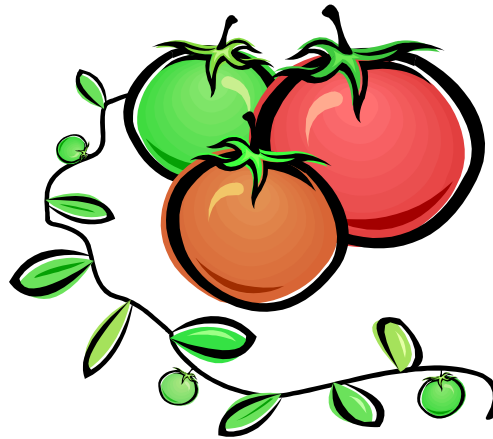
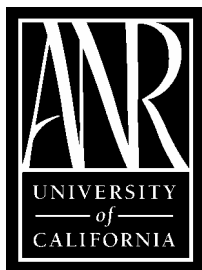


2004
Fresh Market Tomato
Statewide Uniform Variety Trial Report
Field and Postharvest Evaluations
South San Joaquin Valley



University of California Cooperative Extension



Tulare County Office
4437-B South Laspina Street
Tulare, California 93274
(559) 685-3303

Kings County Office
680 North Campus Drive
Hanford, California 93230
(559) 582-3211, ext.1-2730



2004 Fresh Market Tomato Variety Trial Research Report South San Joaquin Valley

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

TABLE OF CONTENTS

Fresh Market Tomato Variety Trial:	
Fresno County	3
STATEWIDE FRESH MARKET TOMATO VARIETY TRIALS:	
Fresno, Merced, and San Joaquin Counties	
Production Summaries: Combined Results	14
Postharvest Evaluations: By County and Combined.....	24
Data Analysis Terms:	30

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.

SPECIAL THANKS TO ...

- i The California Tomato Commission for their support and John LeBoeuf for his interest and help in the projects;
- i UC West Side Research & Extension Center Staff for their cooperation with the management of the variety trial;
- i Marita Cantwell, postharvest specialist, UC Davis, for her lead and cooperation in the postharvest evaluations of the variety trial; Mann Laboratory: Xunli Nie, research associate, and student assistants Eduardo Gutierrez and Ana Maria Ibañez;
- i The commercial seed companies that supplied seed and support for the variety trial;
- i Ryan Rocha of Westside Transplants for raising the transplants for the variety trial;
- i Heather Rhodes and Jason Hawkins for their hard work as field research assistants; and
- i Edna Blackhurst, secretary.

The University of California prohibits discrimination against or harassment of any person on the basis of race, color, national origin, religion, sex, physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (special disabled veteran, Vietnam-era veteran or any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized). University policy is intended to be consistent with the provisions of applicable state and federal laws. Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action Director, University of California, Agriculture and Natural Resources, 300 Lakeside Drive, 6th Floor, Oakland, CA 94612-3560. (510) 987-0096.

2004 Fresh Market Tomato Variety Trial Report – Fresno County

Michelle Le Strange, Farm Advisor

Introduction

Fresh market tomato trials are conducted by UCCE Farm Advisors from Kings/Tulare, Merced/Madera, and San Joaquin/Stanislaus 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.

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 the early trial which was planted in Fresno County. Round and roma lines were evaluated.

Trial Procedure

The 2004 variety trials were established at the UC West Side Research & Extension Center near Five Points in Fresno County. Seeds were planted in the greenhouse on February 12 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**. Eight round and 4 roma varieties were replicated four times, while 13 round and 8 roma lines were observed in single plots. Variety names, code numbers, and sources of seed are listed in **Table 2**. The trials were grown under furrow irrigation and 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, market grades, and quality results for the round

replicated and observed varieties are presented in **Tables 3-6**. Roma lines were separated into red and green fruit, but were not sorted to size. Results are shown in **Tables 7 and 8**.

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 moderately warm and ideal during the first month after transplanting. Summer temperatures were typical and remained fairly constant through harvest. Crown set was good and later fruit set was only slightly affected by high temperatures. Vine growth was not excessively rank and tall. There was some dodder and field bindweed but a lot of nightshade in the field that required several hand weeding. There was virtually no worm pressure and no insecticides were sprayed. The marketable yield average was 2½ tons and the total yield average was 4 tons/acre more than in 2003.

Trial Averages By Year

	Yield Tons/A		%
	Market	Total	Red
2004	33.1	40.9	15.6
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

ROUND REPLICATED VARIETIES

Yields and Grades (Tables 3A & 3B).

Market Yield: Market yield ranged from a high of 38.1 tons (3050 boxes) to a low of 28.9 tons (2313 boxes) with an average of 33.1 tons (2646 boxes) per acre for the eight replicated varieties.

SVR 2935 was the top producer and the only variety that yielded more marketable fruit than Shady Lady. All other lines were in between and not significantly less than SVR 2935 or more than Shady Lady.

Total Yield: Small and cull fruit combined averaged 7.7 tons per acre. Total yield ranged from 46 tons to 37.2 tons per acre. The varietal ranking shifted insignificantly when sorted by total yield (Table 3-B); there was no significant difference in total tonnage between varieties.

Fruit Grades: The trial averaged 52, 37, and 11% extra large, large, and medium size fruit. This is 3% more extra large fruit and 3% less small fruit than 2003 and indicates very good large sizes. Shady Lady tends to have smaller fruit.

Percent Red Fruit at Harvest: The trial's average maturity at harvest was 15.6% red fruit. Shady Lady and QualiT 23 were the earliest, while QualiT 21 was the latest. These are similar results to 2003.

Fruit and Vine Characteristics (Table 4)

Fruit shape ranged from flat globe to deep globe. In general fruit shape of most varieties was better and more uniform than usual and very acceptable in appearance. There was less catfacing than in previous years.

Shoulder smoothness and blossom end size was variable among the varieties, which is typical. Most varieties had very tight blossom ends this year, however QualiT 23 and Shady Lady tended to be large on some fruit. Vine size was ranked relative to each other and most are medium-large. QualiT 21 is noticeably larger in the field while L-311 is noticeably smaller in vine stature.

Overall quality is based on visual appeal and represents a general conclusion based on all quality characteristics. Overall appearance ranged from good to fair. No variety was extremely outstanding

in high quality though most were acceptable. L-311, was a little rough in overall quality, despite very tight blossom ends.

ROUND 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.

Yields and Grades (Table 5)

Marketable yield ranged from 41.2 tons (3295 boxes) to 23.3 tons (1866 boxes) with an average yield of 33.6 tons (2687 boxes) per acre. Non market yield accounted for approximately 7.5 tons and total yields did not change the ranking of most varieties.

