differences were observed, though the Merced location had significantly less XL fruit. All three trials were shown at field days prior to harvest.

Introduction
UCCE conducts fresh market tomato variety trials in three areas in the San Joaquin Valley to evaluate the performance of new varieties and breeding lies from commercial plant breeders for the mature green market. These variety trials provide the opportunity to evaluate and compare fruit quality characteristics and yield in commercial production fields with different types of soil, management, and growing conditions.

The objective of this trial is to identify dependable, higher yielding and higher quality lines that can be grown in a wide geographic area and varying environmental conditions characteristic of central California. The main commercial market is for mature green tomatoes. Varieties are typically semi-determinant, bush-type grown without support and hand harvested. This market includes both round and "roma" type tomatoes.

The trials are broken into two components: replicated and observation. Seed companies are asked to submit lines that have been previously tested in grower fields in California for the replicated trial. The observation lines usually represent the plant breeder's most promising lines for central California's commercial growing conditions and markets.

Procedure
The trials are conducted by each Farm Advisor in a similar fashion so that local results can be compared with other locations. Plot size is 1 bed by 40 to 50 feet long, planted using commercial transplanters on 5 foot raised beds. Trials are laid out as randomized complete block designs with 4 replications (observation lines are not replicated but are planted adjacent to the replicated plots). Plots are managed concurrently as the commercial field in which they are located. Harvest is done by hand at the same time as the rest of the field, picking from a 10 foot section from the center of the plot. At harvest, fruit are sorted by culls, color, and size. Small fruit (2 – 2.25") are picked but are not included in the total market yield.

In 2005, three round and two roma variety trials were conducted, however, the roma trial at the UC Westside Research & Extension Center (WSREC) in Fresno County was not replicated as requested

by seed companies. Trial locations, varieties, and field information are shown in Table 1. Both the Merced and San Joaquin trials were conducted in commercial production fields. The Fresno, Merced, and San Joaquin trials were planted one month apart, to reflect early, mid, and late season production fields.

A field day was held at each location. The Le Grand (Merced county) field day features information booths from UCCE Specialists and area Farm Advisors plus a hosted barbecue, so industry participation is great.

Postharvest samples from all the replicated varieties were collected by Marita Cantwell from all trials at the time of harvest and taken to the Mann Laboratory at UC Davis for color, firmness, and fruit composition analysis at the mature-green and table-ripe stage. A complete summary of the postharvest results follows this field report.

Results

Replicated Lines

Results for marketable yield and fruit size for Fresno, Merced, and San Joaquin Counties are shown in Tables 2, 3, and 4. The combined analysis is shown in Table 5. In Fresno, BHN 580 was the clear standout with regard to yield, with a mean yield over 2400 boxes/A. This was largely a result of an over-production of jumbo sized fruit. Merced also had a clear winner with AT-37, at over 2500 boxes per acre. There was no variety in San Joaquin County that was so markedly higher yielding than the rest. AT-37, QualiT-21, Catalyst, and RFT 500-311 all yielded similar to each other.

Yields broken down by size category for each trial location are shown in Figure 1. Significant yield differences were found at each location, though because of the difference in the timing and location of each trial, no one variety did significantly better or poorer at every location. When the data were combined, no significant differences were found for yield or size category. Essentially, low yields at one location were offset by high yields at another (Fig. 2). If only AT-37 (highest yielding) and Shady Lady (lowest yielding) are compared, these means are significantly different.

Extra large fruit were a smaller percentage of the market yield in Merced as compared to the other locations (Fig. 3). In general, Shady Lady had consistently smaller fruit at each location, while RFT 500-305 and –311 produced more XL fruit. Other location comparisons are shown in Table 5. RFT 500-312 had the highest percentage of red fruit, suggesting this is a line that is even earlier than the standard Shady Lady.

The significant variety by location LSD found for yield, XL%, cull %, and red% indicates that varieties are performing differently at different locations. This makes sense, because some lines are better adapted for early or late season growing conditions. The implications are that it is better to use the individual location results for determining variety fit rather than the combined analysis.

Fruit and vine characteristics are shown in Tables 6 –8. RFT 500-305 were noted to have nice looking fruit at the Fresno and San Joaquin locations.

Observed Lines

Fruit size and market yields for each county are shown in Tables 9, 10, and 11. The combined analysis is shown in Table 12. Because there is no replication in the observed lines, statistical analysis could be performed only on the combined data set. SRT 6784 did particularly well in Fresno, while BHN 525 and PX 2942 yielded well in Merced and San Joaquin locations. Combining

locations, no significant differences among varieties were found for yield or size, mainly because of the large amount of variability in the data (Fig 4).

The only significant factor found was % red fruit. SXT 6764, BHN 703 and BHN 678 had significantly more red fruit than the other lines.

As with the replicated trial, the Merced location had less XL fruit than the other locations (Fig 5).

Fruit and vine characteristics for the observation lines are shown in Tables 13 – 15. Many of the lines suffered from pointed and misshapen fruit at all locations; fleck (gold speckling on the fruit) was bad on the fruit from most of the lines in Merced.

Roma Trials

Roma trials were conducted in Fresno and San Joaquin, however, the Fresno location did not include replication. Results from the observation plots are shown in Table 16. Results from San Joaquin County are shown in Table 17. In general, yields were much lower than the round lines, and were dominated by small fruit. Market yield ranged from almost 1100 boxes for BHN C9008 to 700 boxes for Monica, but due to high variability these differences were not significant (Fig 6). The only significant differences found on any measured variable were with fruit size. RFT 8109 had the highest percentage of large fruit, whereas WS4062 had no red fruit. The fruit size breakdown for the San Joaquin trial is shown in Figure 7. Regardless of variety, most fruit were classed as small.

Fruit and vine characteristics for the roma lines are shown in Tables 18 and 19. Miroma was best in the trial, with fruit quality much better than all other lines.

Acknowledgements

Many thanks to the following seed company representative for their participation: Joe Haga, American Takii; Ted Angel and Pablo Salgado, BHN Seed; Ray Violin, Western Seed; Todd Rehrman and Rod Jorgenson, Syngenta/Rogers Seed; Susan Peters, Nunhems; Doug Heath, Seminis, and Jeff Zischke, Sakata Seeds. Additional thanks to the cooperators who helped with these trials, and to the California Tomato Commission for financial support.

Table 1. 2005 Fresh Market Tomato Regional Variety Trial

Early Trial *Michelle Le Strange* *559-685-3309* *mlestrange@ucdavis.edu*	Mid Season Trial *Scott Stoddard* *209-385-7403* *csstoddard@ucdavis.edu*	Late Season Trial *Jan Mickler* 209-525-6800 *cjmickler@ucdavis.edu*	
Replicated	**Replicated**	**Replicated**	**Company**
1 AT-37	1 AT-37	1 AT-37	**American**
2 BHN 580	2 BHN 580	2 BHN 580	**Takii**
3 BHN 654	3 BHN 654	3 BHN 654	**BHN Seed**
4 Shady Lady	4 Shady Lady	4 Shady Lady	
5 Quali T-21	5 Quali T-21	5 Quali T-21	**Nunhems**
6 Quali T-23	6 Quali T-23	6 Quali T-23	**Syngenta**
7 Bobcat	7 Bobcat	7 Bobcat	
8 Catalyst	8 Catalyst	8 Catalyst	
9 RFT 500-305	9 RFT 500-305	9 RFT 500-305	
10 RFT 500-311	10 RFT 500-311	10 RFT 500-311	**Syngenta**
11 RFT 500-312	11 RFT 500-312	11 RFT 500-312	
12 STM 0115	12 STM 0115	12 STM 0115	
13 PX 2935	13 PX 2935		**Sakata Seed** **Seminis**
Observation	**Observation**	**Observation**	
1 BHN 525	1 BHN 525	1 BHN 525	**BHN Seed**
2 BHN 678	2 BHN 678	2 BHN 678	
3 BHN 703	3 BHN 703	3 BHN 703	
4 SXT 6763	4 SXT 6763	4 SXT 6763	**Nunhems**
5 SXT 6764	5 SXT 6764	5 SXT 6764	
6 SRT 6783	6 SRT 6783	6 SRT 6783	**Nunhems**
7 SRT 6784	7 SRT 6784	7 SRT 6784	
8 STM 2203	8 STM 2203	8 STM 2203	**Sakata**
9 PX 2942	9 PX 2942	9 PX 2942	**Seminis**
ROMA		**ROMA**	
1. BHN C9008		1. BHN C9008	**BHN Seed**
2. Monica		2. Monica	**Sakata**
3. Muriel		3. Muriel	**Sakata**
4. SVR 3684	**Seminis**	4. WS 4061	**Western Seed**
5. SVR 0739	**Seminis**	5. WS 4062	**Western Seed**
6. WS 4061		6. MiRoma	**Syngenta**
7. WS 4062		7. RFT 8109	**Syngenta**
Seeded: March 3, 2005 Transplant: April 20, UC WSREC near 5 Points Plot 66" x 45 ft 5 reps Furrow irrigated Field Day: July 12 Harvest: July 14	Seeded: March 30, 2005 Transplant: May 20, Live Oak Farms, Le Grand, CA Plot 60" x 45 ft 4 reps Drip irrigated Field Day: Aug 9 Harvest: Aug 10, 11 (3 reps)	Seeded: May 10, 2005 Transplant: June 17, Celli Bros Farms, Thornton, CA Plot 60" x 25 ft 4 reps Furrow irrigated Field Day: Sept 9 Harvest: Sept 12	

For the roma trial with Michelle Le Strange, all varieties but Monica requested observation trial.
For the roma trial with Jan Mickler, all lines were replicated.

Table 2. Fresh market tomato variety trial yield and grade results, UC WSREC FRESNO 2005. REPLICATED varieties.

Code	Variety	Market Yield Tons/A	Market Yield Boxes/A	XL	L	M	S	Total Tons/A	Total Yield Culls %	Total Yield Red %
				--- % Marketable Yield ---						
1	**AT-37**	**20.4**	1630	43.6	40.9	15.6	2.5	**31.5**	27.2	13.0
2	**BHN 580**	**30.2**	2415	52.0	35.8	12.2	3.2	**41.4**	19.5	21.1
3	**BHN 654**	**23.2**	1852	49.3	37.8	12.9	2.3	**33.3**	23.5	14.4
4	**Shady Lady**	**22.9**	1830	42.7	36.0	21.3	4.1	**32.2**	16.2	22.7
5	**QualiT 21**	**19.7**	1578	39.5	42.5	18.0	1.9	**26.8**	19.2	6.7
6	**QualiT 23**	**21.8**	1745	50.8	32.9	16.4	2.1	**31.6**	24.4	11.3
7	**Bobcat**	**24.2**	1931	45.5	40.9	13.6	2.1	**30.9**	15.2	9.1
8	**Catalyst**	**22.2**	1776	40.3	43.5	16.3	3.6	**31.0**	16.6	13.4
9	**RFT 500-305**	**19.6**	1569	37.8	38.9	23.3	3.9	**28.5**	17.6	15.8
10	**RFT 500-311**	**20.0**	1602	56.0	31.8	12.2	1.6	**28.8**	25.0	12.3
11	**RFT 500-312**	**22.7**	1814	49.5	36.8	13.8	2.6	**32.3**	21.8	26.8
12	**STM 0115**	**19.4**	1552	38.8	42.4	18.8	2.4	**31.8**	31.8	15.9
13	**SVR 2935**	**22.2**	1772	40.9	40.6	18.6	3.5	**30.3**	15.2	2.4
	Average	**22.2**	**1774.3**	**45.1**	**38.5**	**16.4**	**2.7**	**31.6**	**21.0**	**14.2**
	LSD 0.05	2.6	211	5.3	5.4	4.5	1.2	3.4	5.9	4.8
	CV %	8.3	8.3	8.2	9.8	19.1	29.9	7.5	19.7	23.6

Table 3. Fresh market tomato variety trial yield and grade results, MERCED COUNTY, 2005. REPLICATED varieties.