Last year fruit grades were approximately 40-40-20 for extra large, large, and medium size fruit. This year fruit was larger with 50-35-15 for the respective size grades. Percent red fruit at harvest ranged from 33.4 to 6.0%. RFT 500311, L-312, and SRT 6764 were earliest and RFT 500305, SRT 6765, and RFT 500311 were the latest.

Fruit and Vine Characteristics (Table 6)

Fruit were rounder in shape than in most other years. Blossom ends were nice and tight in many lines. Shoulder smoothness was more round and smooth as is desirable in most cases, although there were a few exceptions. Most stem scars were not exceedingly obvious. Vine size was medium to large in overall stature with most providing fair sunburn protection. BHN 681 and L-312 did not fare well overall, while SRT 6764 looked very good.

ROMA VARIETY TRIAL (Tables 7 and 8)

Four roma varieties were replicated and 8 roma lines were observed, but only 7 were harvested. One line had greenhouse stand establishment problems and so only a few plants were grown. Although there was little difference in marketable and total yield between the replicated varieties there were differences in fruit shape. The fruit was not graded to size (next year!). The roma varieties also showed more zippers and blossom end rot than the round lines.

2004 Fresh Market Tomato Variety Trial
South San Joaquin Valley – UC WSREC

Table 1

Trial Specifics

Cooperators	UC West Side Research and Extension Center (WSREC) Edwin Scott, Field Superintendent
Trial Location	Five Points, CA
Soil Type	Panoche clay loam
Transplant Date	April 16, 2004 Greenhouse Seeded: Feb. 21, 2004
Plot Size	One 60-inch bed x 45-foot row; 30 plants per plot
Plant Spacing	18 inches between plants; single row per bed
Pesticides	Vapam prior to planting; Matrix-postemergence; Sulfur, July 3, 2004
Fertilization	~140 lbs N, 75 lbs P ₂ O ₅ and 85 lbs K ₂ O
Irrigation	Furrow
Harvest Date	July 17, 2004 - 92 days after transplant
Harvest Plot Size	One 60-inch bed x 10-foot row
Experimental Design	Randomized Complete Block (4 replications: A, B, C, D)

Table 2
2004 Fresh Market Tomato Varieties – South San Joaquin Valley
Michelle Le Strange, Farm Advisor, Tulare & Kings Counties

ROUND

SEED COMPANY	REPLICATED	OBSERVED
American Takii		11. AT 37
BHN	1. BHN 580 (VFFN)	12. BHN 654 (VFFT) 13. BHN 681 (VFF) 14. BHN 682 (VFF)
LSL Plant Sciences	2. L-311 (VFFT)	15. L-312 (VFFNT) 16. L-310 (VFFN)
Seminis	3. SVR 2935 (VF2NAscStSwTy)	
Nunhems	4. Shady Lady (VFAS)	17. SRT 6762 18. SRT 6763 (VFFNASTMV) 19. SRT 6764 (VFFNASTMV) 20. SRT 6765 (VFNA)
Syngenta (Rogers)	5. QualiT 21 (VFFNTMVSt) 6. QualiT 23 (VFFTMVSt) 7. Bobcat (VFFSt) 8. Catalyst (RFT 6047) (VFFSt)	21. RFT 500305 22. RFT 500311 23. RFT 500312

ROMA

SEED COMPANY	REPLICATED	OBSERVED
Bejo Seeds		31. B55-436 32. BSS-437
BHN	41. BHN 523 (VFFP)	33. BHN C9008 (VFFNT)
LSL Plant Sciences	42. SD 257	34. SD 256
Seminis	43. PX 2626	
Syngenta (Rogers)	44. Miroma	35. RFT 8109
United Genetics		36. UG 13002 37. UG 13102
Western Seed		38. 869963 (LSL)

Table 3-A

2004 YIELDS AND GRADES OF FRESH MARKET TOMATO VARIETIES
South San Joaquin Valley - UC WSREC, Fresno County
Replicated Varieties
SORTED BY MARKETABLE YIELD

#	Variety	Market			% Market Yield ²			Nonmarket ... Yield ...		TOTAL	
		..... Yield/Acre ^{1*}	Tons	Boxes	X-L	Large	Med	Small ³ T/A	Culls ⁴ T/A	Yield ⁵ T/A	% Reds ⁶
3	SVR 2935	38.1	3050	a	56.3	35.2	8.5	1.8	6.1	46.0	9.0
1	BHN 580	35.1	2810	ab	53.3	35.4	11.4	2.6	5.3	43.0	14.9
6	QualiT 23	34.0	2723	ab	50.1	38.1	11.9	2.2	4.9	41.2	22.1
5	QualiT 21	33.7	2694	ab	54.9	34.4	10.8	1.8	7.8	43.3	9.2
8	Catalyst	32.5	2599	ab	52.5	36.5	11.1	1.7	4.1	38.2	16.6
7	Bobcat	32.3	2584	ab	54.0	35.4	10.6	1.6	4.6	38.5	17.2
2	L-311	29.9	2392	ab	52.3	35.8	12.0	2.0	7.8	39.7	12.1
4	Shady Lady	28.9	2313	b	42.9	43.5	13.6	2.8	5.5	37.2	23.5
	Average	33.1	2645.6		52.0	36.8	11.2	2.0	5.7	40.9	15.6
	LSD .05	8.5	681.0		8.4	6.2	4.8	1.0	2.7	ns	8.1
	CV %	17.5	17.5		10.9	11.4	28.8	34.3	32.2	16.3	35.3

- 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

2004 YIELDS AND GRADES OF FRESH MARKET TOMATO VARIETIES
South San Joaquin Valley - UC WSREC, Fresno County
Replicated Varieties
SORTED BY TOTAL YIELD

#	Variety	Market			% Market Yield ²			Nonmarket ... Yield ...		TOTAL Yield ^{5*}	% Reds ⁶	
		..... Yield/Acre ^{1*}	Tons	Boxes	X-L	Large	Med	Small ³ T/A	Culls ⁴ T/A			
3	SVR 2935	38.1	3050	a	56.3	35.2	8.5	1.8	6.1	46.0	a	9.0
5	QualiT 21	33.7	2694	ab	54.9	34.4	10.8	1.8	7.8	43.3	a	9.2
1	BHN 580	35.1	2810	ab	53.3	35.4	11.4	2.6	5.3	43.0	a	14.9
6	QualiT 23	34.0	2723	ab	50.1	38.1	11.9	2.2	4.9	41.2	a	22.1
2	L-311	29.9	2392	ab	52.3	35.8	12.0	2.0	7.8	39.7	a	12.1
7	Bobcat	32.3	2584	ab	54.0	35.4	10.6	1.6	4.6	38.5	a	17.2
8	Catalyst	32.5	2599	ab	52.5	36.5	11.1	1.7	4.1	38.2	a	16.6
4	Shady Lady	28.9	2313	b	42.9	43.5	13.6	2.8	5.5	37.2	a	23.5
	Average	33.1	2645.6		52.0	36.8	11.2	2.0	5.7	40.9		15.6
	LSD .05	8.5	681.0		8.4	6.2	4.8	1.0	2.7	ns		8.1
	CV %	17.5	17.5		10.9	11.4	28.8	34.3	32.2	16.3		35.3

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
2004 Replicated Varieties
 South San Joaquin Valley - UC WSREC, Fresno County

Code	Variety	Fruit shape	Shoulder smooth	Blossom end	Vine size	Vine cover	Overall	Comments
3	SVR 2935	FG-G	F-Sm	1-2	ML-L	VG	G	Uniform, big yield
1	BHN 580	FG-G	F-Sm	2	ML	G	G	Smooth, uniform
6	QualiT 23	G-DG	F-Sm	3-4	ML-L	F	F-G	Variable
5	QualiT 21	G	F-Sm	1-2	L	VG	F-G	Good green color
8	Catalyst	G	F-Sm	1-3	ML	F	F-G	Some zippers
7	Bobcat	G	F-Sm	1-3	M-ML	G	F-G	Many small fruit
2	L-311	FG-G	F	1	S-M	P	F	Rough shape, not uniform, pointed ends, low yield
4	Shady Lady	FG-G	F	2-5	ML	F	F-G	Variable

- | | | | | |
|--------------------------|----------------------------------|-----------------|------------------------------|-------------------------------|
| 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
2004 YIELDS AND GRADES OF FRESH MARKET TOMATO VARIETIES
 South San Joaquin Valley - UC WSREC, Fresno County
 Observed Varieties

Code	Variety	Market .. Yield/Acre ¹..		.....% Market Yield ²			Nonmarket....Yield		TOTAL Yield ⁵ T/A	% Red ⁶
		Tons	Boxes	X-Large	Large	Medium	Small ³ T/A	Culls ⁴ T/A		
17	SRT 6762	41.2	3295	42.6	46.0	11.4	2.5	4.4	48.0	25.5
23	RFT 500312	40.5	3241	62.1	29.8	8.1	1.7	5.0	47.3	14.2
21	RFT 500305	37.6	3006	61.9	32.5	5.7	0.4	3.8	41.8	6.0
12	BHN 654	36.9	2948	59.3	27.9	12.8	2.9	4.6	44.4	15.1
14	BHN 682	36.6	2927	61.9	29.0	9.1	1.2	3.8	41.6	10.6
16	L-310	34.3	2747	53.5	39.2	7.3	2.2	6.3	42.8	33.4
22	RFT 500311	33.4	2674	56.0	32.5	11.5	2.4	2.9	38.6	9.8
11	AT 37	33.1	2648	56.2	31.2	12.6	2.7	4.5	40.3	25.7
20	SRT 6765	32.2	2576	32.2	43.9	23.9	4.5	5.6	42.3	7.0
13	BHN 681	31.8	2541	39.7	41.0	19.3	3.0	7.0	41.7	13.8
19	SRT 6764	29.3	2347	46.4	35.2	18.4	3.2	4.9	37.4	29.7
15	L-312	26.4	2110	52.6	35.7	11.7	1.7	4.0	32.1	32.0
18	SRT 6763	23.3	1866	40.6	40.2	19.2	3.9	8.6	35.8	18.0
	Average	33.6	2687	51.2	35.7	13.1	2.5	5.0	41.1	18.5

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
2004 Observed Varieties
 South San Joaquin Valley - UC WSREC, Fresno County

#	Variety	Fruit shape	Shoulder Smooth	Blos End	Vine Size	Vine Cover	Sun-burn	Overall	Comments
17	SRT 6762	FG-G	M	1-2	ML	G	some	F-G	a little rough, fruit is pale green
23	RFT 500312	FG-G	M-Sm	1-3	ML	F-P	a lot	G	smooth uniform
21	RFT 500305	FG-G	M-Sm	1-2	L	F	a lot	G-F	uniform, nice color, good yield
12	BHN 654	var	M	1-3	ML	F-P	a lot	F	many zippers
14	BHN 682	Rnd G	M	1-3	ML	F	some	F	many zippers, variable
16	L-310	G	M	1-2	M	P	a lot	F-G	many striped fruit
22	RFT 500311	FG-G	M-Sm	1-3	L	G	few	F	later maturity
11	AT 37	G	Sm	1-2	M	F	a lot	G	nice shape, seems firm
20	SRT 6765	G	V. Sm	2-3	ML	G	few	G	small stem scar, BE could be tighter
13	BHN 681	VAR	M	1-3	ML	P	a lot	P	small fruit, very many pointed ends
19	SRT 6764	Rnd G	V. Sm	1-2	M	G	few	G-VG	smooth, uniform, nice
15	L-312	FG	Sm	2-3	M	F-P	a lot	P	no yield
18	SRT 6763	FG-G	M	1-3	M	F	some	F	many zippers

Wall Thickness:	VTH = very thick	TH = Thick	MTH = medium thick	
Fruit Shape:	FG = flat globe	G = globe	DG = deep globe	var = variable
Shoulder Smoothness:	Vsm = very smooth	sm = smooth	med = medium	r = rough
Blossom End:	1 = tight	2 = slight scar	3 = medium scar	4 = big scar
Stem Scar:	small = great, hardly noticeable	med = ok		large = very noticeable
Vine Size:	VL = very large	L = large	M = medium	s = small
Leaf Cover:	XLNT - excellent cover of fruit		VG = very good	G = good
	F = fair	Split = split open vines	P = poor, much exposed fruit	
Overall appearance:	VG = very good	G = good	F = fair	P = poor

Table 7
ROMA Variety Trial - UC WSREC, Fresno County - 2004
Summary of YIELD Results