Code	Variety	Market Yield Tons/A	Market Yield Boxes/A	XL	L	M	S	Total Tons/A	Total Yield Culls %	Total Yield Red %
				--- % Marketable Yield ---						
1	**AT-37**	31.5	2523	27.8	51.5	20.6	5.5	47.4	22.0	12.2
2	**BHN 580**	21.1	1688	18.8	50.4	30.9	6.3	37.4	27.1	8.9
3	**BHN 654**	21.2	1699	20.6	49.8	29.6	6.9	35.4	20.5	9.4
4	**Shady Lady**	20.1	1607	12.5	55.1	32.4	7.8	39.0	28.9	14.9
5	**QualiT 21**	23.1	1845	24.1	53.7	22.3	3.8	35.9	25.8	4.1
6	**QualiT 23**	22.0	1762	21.0	54.6	24.5	4.6	38.6	31.0	9.1
7	**Bobcat**	25.2	2013	30.8	43.3	25.9	4.7	39.5	24.4	10.2
8	**Catalyst**	24.6	1968	24.5	45.3	30.2	6.2	38.6	20.3	6.5
9	**RFT 500-305**	24.0	1917	40.0	44.7	15.3	2.6	33.9	20.5	12.6
10	**RFT 500-311**	27.3	2187	34.3	50.8	14.9	3.6	37.6	18.1	10.1
11	**RFT 500-312**	27.7	2217	21.2	53.4	25.4	6.1	39.8	14.6	17.2
12	**STM 0115**	25.0	2000	18.1	47.2	34.7	6.7	39.2	19.1	22.2
13	**SVR 2935**	24.4	1951	18.5	50.1	31.4	5.6	41.6	23.6	9.7
	Average	**24.4**	**1952**	**24.0**	**50.0**	**26.0**	**5.4**	**38.7**	**22.8**	**11.3**
	LSD 0.05	5.3	424	9.8	NS	11.9	2.9	NS	7.6	NS
	CV %	13.0	13	23.8	12.6	27.5	32.9	11.0	20.0	55.6

See notes next page.

Table 4. Fresh market tomato variety trial yield and grade results, SAN JOAQUIN COUNTY, 2005. REPLICATED varieties.

		Market Yield		XL	L	M	S	Total	Total Yield	
Code	Variety	Tons/A	Boxes/A	--- % Marketable Yield ---			Tons/A	Tons/A	Culls %	Red %
1	**AT-37**	25.6	2044	45.8	40.6	13.7	5.6	37.4	16.6	5.3
2	**BHN 580**	18.3	1462	39.8	42.4	17.9	5.0	29.2	20.9	2.0
3	**BHN 654**	20.7	1652	47.3	37.8	15.0	4.7	33.9	26.0	3.8
4	**Shady Lady**	17.5	1396	34.9	46.9	18.2	6.4	28.5	15.5	2.6
5	**QualiT 21**	24.5	1962	47.0	39.6	13.5	6.4	37.7	17.8	2.5
6	**QualiT 23**	21.5	1718	35.1	40.7	24.2	5.6	32.2	15.4	2.4
7	**Bobcat**	21.2	1692	38.4	38.0	23.6	4.4	31.7	19.8	2.6
8	**Catalyst**	24.6	1968	44.0	42.6	13.4	5.4	36.8	18.6	3.0
9	**RFT 500-305**	21.6	1726	45.6	38.6	15.9	5.2	30.9	13.3	3.5
10	**RFT 500-311**	24.5	1960	45.6	41.3	13.2	4.8	35.3	17.0	3.4
11	**RFT 500-312**	23.0	1836	33.1	46.1	20.9	4.8	33.8	18.4	4.4
12	**STM 0115**	21.3	1706	36.7	39.0	24.3	4.4	32.4	21.5	3.1
13	**SVR 2935**		***	***	NOT	IN	TEST	***	***	
	Average	**22.0**	**1760**	**41.1**	**41.1**	**17.8**	**5.2**	**33.3**	**18.4**	**3.2**
	LSD 0.05	4.5	360	NS	NS	NS	NS	5.8	NS	NS
	CV %	14.2	14	22.4	18.0	37.6	37.1	12.2	37.0	61.4

Market yield = XL + L + M size fruit, average of four replications. 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"
LSD 0.05 = least significant difference at the 95% probablility level.
Means within the same column that differ by less than this amount 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 5. Fresh market tomato variety trial yield and grade results, COMBINED ANALYSIS, 2005. REPLICATED varieties.

Code	Variety	Market Yield Tons/A	Market Yield Boxes/A	XL --- % Marketable Yield ---	L --- % Marketable Yield ---	M --- % Marketable Yield ---	S Tons/A	Total Tons/A	Total Yield Culls %	Total Yield Red %
1	**AT-37**	25.3	2024.0	40.1	43.7	16.3	4.4	38.0	21.9	10.0
11	**RFT 500-312**	24.1	1928.0	35.8	44.7	19.5	4.3	34.9	18.6	16.0
10	**RFT 500-311**	24.0	1916.8	45.7	40.3	14.0	3.3	33.9	20.1	8.6
2	**BHN 580**	23.8	1904.0	40.5	41.0	18.5	4.7	35.9	20.9	10.8
8	**Catalyst**	23.7	1896.0	37.3	43.7	19.0	5.0	35.1	18.3	7.7
7	**Bobcat**	23.3	1864.0	38.9	40.5	20.6	3.6	33.5	19.4	7.0
13	**SVR 2935**	23.3	1862.0	30.1	46.2	23.7	4.4	34.5	19.4	6.0
5	**QualiT 21**	22.4	1790.4	38.0	44.5	17.5	4.1	33.2	20.4	4.4
6	**QualiT 23**	21.7	1739.6	37.0	41.6	21.4	4.0	33.7	22.9	7.5
3	**BHN 654**	21.7	1737.6	40.7	41.1	18.2	4.4	34.1	23.6	9.2
9	**RFT 500-305**	21.5	1720.0	41.2	40.3	18.4	4.0	30.8	16.8	10.4
12	**STM 0115**	21.0	1677.6	30.8	43.6	25.6	4.3	32.6	25.5	13.0
4	**Shady Lady**	20.1	1611.6	31.6	45.2	23.2	5.9	32.7	19.4	13.3
	Fresno	22.2	1774.4	45.1	38.5	16.4	2.7	31.6	21.0	14.2
	Merced	24.4	1952.0	24.4	49.9	26.0	5.4	38.7	22.8	11.3
	San Joaquin	22.0	1760.0	41.1	41.1	17.8	5.2	33.3	18.4	3.2
	Average	22.8	1829.0	37.7	42.7	19.6	4.3	34.1	20.6	9.6
	Var LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Location LSD	NS	NS	6.4	4.2	4.9	1.2	4.6	NS	4.5
	Var x Location LSD	3.8	304.0	9.3	NS	8.0	NS	5.0	7.5	5.6
	CV %	11.9	11.9	17.6	13.8	29.2	35.7	10.4	25.8	41.7

Market yield = XL + L + M size fruit, average of four replications. 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"
LSD 0.05 = least significant difference at the 95% probablility level.
Means within the same column that differ by less than this amount are not significantly different.
Var x Location LSD = least significant difference between the same variety at different locations.
A significant var x location interaction indicates the varieties perform differently depending on location.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.

Table 6. Fresh market tomato fruit and vine characteristics. UC WSREC, 2005.
REPLICATED varieties

Code	Variety	Vine size	Vine cover	Fruit shape	Rough-ness	Blossom end	Sun-burn	Zip-pers	Over-all	Comments
1	**AT-37**	ML	SC	FG-DG	M	1-3	SL	S	F-G	larger fruit are flatter
2	**BHN 580**	ML	F	FG	M	2-4	S		F	too many huge fruit
3	**BHN 654**	ML	SC	G	S-M	1-2	S		G	smooth and uniform
4	**Shady Lady**	S-M	SC	FG	MR	2-4	S		F-G	rough shoulders, variable shape
5	**QualiT 21**	L	SC	G	M	1-3	SL		F-G	could be more uniform
6	**QualiT 23**	ML	SC	FG	MR	2-4	SL		F-G	variable shape & uniformity
7	**Bobcat**	ML	C	FG-G	M	2-3	SL-S		F-G	variable shape & uniformity
8	**Catalyst**	ML	C	FG-G	MR	2-3	SL-S		F	rough, smallish, not uniform
9	**RFT 500-305**	ML	F	G	S-M	1-3	SL	N	G	nice, uniform, smooth
10	**RFT 500-311**	ML	C	FG-G	M-S	2-4	SL		G	
11	**RFT 500-312**	ML	C	FG-G	M-S	2-3	SL		F-G	pretty uniform
12	**STM 0115**	ML	C	FG-DG	M-S	2-3	S		F	
13	**SVR 2935**	VL	F	G	M	2-3	SL		F-G	maturity is late

Vine size	VL=very large, L=large, M=med, S=small
Vine cover	C=compact, SC=semi-compact, F=floppy
Fruit shape	DG=deep globe, G=globe, FG= flat globe
Roughness	VS=very smooth, S=smooth, M=med, R=rough
Blossom end	1=very tight, 5=very open
Sunburn	N=none, SL=slight, S=Some, M=Much
Zippers	N=none, SL=slight, S=Some, M=Much
Overall	VG=very good, G=good, F=Fair, P=poor

Table 7. Fresh market tomato fruit and vine characteristics. Merced County, 2005.
REPLICATED varieties.

Var #	Variety	Vine Size	Leaf cover	Leaf roll	Fruit shape	Rough-ness	Blossom end	Sun-burn	Cat-facing	Zip-pers	disease resistance	Comments
1	AT-37	L	G	S	G	S	SL	SL	S	SL		cat facing
2	BHN 580	VL	G	N	G	MR	T	SL	N	SL	VFFN	zippers, fleck
3	BHN 654	VL	G	N	G	MR	SL	SL	N	SL	VFF T	
4	Shady Lady	M	G	SL	G	M	SL	SL	N	S		
5	Quali T-21	VL	G	N	G	S	T	SL	N	N	VFFN TMV ST	some stripes, growth cracks
6	Quali T-23	L	G	N	G	S	SL	SL	N	N	VFF TMV ST	
7	Bobcat	M	G	S	G	S	SL	SL	N	N	VFFST	
8	Catalyst	M	G	S	G-FG	S	SL	SL	N	SL		gold fleck
9	RFT 500-305	L	G	SL	G	S	SL	SL	N	N		
10	RFT 500-311	L	G	SL	G	S	T	SL	SL	N		
11	RFT 500-312	M	G	S	DG	S	SL	SL	N	N		fleck
12	STM 0115	L	G	SL	DG	MR	T	SL	N	SL	VFFAS	deep shoulders
13	PX 2935	VL	G	N	G	R	SL	SL	N	N		gold fleck

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	
Zippers:	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 virus			

Table 8. Fresh market tomato fruit and vine characteristics, San Joaquin County 2005.
REPLICATED varieties

Var #	Variety	Maturity	Fruit Shape	Smooth ness	firm- ness	fruit set	stem- ability	vine cover	fruit size	other notes
1	AT 37	M-ML	FG-G	3.5	3.5	G	2.5	F	L-XL	floppy vine, some sunburn, good yield
2	BHN 580	L	FG	3	3	G	2	F	L-XL	floppy vine, stems hard, some small fruit, fair yld
3	BHN 654	ML	FG	3	3.5	F-G	2	G	L-XL	good vine cover, stems hard, lg vine, some rough
4	Shady Lady	ML	FG-G	3.5	3	G	2	F-G	L-XL	stems hard, some small frit, only fair yield
5	Quali T-21	ML	FG-G	3.5	3.5	G	3.5	F	L-XL	floppy vine, good yield, some small fruit
6	Quali T-23	ML	FG-G	4	4	G	2.5	F	M-XL	floppy vine, firm fruit, fairly smooth
7	Bobcat	ML	FG-G	3.5	3.5	G	2	F	M-XL	floppy vine, stem hard. Best overall
8	Catalyst	ML	FG-G	3.5	4	G	2.5	F-G	L-XL	Firm fruit, good yield, sunburn
9	RFT 500-305	ML	FG-G	4.5	4	G	3.5	G	L-XL	good vine cover, pretty smooth, firm fruit
10	RFT 500-311	ML	FG-G	4	3	G	3.5	F-G	L-XL	some rough fruit but otherwise quite smooth
11	RFT 500-312	ML	FG-G	4	3.5	G	2.5	F	M-XL	floppy vine, pretty smooth, some small fruit
12	STM 0115	ML	FG-G	4	4	G	3.5	G	M-XL	good vine cover, pretty smooth, firm fruit

M = midseason maturity, ML = mid late maturity, L = late maturity
fruit shape: FG = flat globe, G = globe
Fruit Smoothness: 1 = bad, 5 = excellent
Fruit Firmness: 1 = soft, 5 = very firm
Stemability: 1 = hard stemming (many stems attached to fruit), 5 = stems easily
Fruit Size: S = small; M = medium, L=large

Table 9. Fresh market tomato variety trial yield and grade results, UC WSREC FRESNO, 2005.
OBSERVED Varieties

		Market Yield		XL	L	M	S	Total	Culls	Red
Code	Variety	Tons/A	Boxes/A	--- % Marketable Yield ---			Tons/A	Tons/A	---% Total Yield---	
21	**BHN 525**	19.8	1585.9	20.6	43.5	35.8	3.2	27.2	15.5	0.0
22	**BHN 678**	19.6	1567.5	28.3	43.7	28.0	4.3	27.8	13.8	2.7
23	**BHN 703**	25.6	2051.8	56.6	35.0	8.4	0.7	32.0	17.8	6.9
24	**SXT 6763**	18.4	1473.5	11.9	56.4	31.7	4.0	28.7	21.9	6.3
25	**SXT 6764**	34.0	2721.9	50.7	36.0	13.3	4.0	49.5	23.2	22.7
26	**SRT 6783**	29.3	2346.0	54.2	35.5	10.3	2.3	38.8	18.4	19.6
27	**SRT 6784**	37.9	3029.7	47.2	39.8	12.9	3.6	54.5	24.0	20.9
28	**STM 2203**	23.7	1899.7	43.7	41.9	14.4	2.5	38.0	30.8	15.7
29	**PX 2942**	27.9	2230.7	57.2	36.0	6.8	1.7	47.9	38.3	8.8
4	**Shady Lady**	25.3	2027.7	49.2	40.0	10.8	3.2	41.2	30.7	26.5
	AVERAGE	**26.2**	**2093.5**	**42.0**	**40.8**	**17.3**	**2.9**	**38.6**	**23.4**	**13.0**

See notes next page.

Table 10. Fresh market tomato variety trial yield and grade results, MERCED COUNTY, 2005.
OBSERVED Varieties

		Market Yield		XL	L	M	S	Total	Culls	Red
Code	Variety	Tons/A	Boxes/A	--- % Marketable Yield ---			Tons/A	Tons/A	---% Total Yield---	
21	**BHN 525**	28.2	2256	20.1	57.9	22.0	5.5	45.7	26.2	6.8
22	**BHN 678**	19.7	1577	20.6	43.1	36.3	5.7	43.7	41.9	2.6
23	**BHN 703**	25.0	2004	22.3	43.0	34.6	3.7	49.6	41.9	11.6
24	**SXT 6763**	13.6	1089	8.8	29.3	61.9	8.1	36.7	41.0	3.0
25	**SXT 6764**	22.4	1795	22.2	45.3	32.5	7.3	47.4	37.2	13.0
26	**SRT 6783**	20.3	1626	25.0	48.2	26.8	3.2	33.5	29.8	10.7
27	**SRT 6784**	13.7	1095	13.3	39.3	47.5	7.1	38.9	46.6	7.0
28	**STM 2203**	12.8	1022	15.9	49.7	34.4	4.3	34.5	50.5	2.1
29	**PX 2942**	28.6	2285	24.1	48.5	27.3	3.8	49.3	34.2	6.8
	AVERAGE	20.5	1638.8	19.1	44.9	35.9	5.4	42.1	38.8	7.1

See notes next page.

Table 11. Fresh market tomato variety trial yield and grade results, SAN JOAQUIN COUNTY, 2005.
OBSERVED Varieties

Code	Variety	Market Yield Tons/A	Market Yield Boxes/A	XL	L	M	S Tons/A	Total Tons/A	Culls	Red
				--- % Marketable Yield ---					---% Total Yield---	
21	**BHN 525**	29.3	2344	59.6	35.1	5.3	8.9	46.9	18.6	5.6
22	**BHN 678**	24.4	1952	76.3	18.4	5.3	5.7	37.9	20.6	3.4
23	**BHN 703**	16.6	1328	46.2	47.3	6.5	11.0	36.6	24.6	4.0
24	**SXT 6763**	16.4	1312	53.8	36.4	9.8	10.4	33.8	20.7	1.0
25	**SXT 6764**	11.3	904	40.6	39.6	19.8	10.0	27.9	23.7	3.0
26	**SRT 6783**	20.0	1600	34.7	47.2	18.1	6.1	33.5	22.1	15.1
27	**SRT 6784**	22.4	1792	29.5	53.2	17.3	8.4	36.9	16.5	12.3
28	**STM 2203**	15.5	1240	43.0	28.5	28.5	5.9	26.2	18.3	2.0
29	**PX 2942**	22.9	1832	72.7	10.7	16.6	8.0	36.0	14.2	3.5
	AVERAGE	19.9	1589.3	50.7	35.2	14.1	8.3	35.1	19.9	5.5

See notes next page.

Table 12. Fresh market tomato variety trial yield and grade results, COMBINED RESULTS, 2005.
OBSERVED Varieties

Code	Variety	Market Yield Tons/A	Market Yield Boxes/A	XL	L	M	S Tons/A	Total Tons/A	Culls	Red
				--- % Marketable Yield ---					---% Total Yield---	
29	**PX 2942**	26.5	2120.0	33.4	45.5	21.0	5.9	39.9	20.1	4.1
21	**BHN 525**	25.8	2064.0	41.7	35.1	23.2	5.2	36.5	25.4	2.9
27	**SRT 6784**	24.7	1976.0	41.7	41.8	16.5	5.1	39.4	28.1	7.5
26	**SRT 6783**	23.2	1856.0	24.8	40.7	34.5	7.5	33.1	27.9	3.4
25	**SXT 6764**	22.6	1808.0	37.8	40.3	21.9	7.1	41.6	28.0	12.9
23	**BHN 703**	22.4	1792.0	38.0	43.6	18.4	3.9	35.3	23.4	15.2
22	**BHN 678**	21.2	1696.0	30.0	44.1	25.9	6.4	43.4	29.0	13.4
28	**STM 2203**	17.3	1384.0	34.2	40.0	25.8	4.2	32.9	33.2	6.6
24	**SXT 6763**	16.1	1288.0	51.3	31.7	16.9	4.5	44.4	28.9	6.4
	AVERAGE	22.2	1776.0	37.0	40.3	22.7	5.5	38.5	27.1	8.0
	LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	8.3
	CV, %	27.7	27.7	38.1	27.5	47.6	25.1	20.7	24.8	59.7

Market yield = XL + L + M size fruit, average of four replications. 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"

LSD 0.05 = least significant difference at the 95% probablility level.
Means within the same column that differ by less than this amount are not significantly different.
Since observation plots were not replicated, this could only be performed on the combined results.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.

Table 13. Fresh market tomato fruit and vine characteristics. UC WSREC, 2005.
OBSERVED Varieties

Code	Variety	Vine size	Vine cover	Fruit shape	Rough-ness	Blossom end	Sun-burn	Zip-pers	Over-all	Comments
21	**BHN 525**	MT	SC	G	VS	2	SL		F-P	very nice small little fruits; to small
22	**BHN 678**	T	SC	FG-G	MR	1-2	SL		F-P	too rough; some pointed ends; variable
23	**BHN 703**	T	F	G	vs	1	SL		G-VG	nice apple green color, uniform fruit
24	**SXT 6763**	M	SC	FG-G	MR	1-3	SL	S	P	ugly, too small, many pointed ends
25	**SXT 6764**	M	SC	G	VS	1-2	S		G-VG	huge yield, good uniformity
26	**SRT 6783**	T	SC	FG,var	R	1-3	SL	S	P	ugly, too small, many pointed ends
27	**SRT 6784**	T	M	G	S	2	S		F-P	misshapen fruit
28	**STM 2203**	M	F	FG,var	R	2-4	S	S	P	ugly; misshapen
29	**PX 2942**	MT	F	FG-DG	MR	2-5	SL		F-P	ugly, not uniform, many culls
4	**Shady Lady**	MT	SC	FG	MR	2-4	S		F-G	shoulder a little rough; ends a little big

Vine size	VL=very large, L=large, M=med, S=small
Vine cover	C=compact, SC=semi-compact, F=floppy
Fruit shape	DG=deep globe, G=globe, FG= flat globe
Roughness	VS=very smooth, S=smooth, M=med, R=rough
Blossom end	1=very tight, 5=very open
Sunburn	N=none, SL=slight, S=Some, M=Much
Zippers	N=none, SL=slight, S=Some, M=Much
Overall	VG=very good, G=good, F=Fair, P=poor

Table 14. Fresh market tomato fruit and vine characteristics. Merced County, 2005.
OBSERVATIONAL varieties.