Variety	Seed Company	TONS/ACRE					Lbs/50 Fruit		% Red
		Red	Green	MKT Yield (red+green)	Culls	TOTAL Yield	Red	Green	
REPLICATED (average of 4 reps)									
Miroma	Syngenta	14.4	20.5	34.9	7.4	42.2	16.2	10.9	23.5
PX 2626	Seminis	9.8	25.0	34.7	9.7	44.4	16.5	14.2	22.0
SD 257	LSL Plant Sci	9.6	24.5	34.0	4.0	38.0	15.3	10.0	24.0
BHN 523	BHN Seed Co.	11.2	22.0	33.2	4.1	37.3	12.7	8.8	30.2
	Average	11.2	23.0	34.2	6.3	40.5	15.1	11.0	27.4
	LSD 0.05	ns	ns	ns	ns	ns	3.2	2.7	ns
	CV %			25.7					
OBSERVED									
UG 13102	United Genetics	22.3	21.6	43.9	1.3	45.2	13.7	8.0	50.7
RFT 8109	Syngenta	18.7	19.5	38.2	2.2	40.4	19.6	10.7	48.9
UG 13002	United Genetics	8.1	29.9	38.0	0.3	38.3	16.7	8.4	21.3
B55-436	Bejo Seeds	19.1	18.6	37.7	0.0	37.7	9.5	6.7	50.6
BHN C9008	BHN Seed Co.	14.2	20.8	35.0	0.3	35.2	16.1	10.9	40.5
BSS-437	Bejo Seeds	16.3	18.3	34.5	0.0	34.5	10.7	7.6	47.1
SD 256	LSL Plant Sci	11.6	19.7	31.3	0.0	31.3	13.8	9.4	37.1

Table 8
ROMA Variety Trial - UC WSREC, Fresno County - 2004
Summary of QUALITY Results

Variety	Fruit				Vine		Overall	Comments
	Shape	Shoulder	BER*	Zipper	Size	Cover		
REPLICATED								
Miroma	blocky, some round, some long	smooth	few	few-some	M-ML	Good-fair	G-F	not uniform
PX 2626	blocky,	smooth	none	few	ML	Fair-poor	F	a lot of sunburn, variable fruit
SD 257	pear-blocky	fair-smooth	few	few-some	M-ML	Fair	G-F	some rough fruit, some pointed ends
BHN 523	pear-blocky some round, some long	smooth	few-some	none	ML	Good	G-F	BER apparent
OBSERVED								
UG 13102	pear-long	smooth	few	none	ML		G	ugly fruit
RFT 8109	variable	fair	some	some-a lot	M		F	some big blocky round, others long
UG 13002	pimiento shape	smooth	none	some	L		F-G	wrong shape
B55-436	pear-long	smooth	few	none	M		G	thin fruit, some pointed ends
BHN C9008	variable	fair	few	some	M		F-P	some big blocky round, others long
BSS-437	blocky-round	fair	few	few	ML		F	short round fruit
SD 256	variable	fair	few	some	S-M		F-P	some big blocky round, others long

* BER = Blossom end rot

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

Statewide FRESH MARKET TOMATO Variety Trials FIELD EVALUATIONS for 2004

*Michelle Le Strange, Scott Stoddard, Bob Mullen (Emeritus), and Jan Mickler
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 two roma variety trials were grown and harvested in 2003.

- **Fresno County: April 16 - July 17** (92 days) at UC Westside Research & Extension Center, round and roma trial (*Michelle Le Strange*).

- **Merced County: May 5 – July 23** (79 days) with Live Oak Farms in Le Grand (*Scott Stoddard*).
- **San Joaquin County: June 9 - Sept. 1** (82 days) with Tom Guido (grower) and Triple "E" Produce; 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 5 replicated and 8 observed (non-replicated) varieties in common at 3 locations and 3 replicated and 5 observed varieties in 2 locations. 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 postharvest results follows this field 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 WSREC, Merced, and San Joaquin Counties 2004 Fresh Market Tomato Uniform Trials

Seed Company	Replicated	Observed
<u>3 Locations</u>		
BHN	BHN 580 (VFFN)	BHN 654 (VFFT) BHN 681 (VFF) BHN 682 (VFF)
LSL Plant Science		L-310 (VFFN) L-311 (VFFT)
Nunhems	SVR 2935 (VF2NAscStSwTy)	
Syngenta	Bobcat (VFFSt) Catalyst (VFF St) QualiT 21 (VFFNTMVSt)	RFT 500305 RFT 500311 RFT 500312
<u>2 Locations</u>		
American Takii		AT 37
LSL Plant Science	L-312 (VFFNT)	
Nunhems	Shady Lady (VFF)	SRT 6762 SRT 6763 (VFFNASTMV) SRT 6764 (VFFNASTMV) SRT 6765 (VFNA)
Syngenta	QualiT 23 (VFFTMVSt)	

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 in bar graph format.

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
- Figure 2: Market Yield
Boxes/Acre and Fruit Sizes

Roma Trial (2 locations)

Replicated & Observed Varieties

- Table 3: Results – San Joaquin County
- Table 4: Results – West Side Research and Extension Center

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 replicated varieties ranged from 36.5 to 23.0 tons (2917 to 1837 boxes) per acre. The average marketable yield at all locations was 32.7 tons/acre (2625 boxes). The same five varieties averaged 34.3 tons in Fresno, 35.5 in Merced, and 28.2 tons per acre in San Joaquin County.

QualiT 21 yielded more marketable fruit than the other four varieties in 3 locations. QualiT 23 yielded more marketable fruit than the other 2 varieties at 2 locations.

Total Yield – Tables 1 and 1B: Total yield of the replicated varieties ranged from 47.1 to 34.6 tons per acre and averaged 42.7 tons (3414 boxes) for varieties at all 3 locations. Total yield includes all small sized and culled fruit. L-312 had the most unmarketable fruit.

QualiT 21 was the top producer in Merced and San Joaquin Counties, whereas SVR 2935 yielded highest in Fresno County. There was not a very wide spread in total yield between the five varieties in the three locations. Because not all varieties were tested in all location there are not as many comparisons to make. Refer to the tables and figures for results.

Percent Reds – Table 1 and 1C: Shady Lady was the earliest variety and QualiT 21 was the latest variety to mature over locations.

Percent Size Grades- Table 1, 1D & Figure 1: Whether tested in 2 or 3 locations all the replicated varieties averaged approximately 50-40-10% extra large, large, and medium size fruit, respectively. This held true in Fresno and San Joaquin, but was closer to 40-40-20 in Merced. San Joaquin County averaged the largest amount of extra large fruit and the smallest percentage of medium size fruit. Large fruit size was abundant this season. Refer to Figure 1 for a good visual representation.

OBSERVED VARIETIES

Eight observed varieties were in common at all 3 locations and these were combined and analyzed. Five observed varieties were only tested in 2

locations. Their averages are shown, but these were not analyzed. There is always more variability within varieties with single plot observations between locations, so the results should be viewed with less confidence than replicated tests.

Market Yield – Table 2 and Figure 2: Market yield of the 8 observed varieties ranged from 37.5 tons (3000 boxes) to 26.5 tons (2120 boxes) and averaged 32.6 tons (2608 boxes) per acre. Because there is variability within varieties and only 3 locations (replications) the statistics indicate that it takes a 6.5 ton difference to recognize a real market yield difference.