Var #	Variety	Vine Size	Leaf cover	Leaf roll	Fruit shape	Rough-ness	Blossom end	Sun-burn	Cat-facing	Zip-pers	disease resistance	Comments
21	**BHN 525**	L	G	N	G-DG	S	SL	SL	N	S	VFF T	fleck, zippers
22	**BHN 678**	M	G	SL	DG	S	T	N	N	S	VFF	
23	**BHN 703**	VL	OK	N	G-FG	M	T	SL	SL	S	VFFN T	splits, zippers
24	**SXT 6763**	L	G	SL	G	M	T	S	SL	S		fleck, zippers
25	**SXT 6764**	L	G	N	G	S	SL	SL	SL	S		fleck, pointy fruit
26	**SRT 6783**	L	G	SL	G	S	T	SL	N	SL		fleck, bl. end rot
27	**SRT 6784**	L	G	S	G-FG	S	T	SL	N	SL		fleck, bl. end rot
28	**STM 2203**	M	OK	N	DG	S	T	SL	SL	SL	VFFAS SW	pointy, fleck, poor color
29	**PX 2942**	VL	OK	N	DG	M	M	SL	N	N		bl end rot

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	
Zippers:	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 virus			

Table 15. Fresh market tomato fruit and vine characteristics, San Joaquin County 2005.
OBSERVATION varieties

Var #	Variety	Maturity	Fruit Shape	Smooth ness	firm- ness	fruit set	stem- ability	vine cover	fruit size	other notes
21	BHN 525	M-ML	FG-G	3.5	3.5	VG	2	G	L-XL	very good yield, good fruit size, stems hard
22	BHN 678	ML	FG-G	4	3.5	G	3	F	L-XL	good yield, large fruit, smooth, floppy vine
23	BHN 703	ML	FG-G	3.5	3	F	3	F	L-XL	only fair yield, floppy vine, some small fruit, smooth
24	SXT 6763	L	FG-G	4	3.5	F	2	P	L-XL	fair yld, some small fruit, stems hard, floppy vine
25	SXT 6764	ML	G	4	3.5	P	3	F	M-XL	small fruit, floppy vine, pointed fruit, sunburn
26	SRT 6783	E-M	FG-G	3.5	3.5	G	2	F	L-XL	floppy vne, stems hard, fair yield, fruit size
27	SRT 6784	M	G	4	3.5	G	2	F	L-XL	floppy vine, smooth fruit, stems hard, sunburn
28	STM 2203	L	FG-G	4	3	F	2	F	M-XL	fair yield, floppy vine, smooth fruit, stmes hard
29	PX 2942	ML	G	4	3.5	G	2	G	L-XL	smooth fruit, stems hard, very large fruit

M = midseason maturity, ML = mid late maturity, L = late maturity
fruit shape: FG = flat globe, G = globe
Fruit Smoothness: 1 = bad, 5 = excellent
Fruit Firmness: 1 = soft, 5 = very firm
Stemability: 1 = hard stemming (many stems attached to fruit), 5 = stems easily
Fruit Size: S = small; M = medium, L=large

Table 16. Fresh market tomato variety trial yield and grade results, UC WSREC, 2005.
ROMA Varieties

	--- Market Yield ---		%L	%M	%S	Total Yield	Culls	Reds
Variety	T/A	Boxes/A	------- of Marketable Yield -------			T/A	%	%
Monica	30.5	2440.5	38.6	41.9	19.5	34.2	10.7	33.7
BHN C9008	30.3	2425.0	31.4	49.1	19.5	34.6	12.4	20.1
Muriel	21.4	1714.1	36.9	49.1	14.0	27.3	21.4	8.6
SVR 3684	34.3	2747.7	70.2	15.4	14.4	36.6	6.1	32.5
SVR 0739	18.0	1440.2	42.5	47.6	9.9	24.7	27.2	48.9
WS 4061	17.6	1404.7	20.1	37.5	42.4	20.8	15.7	35.9
WS 4062	25.0	1999.6	30.2	47.1	22.8	28.9	13.5	58.8
Average	25.3	2024.5	38.6	41.1	20.3	29.6	15.3	34.1

Observation plots only in Fresno.

See notes for Table 17.

Table 17. Fresh market tomato variety trial yield and grade results, San Joaquin County 2005
ROMA Varieties

	--- Market Yield ---		%L	%M	%S	Total Yield	Culls	Reds
Variety	T/A	Boxes/A	------- of Marketable Yield -------			T/A	%	%
BHN C9008	13.4	1068.0	18.4	32.2	49.5	21.4	10.5	7.2
Miroma	12.7	1016.0	16.5	35.0	48.5	23.2	9.4	9.7
RFT 8109	11.7	938.0	24.6	34.4	41.1	21.1	7.5	14.0
Muriel	11.2	896.0	8.9	36.5	54.7	20.8	8.5	9.5
WS 4062	10.3	822.0	0.0	18.8	81.2	20.3	18.5	14.8
WS 4061	10.2	818.0	11.2	38.4	50.4	20.0	7.6	6.1
Monica	8.9	714.0	13.1	29.2	57.7	16.7	10.0	6.5
AVERAGE	11.2	896.0	13.2	32.1	54.7	20.5	10.3	9.7
LSD 0.05	NS	NS	7.7	NS	19.5	NS	NS	NS
CV %	20.4	20.4	39.1	35.4	24.0	13.4	58.0	59.0

Market yield = L + M +S size fruit, average of four replications. One box = 25 lbs.
L, M, S% = 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.

LSD 0.05 = least significant difference at the 95% probablility level.
Means within the same column that differ by less than this amount 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 18. Fresh market tomato fruit and vine characteristics. UC WSREC, 2005.
ROMA Varieties

Code	Variety	Vine size	Vine cover	Fruit shape
31	**Monica**	M	SC	Pear - blocky
32	**BHN C9008**	S	F	Var, blocky with pointed ends; some almost round
33	**Muriel**	L	SC	
34	**SVR 3684**	M	F	Pear - blocky
35	**SVR 0739**	S	F	Blocky - long
36	**WS 4061**	M	SC	Blocky - square
37	**WS 4062**	S	SC	Pear - long

Table 19. Fresh market tomato fruit and vine characteristics. San Joaquin County, 2005.
ROMA Varieties

Code	Variety	Maturity	Shape	Smooth ness	Firm- ness	Fruit Set	stem ability	Vine Cover	Fruit Size	Other
31	Monica	M-ML	LP	4	3.5	poor to fa	3	good	S	good vine cover, smooth, poor yield and fruit size, stemmy
32	BHN C9008	M-ML	P	4	3	fair to go	2.5	fair	S-M	flip-flop vine, lots of sunburn, pointed fruit, stems, small
33	Muriel	M	LP	4	3.5	good	4	fair+	S-M	nice smotth fruit, faily good vine cover, some small fruit
36	WS 4061	M-ML	SQ	3	2.5	fair	4	fair	S-M	fruit a bit soft, lots of small fruit, fair vine cover
37	WS 4062	E-M	LP	4	3.5	fair	4	fair	S	flip flop vine, good fruit smoothness, lots small fruit
38	Miroma	M	LP	4	4	fair to go	4.5	good	S-L	good vine cover, best in trial, stems easily, smooth and firm
39	RFT 8109	E-M	LP	4	3.5	fair to go	4	fair+	M	pretty good quality line, fairly good vine cover, smooth fruit

P = pear, LP = long pear, SQ = square/blocky
E = early maturity,EM = early to midseason, M = midseason, ML = mid-late
Fruit Smoothness: 1 = bad, 5 = excellent
Fruit Firmness: 1 = soft, 5 = very firm
Stemability: 1 = hard stemming (many stems attached to fruit), 5 = stems easily
Fruit Size: S = small; M = medium, L=large

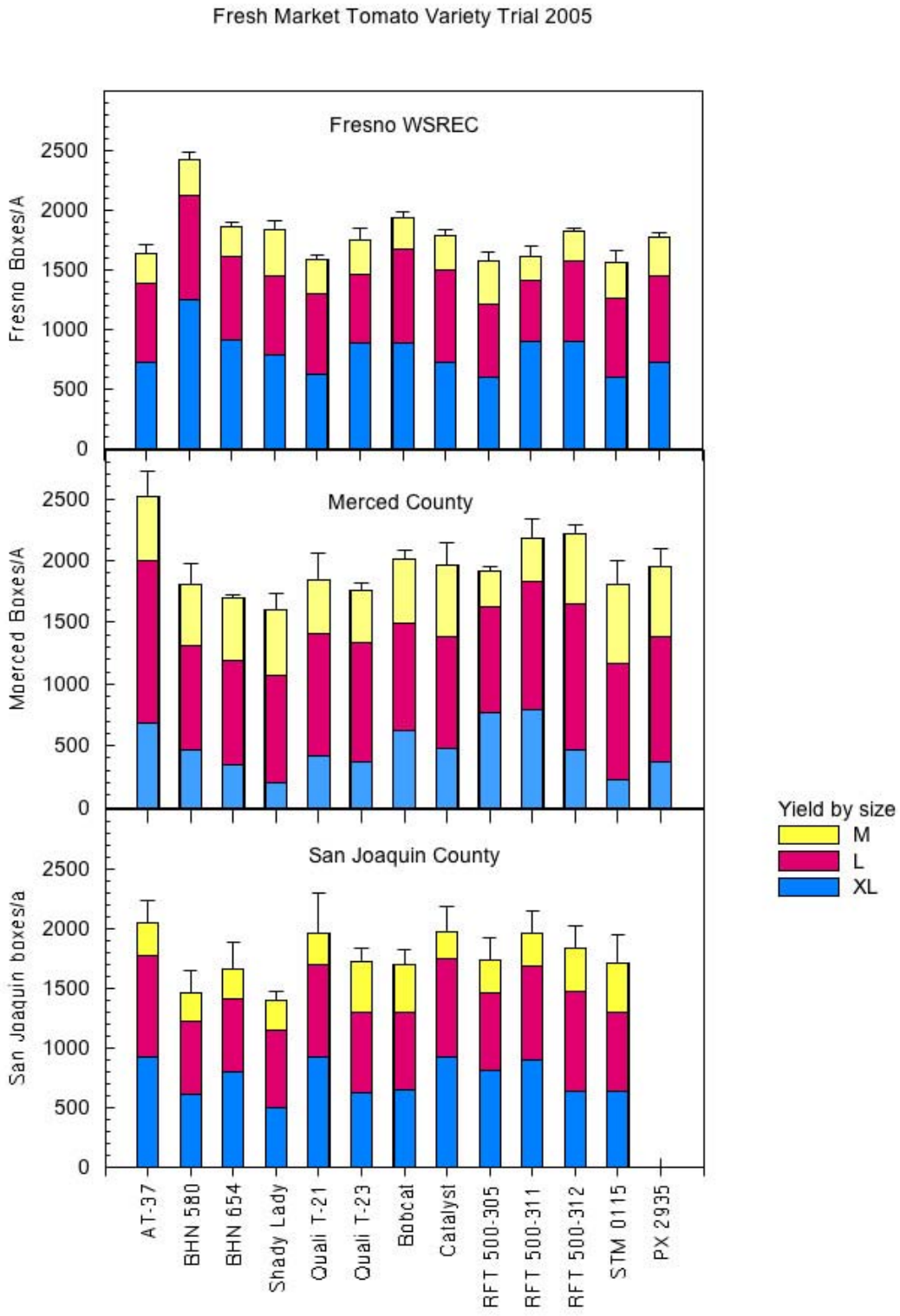

Figure 1. Yield by size class for all three locations in the fresh market tomato variety trial, 2005. Error bars are the standard error of the mean for each variety. The total height of the bar is the total market yield.

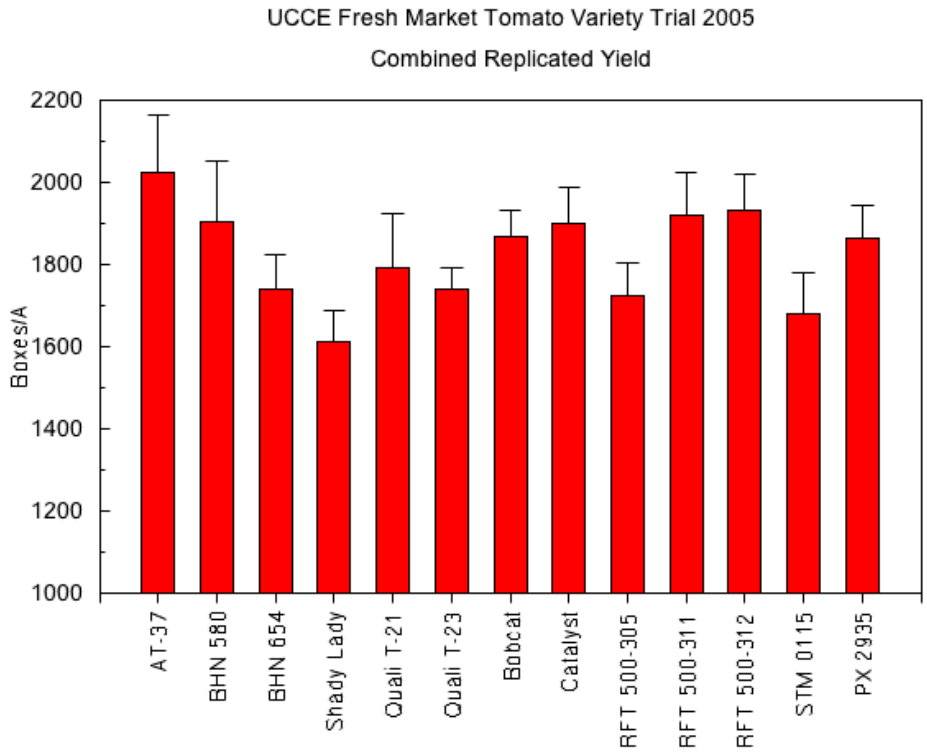

Figure 2. Total market yield with combined data from all three locations. Error bars represent one standard error of the mean. Varietie yields are not significantly different.

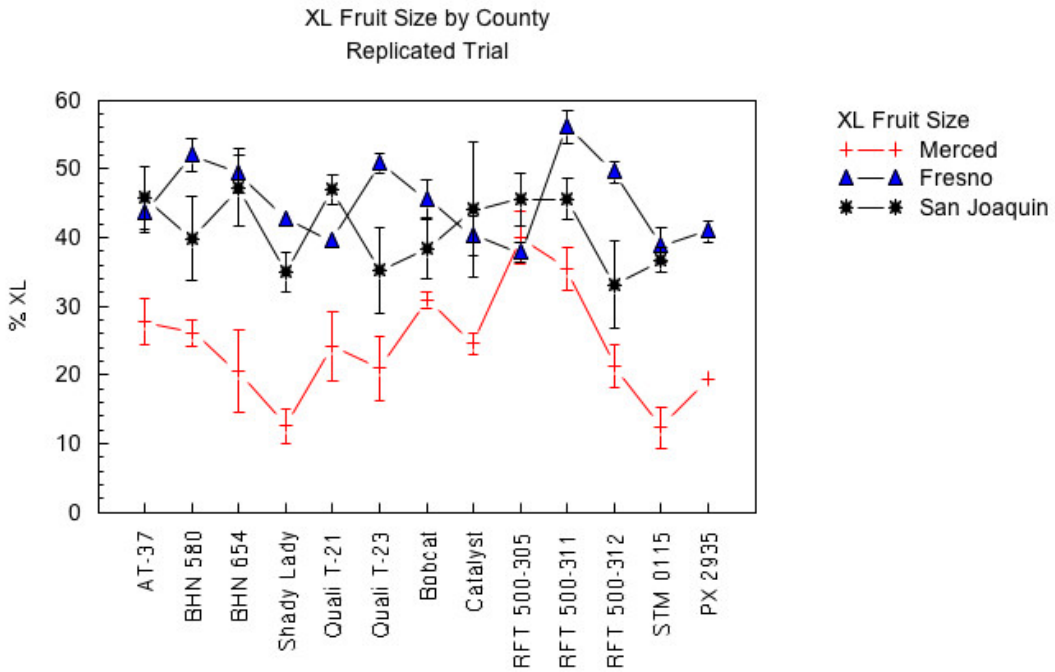

Figure 3. XL fruit size by county from the replicated trials. Merced had significantly less XL fruit than the other locations.

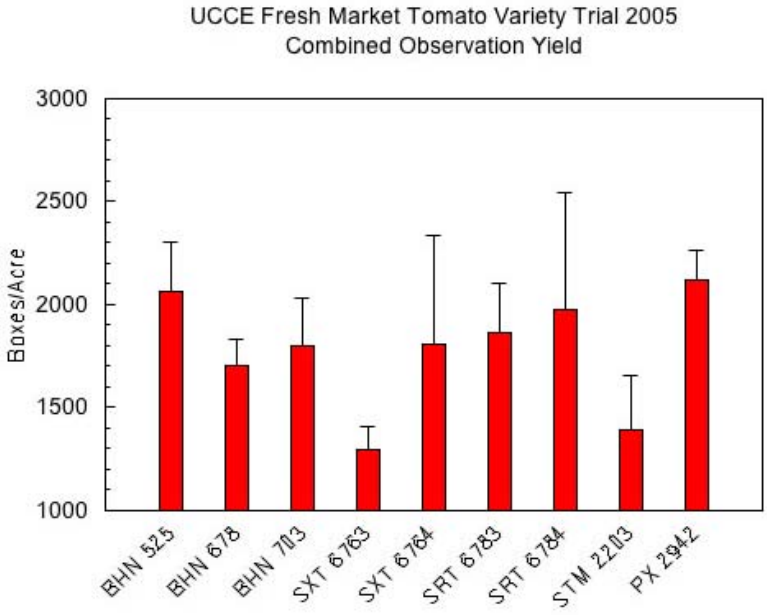

Figure 4. Total market yield results for the observation varieties, combined across location. Error bars represent one standard error of the mean. Variety yields are not significantly different.

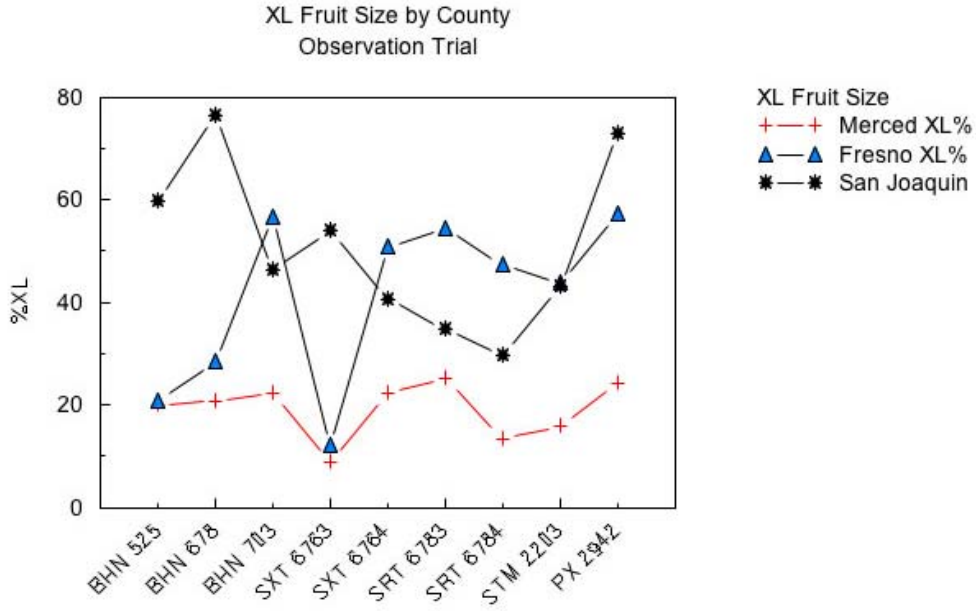

Figure 5. XL fruit size by county from the observation trials. Merced had significantly less XL fruit than the other locations (average 19 vs 45%).

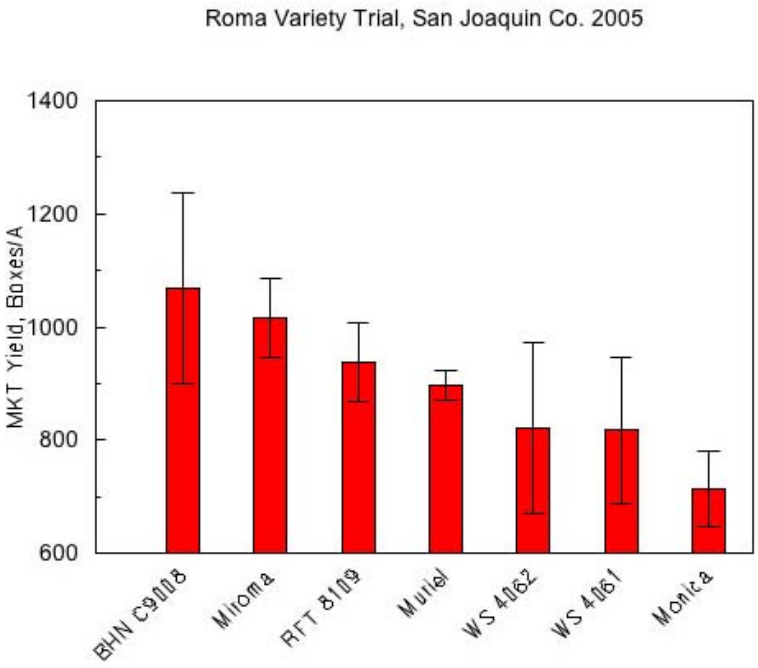

Figure 6. Market yield for the roma variety trial in San Joaquin County. Error bars are one standard error. Due to the large amount of variability, these are not significantly different.