Total Yield – Table 2: As in the replicated test small sizes and culled fruit accounted for approximately 10 tons of fruit per variety. Total yield ranged from 46.7 to 32.0 tons (3736 to 2560 boxes) per acre. Merced county had the highest total yields (48.3 tons average), followed by Fresno (42.2 tons) and San Joaquin (39.1 tons). In other words the average number of unmarketable fruit was 16.4, 7.1, and 8.5 T/A for Merced, Fresno, and San Joaquin, respectively. RFT 500305 had the lowest total yield in San Joaquin, almost the highest yield in Merced, and was average in Fresno county. L-310 and BHN 681 had more than ten tons of unmarketable fruit.

Percent Red Fruit at Harvest – Table 2: There was a lot of variability between trials in % red fruit at harvest. When combined at all 3 locations L-310 and BHN 681 were the earliest (16%) and BHN 682 and RFT 500211 were the latest (8%).

ROMA TRIALS

San Joaquin County- 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 or Jan Mickler in Stanislaus County.

Replicated Varieties

Market yield of the replicated varieties ranged from 22.6 to 16.8 tons with an average of 19.2 tons (1536 boxes) per acre. The vast majority of fruit were medium and small sizes. Immature fruit

averaged 3.2 tons and culls averaged 2.2 tons per acre. Total yield ranged from 28.4 to 21.1 tons (2272 to 1688 boxes) per acre. Percent red fruit at harvest ranged from 23.1 to 8.2% and averaged 13.7%. BHN 523 had the most red fruit and Mariana had the least.

Observed Varieties

The market yield of the six observed lines ranged from 20.3 tons (1624 boxes) to 11.0 tons (880 boxes) per acre. HA 3512 and HA 3513 were the earliest lines and perhaps this explains why there were no extra large or large fruit harvest whereas earlier lines had substantial amounts. HA 3824, C9008, and HA 3811 appear to be the earliest lines in the whole trial. The rest of the results run par with the replicated trial.

Fresno County- Table 4

Four roma varieties were replicated and 8 roma lines were observed, but only 7 were harvested. One line had greenhouse stand establishment problems and so only a few plants were grown. Although there was little difference in marketable and total yield between the replicated

varieties there were differences in fruit shape. The fruit was not graded to size (next year!). It was noted that the roma varieties also showed more zippers and blossom end rot than the round lines.

This trial was evaluated very differently from the San Joaquin Trial and efforts will be made to follow a more similar and consistent reporting method next season.

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 - 2004
SORTED BY MARKETABLE YIELD

Variety	Company	Combined Results			Fresno Co. (early season)			Merced Co. (midseason)			San Joaquin Co. (late season)		
		Yield T/A	%	Reds	Yield T/A	%	Reds	Yield T/A	%	Reds	Yield T/A	%	Reds
3 LOCATIONS													
QualiT 21	Syngenta	36.5	47.1	7.9	33.7	43.3	9.2	42.5	54.5	7.5	33.2	43.7	6.9
SVR 2935	Nunhems	32.2	44.1	8.9	38.1	46.0	9.0	36.5	55.3	8.1	22.0	30.9	9.5
Bobcat	Syngenta	32.1	42.3	11.6	32.3	38.5	17.2	33.0	48.5	10.7	31.1	40.0	7.0
Catalyst	Syngenta	32.1	41.0	10.5	32.5	38.2	16.6	33.1	46.1	5.1	30.9	38.7	9.8
BHN 580	BHN	30.6	38.9	10.1	35.1	43.0	14.9	32.7	48.2	6.0	24.0	25.5	9.5
	Average	32.7	42.7	9.8	34.3	41.8	13.4	35.5	50.5	7.5	28.2	35.7	8.5
	LSD .05	3.9	5.3	3.8									
	CV %	14.6	15.1	46.5									
Variety x Location Interaction		s	s	ns									
2 LOCATIONS													
QualiT 23	Syngenta	34.2	41.5	15.5	25.2	41.2	22.1				34.4	41.9	9.0
Shady Lady	Nunhems	26.8	34.6	19.4	28.9	37.2	23.5				24.6	32.0	15.3
L-312	LSL	23.0	40.8	10.7				20.7	43.4	6.1	25.2	38.1	15.2
	Average	28.0	39.0	15.2	27.1	39.2	22.8	20.7	43.4	6.1	28.1	37.3	13.2
	LSD .05	5.4	6.8	3.7									
	CV %	17.9	16.1	22.3									
Variety x Location Interaction		ns	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

* 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.

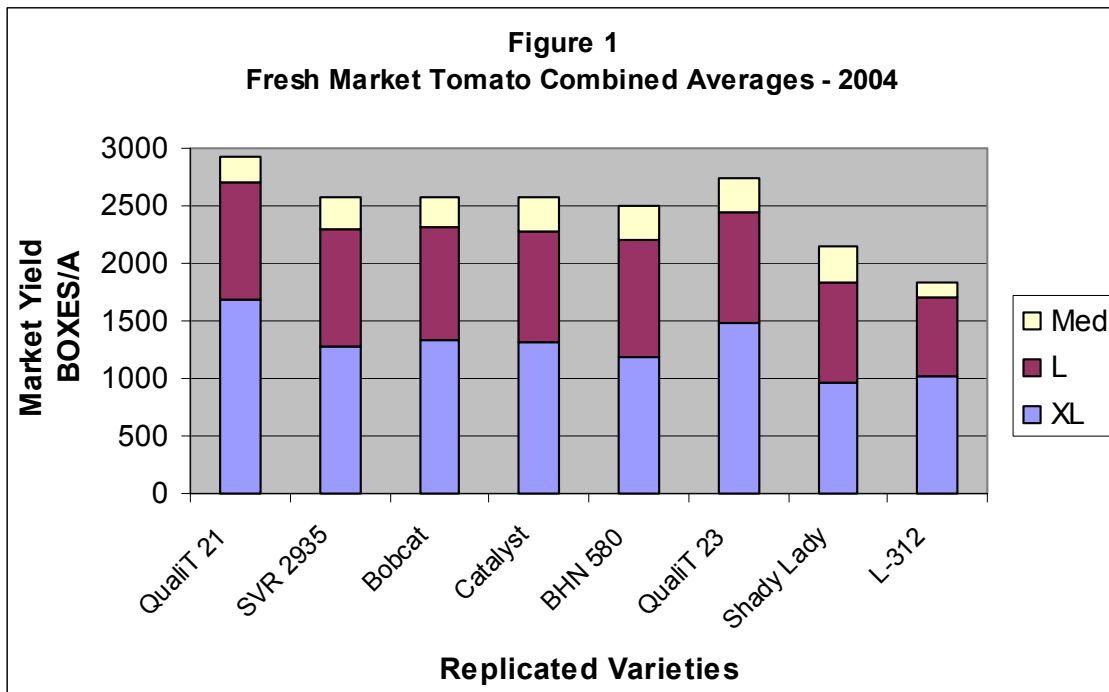


Table 1-A
Marketable Yield (TONS/Boxes per Acre)* - REPLICATED Varieties
Summary of Three Fresh Market Tomato Trials - 2004