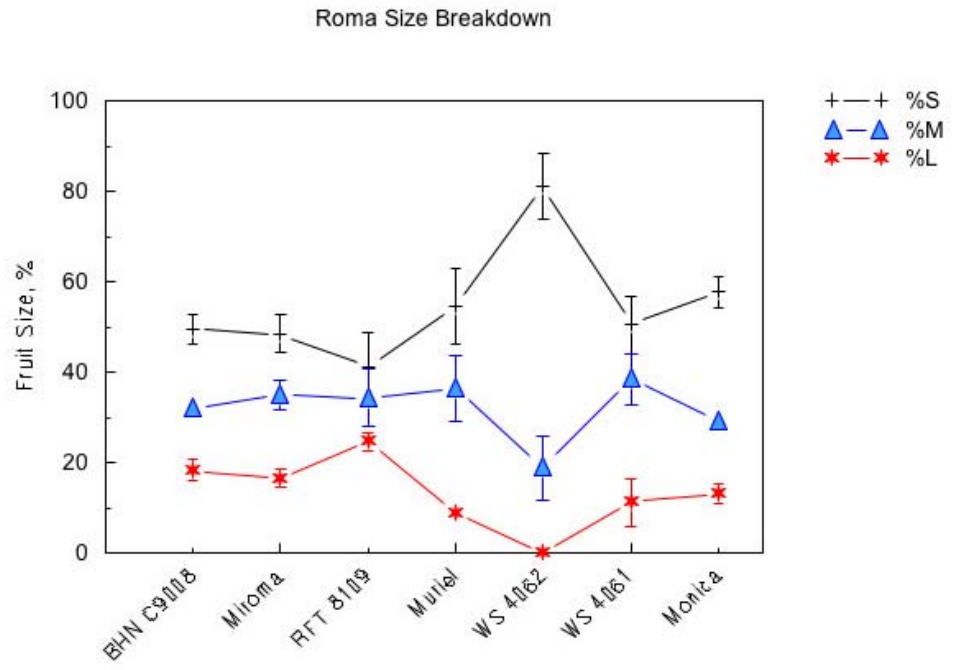

Figure 7. Fruit sizes by variety for the roma variety trial in San Joaquin County. Error bars are one standard error.

Statewide Tomato Variety Trials

Postharvest Evaluations for 2005

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Research Objectives

To evaluate the color, firmness and compositional quality of table-ripe fresh market tomatoes (round and roma types) from established varieties and new experimental lines.

Executive Summary

In 2005 we evaluated 13 **round** fresh market tomato varieties from the Fresno and Merced replicated trials, and 12 varieties from the San Joaquin Trial. There were 12 varieties in common among the 3 trials. We evaluated fruit for color, firmness and composition at the table-ripe stage. Fruit were harvested as mature-greens (MG) and vine-ripes (VR, 30-40% color) in Fresno and Merced Trials and only as MG in the San Joaquin Trial. Seven **Roma** fresh market tomato varieties were harvested as MG from the San Joaquin Trial. A description of the color, firmness and composition quality measurements on fruit at table-ripe stage are described in **Tables 1-3.**

Results for **round** tomato variety trials are presented in **Tables 4 – 6** for the individual trials and all MG results are summarized in **Table 8** and all results for VR-harvested are in **Table 9**. An overall rating for the 13 round varieties is presented in **Table 10**. All varieties tested in 2005 developed good red color, whether harvested as MG or VR. Many varieties had very firm fruit, a few had firm fruit and 1 variety (AT-37) had consistently low firmness values. Composition was generally similar among the 13 varieties for a given trial. It was abundantly evident that fruit from the Fresno trial developed excellent color, had the highest firmness values and also had the best composition (average of 4.8% soluble solids and 0.38% titratable acidity). Round fruit from the Merced and San Joaquin trials had similar average composition, color and firmness. The seven Roma cultivars evaluated in the San Joaquin trial (MG only) had good red color, similar firmness values, but % soluble solids and % titratable acidity varied significantly (**Table 7**).

Experimental Procedures

Fruit Sampling. We harvested mature-green (MG) fruit from the 3 variety trials for 13 replicated varieties. For 2 trials, vine-ripe (VR) fruit were harvested with 30-40% 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 (**color stage 6 on USDA scale + 1-2 days) based on visual assessment.

Quality Measurements. 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. Typical values for color and firmness measurements are described in **Table 2** and **Table 3**.

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

Attribute	Measurement	Additional Information
1. Color	**1a**. Objective color values using a Minolta Color meter	Data reported as Hue; this is the most useful single value to compare tomato color; see **Table 2** for typical values. Hue values from 35-40 usually indicate good red color.
	1b. Lycopene	Pericarp discs are extracted in hexane and determined spectrophotometrically.
2. Texture	**2.** Compression test: the force to compress fruit a distance of 5 mm	Computerized texture analyzer equipped with a 25 mm flat cylinder moving at 0.5 mm/sec. Typical range 15-25 N (**Table 3**). 1 N =9.81 kg-force or 4.45 lb.-force.
3. Composition	**3a.** 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%.
	3b. Simple sugars	The filtered juice is analyzed for simple sugars by a spectrophotometric method using glucose for calibration.
	3b. 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. One Newton-force = 9.81 kg-force or 4.45 pound-force.

Firmness Class	Description based on hand and finger pressure	Newtons-force
Very Firm	Fruit yields only slight to considerable pressure	>25
Firm	Fruit yields slightly to moderate pressure	18-25
Moderately Firm	Fruit yields moderately to moderate pressure	15-18
Moderately Soft	--	12-15
Soft	Fruit yields readily to slight pressure	8-12
Very Soft	Fruits yields very readily to slight pressure	<8

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.

Round Fresh Market Tomato Variety Results

Fresno County Replicated Round Tomato Trial.

Thirteen cultivars from the replicated trial were evaluated from both MG and VR harvested fruit (**Table 4**). Final red color was very good in all fruit ripened from MG and VR stages with all values below 40 hue color units (see Table 2). The VR harvested fruit had lower average firmness than that of MG ripened fruit, although all fruit in this trial had firm to very firm fruit. Fruit in the Fresno trial were generally firmer than fruit from the other 2 trials. AT-37 had the lowest firmness, followed by Shady Lady. More than half the other cultivars were very firm. The average % soluble solids were higher in this trial than the other 2 variety trials and %soluble solids averaged the same at the table-ripe stage from the MG or VR harvested fruit. There was little variation among varieties in % soluble solids, pH or acidity. Average titratable acidity was the same for the MG and VR harvested fruit and was higher than that of fruit from the other 2 trials. Analysis of simple sugars from juice extract used for determination of % soluble solids indicates that simple sugars comprise about 50% of the soluble solids reading.

Merced County Replicated Round Tomato Trial.

In the Merced County Trial, 13 cultivars were harvested at the MG and VR stages (**Table 5**). Red color values were good, hovering around the critical 40 hue value. Fruit were generally firm when ripened, but were on average notably less firm than in the Fresno trial. AT-37 and Shady Lady were the least firm cultivars. The % soluble solids were on the low side as were the average % titratable acidity values. There were few differences in ripe quality fruit between the MG and VR harvests based on these measurements.

San Joaquin County Replicated Round Tomato Trial.

In the San Joaquin trial, 12 cultivars were harvested at MG stage only (**Table 6**). Final red color was good, although average values were the least red among the 3 trials. Fruit were generally firm, with AT-37 and Shady Lady being the least firm. Percent soluble solids were intermediate between the values of fruit from the Fresno and Merced trials. Percent titratable acidity was on the low side and did not vary notably among the varieties. In this trial, sugars were also analyzed and results indicate that slightly less than half % soluble solids reading is due to simple sugars. *Lycopene (the carotenoid that is the red pigment in tomatoes) was also measured in this trial.* ***Figure 1*** *shows that there is the expected relationship between objective color values and lycopene concentrations. A higher correlation coefficient could be achieved with a much larger sample size. We are re-examining the protocol and expect better correlations in the future.*

OVERALL ASSESSMENT of Round Tomato Quality from the 3 Trials

Tables 8 and 9 summarize average values for color, firmness and composition for the 13 varieties studied from the 3 trials. MG-harvested fruit from the 3 trials are compared in **Table 8**, while VR-harvested fruit are compared in **Table 9**. For the 3 trial locations, overall average values for the MG harvested fruit (Table 8) indicate that the fruit from Fresno County trial were redder, firmer and higher % soluble solids and % titratable acidity and were therefore the highest quality fruit among the 3 trials. The MG fruit from the San Joaquin County trial were, on average, the least firm with less red color at table-ripe stage, but the overall fruit composition did not vary from that of the fruits from the Merced Trial. The average results for the VR harvested fruit (Table 9) show that the fruit from the Fresno county trial were redder at the table-ripe stage, average firmness did not vary between the 2 trials, and that % soluble solids and % acidity were higher in fruit from Fresno trial. The location differences were observed in most of the varieties.

Table 10 attempts to provide an overall summary that takes into account the color, firmness and compositional quality of the MG and VR fruit ripened to the table-ripe stage. The criteria for the rating categories were the same as used in 2003, but are subjective based on experience of Marita Cantwell. Obviously the ratings could be different if the categories were defined differently. Based on the criteria used, the varieties that had the highest overall scores of 6.5 or 6.6 achieved those values because of their high firmness ratings. Almost all fruit could be considered on the low side for the 'flavor' score. Varieties BHN 580 and 654 had the highest flavor ratings. RFT 500-311 had the lowest flavor score but the highest firmness score. AT-37 ranked notably lower than other varieties mainly because it was consistently softer.

Roma Tomato Variety Results

San Joaquin Replicated Roma Tomato Trial.

Roma tomatoes were only evaluated in one variety trial in 2005. Seven cultivars of Roma tomatoes were harvested at the MG stage (**Table 7**) in a replicated Roma trial at the San Joaquin County trial. Final red color (hue color value) was good and was similar among varieties. Lower hue values corresponded to higher lycopene concentrations as expected. The ripened Roma fruits were all firm with only slight variation among the cultivars. The values of % soluble solids and % titratable acidity were in the moderate range. There were significant differences in % soluble solids, with cv BHN C9008 and Muriel having the highest values (4.7%) and WS4062 have the lowest values (4.0%). The cvs BHN C9008 and Muriel also had the highest titratable acidity levels. Presumably the combination of higher % soluble solids and higher % titratable acidity would translate into better tasting fruit compared with other cultivars.