Variety	Company	Combined Market Yield/Acre			Fresno Co. (early)		Merced Co. (mid)		San Joaquin Co. (late)	
		Tons	Boxes		Tons	Boxes	Tons	Boxes	Tons	Boxes
3 LOCATIONS										
QualiT 21	Syngenta	36.5	2917	a	33.7	2694	42.5	3398	33.2	2660
SVR 2935	Nunhems	32.2	2574	b	38.1	3050	36.5	2915	22.0	1756
Bobcat	Syngenta	32.1	2571	b	32.3	2584	33.0	2639	31.1	2490
Catalyst	Syngenta	32.1	2572	b	32.5	2599	33.1	2646	30.9	2470
BHN 580	BHN	30.6	2491	b	35.1	2810	32.7	2616	24.0	2047
	Average	32.7	2625		34.3	2747	35.5	2843	28.2	2285
	LSD .05	3.9	312							
	CV %	14.6	14.6							
Variety x Location Interaction		s	s							
2 LOCATIONS										
QualiT 23	Syngenta	34.2	2739	a	25.2	2723			34.4	2754
Shady Lady	Nunhems	26.8	2140	b	28.9	2313			24.6	1966
L-312	LSL	23.0	1837	b			20.7	1657	25.2	2018
	Average	28.0	2239		27.1	2518	20.7	1657	28.1	2246
	LSD .05	5.4	432.0							
	CV %	17.9	17.9							
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

* 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 1-B
TOTAL Yield (TONS/Boxes per Acre)* - REPLICATED Varieties
Summary of Three Fresh Market Tomato Trials - 2004

Variety	Company	Combined TOTAL Yield/Acre			Fresno Co. (early)		Merced Co. (mid)		San Joaquin Co. (late)	
		Tons	Boxes		Tons	Boxes	Tons	Boxes	Tons	Boxes
3 LOCATIONS										
QualiT 21	Syngenta	47.1	3768	ab	43.2	3456	54.5	4360	43.7	3496
SVR 2935	Nunhems	44.1	3528	ab	46.0	3680	55.3	4424	30.9	2472
Bobcat	Syngenta	42.3	3384	ab	38.4	3072	48.5	3880	40.0	3200
Catalyst	Syngenta	41.0	3280	b	38.2	3056	46.1	3688	38.7	3096
BHN 580	BHN	38.9	3112	b	43.0	3440	48.2	3856	25.5	2040
	Average	42.7	3414		41.8	3341	50.5	4042	35.8	2861
	LSD .05	5.3	424							
	CV %	15.1	15.1							
Variety x Location Interaction										
2 LOCATIONS										
QualiT 23	Syngenta	41.5	3323	a	41.2	3296			41.9	3352
L-312	LSL	40.8	3262	a			43.4	3472	38.1	3048
Shady Lady	Nunhems	34.6	2767	ab	37.2	2976			32.0	2560
	Average	39.0	3117		39.2	3136	43.4	3472	37.3	2987
	LSD .05	6.8	544.0							
	CV %	16.1	16.1							
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

Table 1-C
Percent (%) Red Fruit at Harvest* - REPLICATED Varieties
Summary of Three Fresh Market Tomato Trials - 2004

Variety	Company	% RED Average		Fresno (early)	Merced (mid)	San Joaquin (late)
3 LOCATIONS						
Bobcat	Syngenta	11.6	ab	17.2	10.7	6.9
Catalyst	Syngenta	10.4	ab	16.6	5.1	9.8
BHN 580	BHN	10.1	ab	14.9	6.0	9.5
SVR 2935	Nunhems	8.8	ab	8.9	8.1	9.5
QualiT 21	Syngenta	7.8	b	9.2	7.5	6.8
	Average	9.7		13.4	7.5	8.5
	LSD .05	3.7				
	CV %	46.5				
Variety x Location Interaction		ns				
2 LOCATIONS						
Shady Lady	Nunhems	19.4	a	23.5		15.3
QualiT 23	Syngenta	15.5	b	22.1		8.9
L-312	LSL	10.7	c		6.1	15.2
	Average	15.2		22.8	6.1	13.1
	LSD .05	3.7				
	CV %	22.3				
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

Table 1-D
Size Grades of Fresh Market Tomatoes - REPLICATED Varieties
Results Summary of Three Fresh Market Tomato Trials - 2004
Sorted by Market Yield

Variety	Company	COMBINED RESULTS			Fresno Co. (early)			Merced Co. (mid)			San Joaquin Co. (late)		
		% Market Yield			% Market Yield			% Market Yield			% Market Yield		
		XL	L	Med	XL	L	Med	XL	L	Med	XL	L	Med
3 LOCATIONS													
QualiT 21	Syngenta	57.9	34.5	7.6	54.9	34.4	10.8	52.7	36.9	10.5	66.2	32.2	1.7
SVR 2935	Nunhems	49.7	39.6	10.7	56.3	35.2	8.5	37.8	43.7	18.5	55.0	40.1	5.0
Bobcat	Syngenta	51.9	38.3	9.9	54.0	35.4	10.6	37.8	46.6	15.6	63.8	32.8	3.5
Catalyst	Syngenta	51.1	37.6	11.3	52.5	36.5	11.1	39.2	41.2	19.6	61.7	35.0	3.4
BHN 580	BHN	47.9	40.7	11.4	53.3	35.4	11.4	41.2	42.5	16.4	49.3	44.3	6.5
	Average	51.7	38.1	10.2	54.2	35.4	10.5	41.7	42.2	16.1	59.2	36.9	4.0
	LSD .05	6.6	5.7	3.6									
	CV %	15.5	18.0	42.4									
Variety x Location Interaction		ns	ns	ns									
2 LOCATIONS													
QualiT 23	Syngenta	53.9	35.4	10.7	50.1	38.1	11.9				57.7	32.8	9.5
Shady Lady	Nunhems	45.4	40.4	14.2	42.9	43.5	13.6				48.0	37.3	14.7
L-312	LSL	55.5	37.5	7.0				45.1	42.5	12.4	65.8	32.6	1.7
	Average	51.6	37.8	10.6	46.5	40.8	12.7	45.1	42.5	12.4	57.1	34.2	8.6
	LSD .05	10.3	5.4	6.7									
	CV %	18.3	13.2	57.9									
Variety x Location Interaction		ns	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

* 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 M = 2 9/32 to 2 17/32 inches diameter
L = 2 17/32 to 2 7/8 " S = 2 1/8 to 2 9/32 "

Table 2

YIELD & MATURITY* of Fresh Market Tomatoes - OBSERVED Varieties
Combined Results of Three Fresh Market Tomato Trials - 2004
Sorted by Market Yield

Variety	Company	Combined Results			Fresno 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
3 LOCATIONS													
RFT 500312	Syngenta	37.5	46.7	13.7	40.5	47.3	14.2	38.1	47.1	14.9	34.0	45.8	12.0
BHN 654	BHN	36.4	46.2	12.0	36.9	44.4	15.1	37.2	50.5	7.8	35.2	43.7	13.1
RFT 500311	Syngenta	35.5	43.4	8.3	33.4	38.6	9.8	33.0	46.1	7.1	40.1	45.5	8.1
RFT 500305	Syngenta	34.0	42.0	9.0	37.6	41.8	6.0	38.5	53.5	9.6	26.0	30.7	11.3
BHN 682	BHN	33.8	44.6	7.4	36.6	41.6	10.6	33.7	55.6	6.2	31.0	36.5	5.5
L-310	LSL	28.6	43.6	16.3	34.3	42.8	33.4	27.0	49.8	7.6	24.4	38.2	7.9
L-311	LSL	28.3	39.8	12.6	29.9	39.6	12.1	27.0	41.5	0.0	28.0	38.4	25.6
BHN 681	BHN	26.5	39.2	16.1	31.8	41.7	13.8	21.6	42.2	11.4	26.1	33.6	23.2
	Average	32.6	43.2	11.9	35.1	42.2	14.4	32.0	48.3	8.1	30.6	39.1	13.3
	LSD .05	6.5	ns	ns									
	CV %	11.4	10.5	60.5									
2 LOCATIONS													
AT 37	Am Takii	34.2	44.3	20.6	33.1	40.3	25.7				35.2	48.3	15.5
SRT 6762	Nunhems	29.9	39.7	16.7	41.2	48.0	25.5				18.5	31.4	7.9
SRT 6765	Nunhems	24.4	33.7	10.5	32.2	42.3	7.0				16.6	25.1	13.9
SRT 6764	Nunhems	22.8	32.0	25.1	29.3	37.4	29.7				16.3	26.5	20.5
SRT 6763	Nunhems	22.7	32.3	15.6	23.3	35.8	18.0				22.0	28.8	13.1
	Average	26.8	36.4	17.7	31.8	40.8	21.2				21.7	32.0	14.2

* 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.

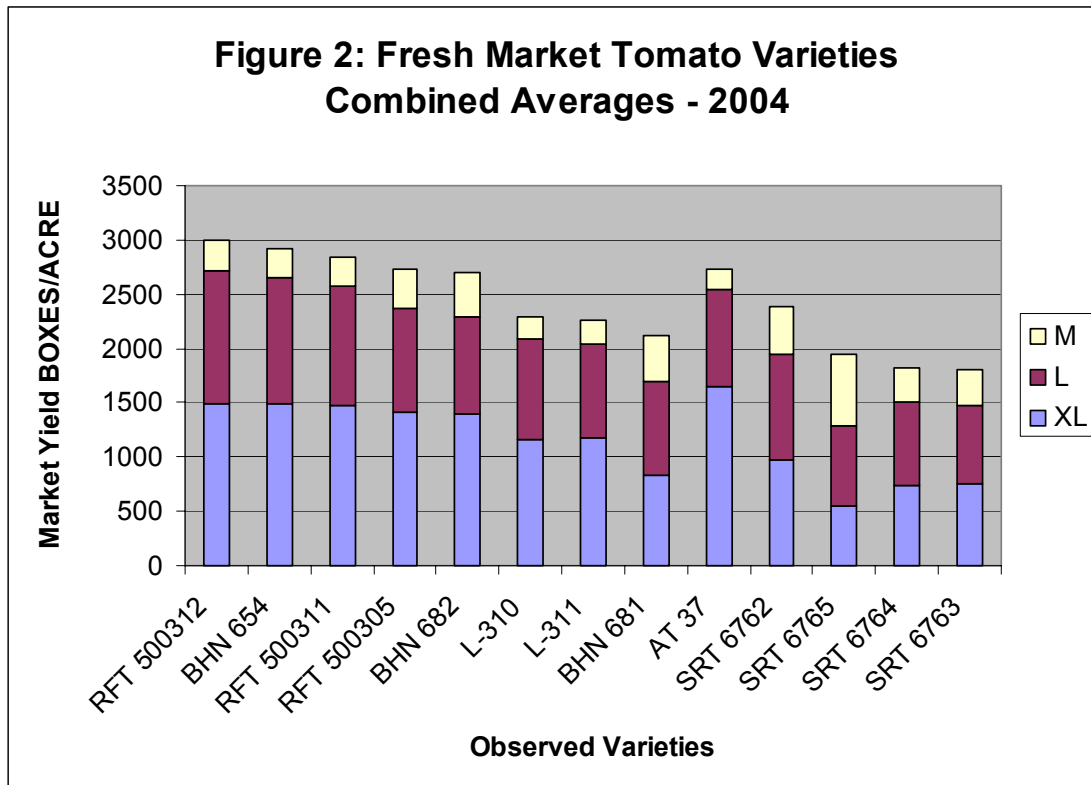


Table 3

ROMA Variety Trial - San Joaquin County - 2004
Summary of Results

Replicated Varieties	Market Yield/Acre		% Market Yield				Nonmarket Yield Tons/Acre		Total Yield	
	Tons	Boxes	X-L	Large	Med	Small	Immature	Culls	T/A	% Reds
Miroma	22.6	1808	5.3	22.6	47.4	24.7	3.3	2.5	28.4	9.9
RFT 8109	22.2	1776	12.2	22.5	46.8	18.5	2.9	2.4	27.5	17.6
BHN 523	18.3	1466	1.3	11.6	65.5	21.6	3.1	2.6	24.0	23.1
Monica	18.0	1436	1.9	11.8	56.6	29.7	3.8	2.4	24.2	12.5
SD 257	17.3	1386	0.6	18.6	57.1	23.7	3.3	1.7	22.3	11.1
Mariana	16.8	1346	7.8	17.8	49.0	25.4	2.7	1.6	21.1	8.2
average	19.2	1536.3	4.9	17.4	53.7	23.9	3.2	2.2	24.6	13.7
LSD .05	3.8	304								
% CV	13.1%	13.1%								
Observation Varieties										
HA 3824	20.3	1624	2.5	5.8	77.1	14.6	1.7	2.3	24.3	40.5
HA 3811	19.6	1568	0.0	12.1	64.8	23.1	2.8	1.3	23.7	26.3
C 9008	14.5	1160	2.1	9.1	72.2	16.6	2.5	1.3	18.3	35.9
HA 3513	12.8	1024	0.0	0.0	55.1	44.9	4.7	0.7	18.2	8.7
SD 256	12.6	1008	0.0	11.3	70.0	18.7	2.1	0.4	15.1	21.7
HA 3512	11.0	880	0.0	0.0	50.6	49.4	4.1	0.8	15.9	4.4
Averages	5.2	409	0.8	6.4	64.9	27.9	3.0	1.1	19.3	22.9