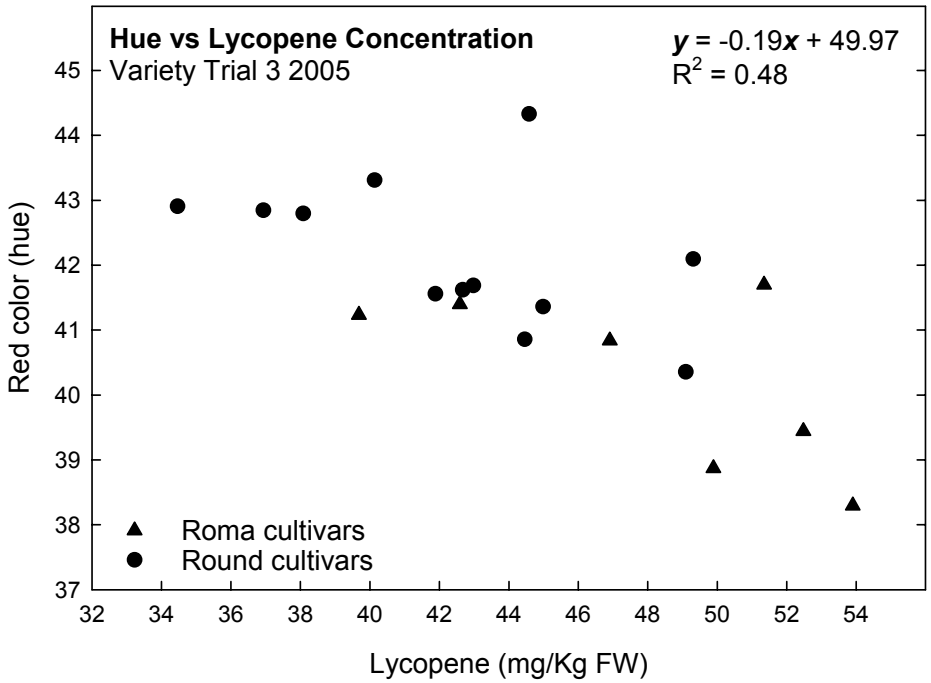

Figure 1. The relationship between average red color values (hue) and lycopene concentrations of pericarp discs of round and roma tomatoes from the 2005 San Joaquin Variety Trial.

Round Fresh Market Tomato Variety Results Tables

Table 4. Quality characteristics of fresh market **round** tomatoes harvested **MG** and **VR** from the 2005 Fresno 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 alphabetically by seed company.

Seed Company	Cultivar	Harvest Stage	Red Color, Hue	Firmness, Newtons	Soluble solids, %	Sugars, %	pH	Titratable acidity, %
American Takii	At-37	MG	36.0	16.5	5.0	2.6	4.39	0.37
BHN	BHN 580	MG	32.7	25.4	5.2	2.7	4.39	0.40
	BHN 654	MG	33.7	25.9	5.0	2.5	4.39	0.38
Nunhems	Shady Lady	MG	32.6	18.1	4.9	2.7	4.31	0.40
Rogers/Syngenta	QualiT21	MG	37.3	28.0	5.0	2.7	4.33	0.40
	QualiT 23	MG	34.3	24.7	5.1	2.4	4.31	0.38
	Bobcat	MG	33.4	28.0	4.8	2.2	4.35	0.39
	Catalyst	MG	33.2	27.7	4.6	2.1	4.37	0.37
	RFT500-305	MG	32.8	23.9	4.6	2.2	4.34	0.36
	RFT500-311	MG	34.8	29.5	4.7	2.4	4.37	0.37
	RFT500-312	MG	33.1	26.8	4.6	2.4	4.34	0.37
Sakata	STM 0115	MG	33.7	24.0	4.9	1.7	4.33	0.44
Seminis	SVR 2935	MG	32.9	29.4	4.6	2.1	4.45	0.33
	LSD.05		**1.6**	**3.1**	**0.3**	**0.5**	**0.06**	**0.04**
American Takii	At-37	VR	36.1	16.5	5.0	2.3	4.42	0.38
BHN	BHN 580	VR	33.9	20.3	5.3	2.7	4.39	0.41
	BHN 654	VR	34.2	20.9	4.8	2.6	4.44	0.38
Nunhems	Shady Lady	VR	33.9	16.3	4.6	2.5	4.35	0.39
Rogers/Syngenta	QualiT21	VR	33.5	21.7	5.0	2.8	4.36	0.40
	QualiT 23	VR	34.2	22.4	4.7	2.9	4.38	0.35
	Bobcat	VR	32.4	23.1	4.8	2.7	4.40	0.36
	Catalyst	VR	33.6	23.2	4.5	2.2	4.37	0.36
	RFT500-305	VR	33.0	22.2	4.7	2.6	4.37	0.38
	RFT500-311	VR	32.5	23.1	4.7	2.4	4.39	0.36
	RFT500-312	VR	33.8	22.9	4.6	2.1	4.37	0.38
Sakata	STM 0115	VR	33.2	18.4	4.8	2.3	4.41	0.38
Seminis	SVR 2935	VR	31.0	24.5	4.8	2.8	4.42	0.34
	LSD.05		**1.6**	**3.1**	**0.3**	**0.5**	**0.06**	**0.04**
	Average	**MG**	**33.9**	**25.2**	**4.8**	**2.4**	**4.36**	**0.38**
	Average	**VR**	**33.5**	**21.2**	**4.8**	**2.5**	**4.39**	**0.37**

Color and firmness data are from 3 replicates of 15 fruits for MG and VR harvested tomatoes; composition data are from 3 replicates of composite samples of 15 fruit per rep. Data were analyzed by ANOVA. Lower hue color values indicate redder fruits; lower firmness values indicate softer fruits.

Table 5. Quality characteristics of fresh market **round** tomatoes harvested **MG** and **VR** from the 2005 Merced 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 alphabetically by seed company.

Seed Company	Cultivar	Harvest Stage	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titratable acidity, %
American Takii	At-37	MG	40.0	12.6	4.2	4.48	0.26
BHN	BHN 580	MG	39.4	18.4	4.6	4.53	0.30
	BHN 654	MG	38.8	18.8	4.5	4.53	0.26
Nunhems	Shady Lady	MG	39.9	16.6	4.3	4.41	0.32
Rogers/Syngenta	QualiT21	MG	39.0	18.8	4.3	4.42	0.30
	QualiT 23	MG	37.7	20.2	4.2	4.42	0.28
	Bobcat	MG	39.5	21.0	4.1	4.43	0.26
	Catalyst	MG	39.6	21.4	4.1	4.44	0.29
	RFT500-305	MG	38.6	19.2	4.1	4.42	0.26
	RFT500-311	MG	39.9	20.9	4.2	4.51	0.24
	RFT500-312	MG	39.5	18.6	4.4	4.48	0.27
Sakata	STM 0115	MG	39.2	16.6	4.3	4.45	0.29
Seminis	SVR 2935	MG	40.6	25.8	4.1	4.55	0.23
	LSD.05		**1.4**	**2.3**	**0.2**	**0.06**	**0.03**
American Takii	At-37	VR	40.0	19.0	4.3	4.55	0.31
BHN	BHN 580	VR	41.0	19.3	4.5	4.56	0.31
	BHN 654	VR	40.4	20.1	4.6	4.57	0.29
Nunhems	Shady Lady	VR	40.4	19.9	4.5	4.48	0.33
Rogers/Syngenta	QualiT21	VR	40.7	18.8	4.2	4.47	0.30
	QualiT 23	VR	39.2	18.5	4.3	4.43	0.28
	Bobcat	VR	39.5	19.4	4.2	4.51	0.30
	Catalyst	VR	39.6	20.8	4.3	4.49	0.31
	RFT500-305	VR	39.3	20.5	4.2	4.45	0.28
	RFT500-311	VR	40.1	20.6	4.1	4.54	0.27
	RFT500-312	VR	40.2	20.7	4.1	4.51	0.30
Sakata	STM 0115	VR	40.1	19.4	4.5	4.48	0.33
Seminis	SVR 2935	VR	40.4	22.5	4.2	4.59	0.25
	LSD.05		**1.4**	**2.3**	**0.2**	**0.06**	**0.03**
	Average	**MG**	**39.4**	**19.2**	**4.3**	**4.47**	**0.27**
	Average	**VR**	**40.1**	**20.0**	**4.3**	**4.51**	**0.30**

Color and firmness data are from 3 replicates of 15 fruits for MG and VR harvested tomatoes; composition data are from 3 replicates of composite samples of 15 fruit per rep. Data were analyzed by ANOVA. Lower hue color values indicate redder fruits; lower firmness values indicate softer fruits.

Table 6. Quality characteristics of fresh market **round** tomatoes harvested **MG** from the 2005 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 alphabetically by seed company.

Seed Company	Cultivar	Red Color Hue	Firmness Newtons	Soluble solids %	Sugars %	pH	Titratable acidity %	Lycopene mg/Kg
American Takii	At-37	44.3	13.6	4.3	2.3	4.25	0.30	44.6
BHN	BHN 580	41.6	20.0	4.6	2.1	4.32	0.29	42.7
	BHN 654	42.8	18.8	4.6	2.1	4.32	0.27	38.1
Nunhems	Shady Lady	40.4	16.1	4.5	1.9	4.28	0.30	49.1
Rogers/Syngenta	QualiT21	42.8	19.3	4.5	2.4	4.32	0.26	36.9
	QualiT 23	42.1	19.9	4.7	2.0	4.25	0.30	49.3
	Bobcat	41.4	20.4	4.2	2.0	4.27	0.28	45.0
	Catalyst	40.9	15.7	4.0	2.2	4.25	0.27	44.5
	RFT500-305	42.9	19.9	4.4	2.3	4.24	0.28	34.5
	RFT500-311	43.3	23.0	4.2	2.0	4.28	0.27	40.1
	RFT500-312	41.6	18.9	4.1	2.2	4.23	0.28	41.9
Sakata	STM 0115	41.7	20.0	4.4	2.0	4.29	0.28	43.0
	LSD.05	1.7	3.1	0.2	ns	0.04	ns	ns
	Average	**42.1**	**18.8**	**4.4**	**2.1**	**4.28**	**0.28**	**42.5**

Color and firmness data are from 3 replicates of 15 fruits; composition data are from 3 replicates of composite samples of 15 fruit per rep. Data analyzed by ANOVA. Lower hue color values indicate redder fruits; lower firmness values indicate softer fruits.

Roma Fresh Market Tomato Variety Results Table

Table 7. Quality characteristics of fresh market **ROMA** tomatoes harvested **MG** from the 2005 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 alphabetically by seed company.

Seed Company	Cultivar	Red Color Hue	Firmness Newtons	Soluble solids %	Sugars %	pH	Titratable acidity %	Lycopene mg/Kg
BHN	BHN C9008	41.2	18.6	4.7	2.8	4.20	0.34	39.7
Sakata	Monica	39.4	21.3	4.4	2.8	4.25	0.29	52.5
	Muriel	38.9	19.1	4.7	2.8	4.22	0.34	49.9
Syngenta/Rogers	Miroma	41.7	20.8	4.4	2.5	4.28	0.29	51.3
	RPT 8109	41.4	22.3	4.3	2.4	4.17	0.30	42.6
Western Seed	WS 4061	38.3	17.2	4.3	2.3	4.32	0.28	53.9
	WS 4062	40.8	21.5	4.0	1.9	4.24	0.29	46.9
	LSD.05	1.2	2.6	0.2	0.2	0.05	0.02	8.6
	Average	**40.2**	**20.1**	**4.4**	**2.5**	**4.24**	**0.30**	**48.1**

Color and firmness data are from 3 replicates of 15 fruits; composition data are from 3 replicates of composite samples of 15 fruit per rep. Data analyzed by ANOVA. Lower hue color values indicate redder fruits; lower firmness values indicate softer fruits.

SUMMARY TABLES

Table 8. Quality characteristics of fresh market **round** tomatoes harvested **MG** from the three 2005 replicated trials 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.

Seed Company	Cultivar	Trial	Red Color Hue	Firmness Newtons	Soluble solids %	pH	Titratable acidity %
American Takii	At-37	Fresno	36.0	16.5	5.0	4.39	0.37
		Merced	40.0	12.6	4.2	4.48	0.26
		San Joaquin	44.3	13.6	4.3	4.25	0.30
		AVERAGE	**40.1**	**14.2**	**4.5**	**4.37**	**0.31**
BHN	BHN 580	Fresno	32.7	25.4	5.2	4.39	0.40
		Merced	39.4	18.4	4.6	4.53	0.30
		San Joaquin	41.6	20.0	4.6	4.32	0.29
		AVERAGE	**37.9**	**21.3**	**4.8**	**4.41**	**0.33**
	BHN 654	Fresno	33.7	25.9	5.0	4.39	0.38
		Merced	38.8	18.8	4.5	4.53	0.26
		San Joaquin	42.8	18.8	4.6	4.32	0.27
		AVERAGE	**38.4**	**21.2**	**4.7**	**4.41**	**0.30**
Nunhems	Shady Lady	Fresno	32.6	18.1	4.9	4.33	0.40
		Merced	39.9	16.6	4.3	4.41	0.32
		San Joaquin	40.4	16.1	4.5	4.28	0.30
		AVERAGE	**37.6**	**16.9**	**4.6**	**4.34**	**0.34**
Rogers/Syngenta	QualiT21	Fresno	37.3	28.0	5.0	4.33	0.40
		Merced	39.0	18.8	4.3	4.42	0.30
		San Joaquin	42.8	19.3	4.5	4.32	0.26
		AVERAGE	**39.7**	**22.0**	**4.6**	**4.36**	**0.32**
	QualiT 23	Fresno	34.3	24.7	5.1	4.31	0.38
		Merced	37.7	20.2	4.2	4.42	0.28
		San Joaquin	42.1	19.9	4.7	4.25	0.30
		AVERAGE	**38.0**	**21.6**	**4.7**	**4.33**	**0.32**
	Bobcat	Fresno	33.4	28.0	4.8	4.35	0.39
		Merced	39.5	21.0	4.1	4.43	0.26
		San Joaquin	41.4	20.4	4.2	4.27	0.28
		AVERAGE	**38.1**	**23.1**	**4.4**	**4.35**	**0.31**
	Catalyst	Fresno	33.2	27.7	4.6	4.37	0.37
		Merced	39.6	21.4	4.1	4.44	0.29
		San Joaquin	40.9	15.7	4.0	4.25	0.27
		AVERAGE	**37.9**	**21.6**	**4.2**	**4.35**	**0.31**

Table 8, cont.

Seed Company	Cultivar	Trial	Red Color Hue	Firmness Newtons	Soluble solids %	pH	Titratable acidity %
	RFT500-305	Fresno	32.8	23.9	4.6	4.34	0.36
		Merced	38.6	19.2	4.1	4.42	0.26
		San Joaquin	42.9	19.9	4.4	4.24	0.28
		AVERAGE	**38.1**	**21.0**	**4.4**	**4.33**	**0.30**
	RFT500-311	Fresno	34.8	29.5	4.7	4.37	0.37
		Merced	39.9	20.9	4.2	4.51	0.24
		San Joaquin	43.3	23.0	4.2	4.28	0.27
		AVERAGE	**39.3**	**24.5**	**4.4**	**4.39**	**0.29**
	RFT500-312	Fresno	33.1	26.8	4.6	4.34	0.37
		Merced	39.5	18.6	4.4	4.48	0.27
		San Joaquin	41.6	18.9	4.1	4.23	0.28
		AVERAGE	**38.1**	**21.4**	**4.4**	**4.35**	**0.31**
Sakata	STM 0115	Fresno	33.7	24.0	4.9	4.33	0.44
		Merced	39.2	16.6	4.3	4.45	0.29
		San Joaquin	41.7	20.0	4.4	4.29	0.28
		AVERAGE	**38.2**	**20.2**	**4.5**	**4.36**	**0.34**
	Average	Fresno	**33.9**	**25.2**	**4.8**	**4.36**	**0.38**
	Average	Merced	**39.4**	**19.2**	**4.3**	**4.47**	**0.27**
	Average	San Joaquin	**42.1**	**18.8**	**4.4**	**4.28**	**0.28**
		LSD.05	**1.8**	**3.3**	**0.2**	**0.06**	**0.04**
	OVERALL	**AVERAGE**	**38.5**	**21.1**	**4.5**	**4.37**	**0.31**

Color and firmness data are from 3 replicates of 15 fruits for MG and VR harvested tomatoes; composition data are from 3 replicates of composite samples of 15 fruit per rep. Data were analyzed by ANOVA. Lower hue color values indicate redder fruits; lower firmness values indicate softer fruits.

Table 9. Quality characteristics of fresh market **round** tomatoes harvested **VR** from the three 2005 replicated trials 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.

Seed Company	Cultivar	Trial	Red Color Hue	Firmness Newtons	Soluble solids %	pH	Titratable acidity %
American Takii	At-37	Fresno	36.1	16.5	5.0	4.42	0.38
		Merced	40.0	19.0	4.3	4.55	0.31
		AVERAGE	**38.0**	**17.7**	**4.6**		
BHN	BHN 580	Fresno	34.0	20.3	5.3	4.39	0.41
		Merced	41.0	19.3	4.5	4.56	0.31
		AVERAGE	**37.5**	**19.8**	**4.9**		
	BHN 654	Fresno	34.2	20.9	4.8	4.44	0.38
		Merced	40.4	20.1	4.6	4.57	0.29
		AVERAGE	**37.3**	**20.5**	**4.7**		
Nunhems	Shady Lady	Fresno	33.9	16.3	4.6	4.35	0.39
		Merced	40.4	20.0	4.5	4.48	0.33
		AVERAGE	**37.2**	**18.1**	**4.5**		
Rogers/Syngenta	QualiT21	Fresno	33.5	21.7	5.0	4.36	0.40
		Merced	40.7	18.8	4.2	4.47	0.30
		AVERAGE	**37.1**	**20.3**	**4.6**		
	QualiT 23	Fresno	34.2	22.4	4.7	4.38	0.35
		Merced	39.2	18.5	4.3	4.43	0.28
		AVERAGE	**36.7**	**20.4**	**4.5**		
	Bobcat	Fresno	32.4	23.1	4.8	4.40	0.36
		Merced	39.5	19.4	4.2	4.51	0.30
		AVERAGE	**35.9**	**21.2**	**4.5**		
	Catalyst	Fresno	33.7	23.2	4.5	4.37	0.36
		Merced	39.6	20.8	4.3	4.49	0.31
		AVERAGE	**36.6**	**22.0**	**4.4**		
	RFT500-305	Fresno	33.0	22.2	4.7	4.37	0.38
		Merced	39.3	20.5	4.2	4.45	0.28
		AVERAGE	**36.1**	**21.4**	**4.4**		
	RFT500-311	Fresno	32.5	23.1	4.7	4.39	0.36
		Merced	40.1	20.6	4.1	4.54	0.27
		AVERAGE	**36.3**	**21.9**	**4.4**		

Table 9, cont.

Seed Company	Cultivar	Trial	Red Color Hue	Firmness Newtons	Soluble solids %	pH	Titratable acidity %
	RFT500-312	Fresno	33.8	22.9	4.6	4.37	0.38
		Merced	40.2	20.7	4.1	4.51	0.30
		AVERAGE	**37.0**	**21.8**	**4.4**		
Sakata	STM 0115	Fresno	33.2	18.4	4.8	4.41	0.38
		Merced	40.1	19.4	4.5	4.48	0.33
		AVERAGE	**36.6**	**18.9**	**4.6**		
Seminis	PX 2935	Fresno	31.0	24.5	4.8	4.42	0.34
		Merced	40.4	22.1	4.2	4.59	0.25
		AVERAGE	**35.7**	**23.5**	**4.5**		
	Average	Fresno	**33.5**	**21.2**	**4.8**	**4.39**	**0.37**
	Average	Merced	**40.1**	**20.0**	**4.3**	**4.51**	**0.30**
		LSD.05	**1.4**	**2.1**	**0.3**	**0.05**	**0.03**
	OVERALL	**AVERAGE**	**36.8**	**20.6**	**4.6**	**4.45**	**0.34**

Color and firmness data are from 3 replicates of 15 fruits for MG and VR harvested tomatoes; composition data are from 3 replicates of composite samples of 15 fruit per rep. Data were analyzed by ANOVA. Lower hue color values indicate redder fruits; lower firmness values indicate softer fruits.

Summary Table 10. Overall scores of ripe round tomato varieties (includes MG from all 3 trials and VR from 2 trials) evaluated in 2005. **Total score is based on sum of flavor, red color and firmness scores; the higher the total score, the better the overall quality. Varieties are ranked based on total quality score (right column).**

Variety	Number Evaluations	%SS Score	% TA Score	Flavor Score (Max = 3)	Red Color Score (Max = 3)	Firmness Score (Max = 3)	Total Quality Score (Maximum =9)
RFT500-311	5	1.4	1.4	**1.4**	**2.2**	**3.0**	**6.6**
QualiT 23	5	1.8	1.6	**1.7**	**2.2**	**2.6**	**6.5**
Bobcat	5	1.4	1.6	**1.5**	**2.2**	**2.8**	**6.5**
Catalyst	5	1.4	1.6	**1.5**	**2.2**	**2.8**	**6.5**
PX 2935	4	1.5	1.5	**1.5**	**2.0**	**3.0**	**6.5**
BHN 580	5	2.4	2.0	**2.2**	**2.0**	**2.2**	**6.4**
BHN 654	5	2.0	1.6	**1.8**	**2.2**	**2.4**	**6.4**
RFT500-305	5	1.4	1.4	**1.4**	**2.2**	**2.6**	**6.2**
RFT500-312	5	1.4	1.6	**1.5**	**2.0**	**2.6**	**6.1**
STM 0115	5	1.6	1.8	**1.7**	**2.2**	**2.2**	**6.1**
Shady Lady	5	1.8	1.9	**1.8**	**2.2**	**2.0**	**6.0**
QualiT21	5	1.6	1.8	**1.7**	**1.8**	**2.4**	**5.9**
AT-37	5	1.4	1.8	**1.6**	**1.8**	**1.6**	**5.0**

Varieties are scored for each characteristic on a 3 point scale, where 1=low, 2=intermediate, 3=high. For red color, score 1= poor, with hue >40, 2= hue 35-40, and score 3 = high with hue <35. For firmness, score 1 = <15N force, score 2 = 15-20, and score 3 = >20. For soluble solids, score 1 = < 4.5 %SS, score 2 = 4.5-5.0 %SS, and score 3 = >5.0 %SS. For Acidity, score 1 = < 0.30 %T.A., score 2 = 0.30-0.40 %T.A., and score 3= >0.40 %T.A. Flavor Score is the average of the soluble solids and titratable acidity scores. The categories are the same as used in 2003.

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.