Roma Sizing Criteria:

Extra Large - >165 grams

Large = 130 to 165 grams

Medium = 90 to 120 grams

Small = 50 to 90 grams

Table 4

TOMATO FRUIT & VINE CHARACTERISTICS
2004 Replicated Varieties
South San Joaquin Valley - UC WSREC, Fresno County

Code	Variety	Fruit shape	Shoulder smooth	Blossom end	Vine size	Vine cover	Overall	Comments
3	SVR 2935	FG-G	F-Sm	1-2	ML-L	VG	G	Uniform, big yield
1	BHN 580	FG-G	F-Sm	2	ML	G	G	Smooth, uniform
6	QualiT 23	G-DG	F-Sm	3-4	ML-L	F	F-G	Variable
5	QualiT 21	G	F-Sm	1-2	L	VG	F-G	Good green color
8	Catalyst	G	F-Sm	1-3	ML	F	F-G	Some zippers
7	Bobcat	G	F-Sm	1-3	M-ML	G	F-G	Many small fruit
2	L-311	FG-G	F	1	S-M	P	F	Rough shape, not uniform, pointed ends, low yield
4	Shady Lady	FG-G	F	2-5	ML	F	F-G	Variable

- | | | | | |
|--------------------------|----------------------------------|-----------------|------------------------------|-------------------------------|
| 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 |

Statewide Tomato Variety Trials POSTHARVEST EVALUATIONS for 2004

Marita Cantwell, Postharvest Specialist, Dept. Plant Sciences, UC Davis
Xunli Nie, Research Associate, Mann Laboratory, Dept. Plant Sciences, UC Davis
Eduardo Gutierrez, Student assistant, Mann Lab, Dept. Plant Sciences, UC Davis
Ana Maria Ibañez, Research assistant, Mann Lab, Dept. Plant Sciences, UC Davis

Objective of Research

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

Executive Summary

In 2004, we evaluated 7 and 8 **round** fresh market tomato varieties from the replicated trials in Fresno and San Joaquin Counties, respectively, for color, firmness and composition at the table-ripe stage.

Fruit were harvested as mature-greens (MG) and vine-ripes (VR, 30-40% color). We also evaluated an additional 13 varieties (harvested MG) from the observational trial in Fresno County.

Roma fresh market tomato varieties were harvested from both the Fresno (4 varieties) and San Joaquin County (6 varieties) trials at the MG and VR stages.

The quality measurements carried out on fruit at the table-ripe stage are described in **Tables 1-3**.

Results for **round** tomato varieties are presented in **Tables 4-6**. The 2004 round variety fruit generally had lower soluble solids (4.2% average for all varieties and both trials) than 2003 fruit (4.9% average), whereas % titratable acidity values were in the usual range of 0.3-0.4%. VR harvested fruit generally have the same % soluble solids but higher % titratable acidity than MG harvested fruit.

Fruit in 2004 were firmer on average than fruit evaluated in 2003. Shady Lady was consistently low in firmness but had good color development, whereas L-311 or L-312 fruit were consistently firmer but had poorer red color development.

Roma tomato variety results are summarized in **Tables 7-9**. The soluble solids averaged slightly less than 4.2% for 2004 Roma fruit, whereas the average for fruit evaluated in 2003 was 5.4%. The % titratable acidity was also lower in 2004 than 2003 for the Roma varieties. Red color and firmness were generally good for all varieties evaluated, although VR harvested fruit were not as firm as the ripened MG fruit.

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

Trial Locations

County farm advisors conduct these variety trials in a uniform fashion so that local results can be compared with other locations. Three round variety trials and two roma variety trials were grown and harvested in 2004. Postharvest evaluations were conducted on fruit from the round and roma trials in Fresno and San Joaquin Counties.

Fresno County: April 16 – July 15 (90 days) at the UC WSREC in Five Points, round and roma variety trials (*Michelle Le Strange*).

San Joaquin County: June 9 – Sept 1 (82 days) with Triple “E” Produce southeast of Stockton, round and roma variety trials (*Bob Mullen and Jan Mickler*).

Experimental Procedures

Fruit Sampling: We harvested mature-green (MG) fruit from the 2 variety trials for 7 replicated varieties. For both 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 **table-ripe stage** (color stage 6 on USDA scale +/- 1-2 days).

Quality Measurements: The minimum quality evaluation of different tomato varieties should include data on firmness, color and composition at the table-ripe stage. **Table 1** describes the measurements useful to assess the postharvest potential of different fresh market tomato varieties. Flavor can be estimated measuring soluble solids (sugars) and acid contents. 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 are described in **Table 2** and **Table 3**.

Attribute	Measurement	Additional Information
1. Color	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.
2. Texture	Compression test: the force to compress the 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. 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	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 Tomato Variety Trials' Results

Fresno County Summary – Tables 4 & 5

Replicated Trial - Seven cultivars from the replicated trial were evaluated from both MG and VR harvested fruit (Table 4). Final red color was very good in the fruit ripened from MG stage except for variety L-311. In general, the VR-harvested fruit were evaluated with slightly less red color development (hue values 2-4 units above the threshold value of 40) than desired. This small difference in color development corresponded to firmness values being higher than if the fruit were evaluated at the desired hue value of 40. The VR harvested fruit had lower firmness than MG ripened fruit even when evaluated with less red color development. Shady Lady was the least firm of the 7 varieties. Although L-311 did not develop the same degree of redness as the other varieties, firmness values were in the same range as the other six cultivars. Soluble solids % varied little among varieties and were generally low (average = 4.2%). The % titratable acidity varied from 0.21 to 0.30% for the MG-harvested fruit and from 0.27 to 0.41% for the VR-harvested fruit.

Observed Trial - MG fruit were harvested from the observational trial (Table 5). At the table-ripe stage, all had good red color development, with the exception of L-310 (had the highest hue values indicating that the fruit were the least red among the 13 varieties in the observational trial). The L-310 variety was also the most firm. Three varieties had firmness values below 15 N, indicating soft fruit (see Table 3). The average % soluble solids was low (4.2%), but values ranged from 4.1 (cvs AT37, SRT6764) to almost 4.4% (L-310). The % titratable acidity averaged 0.30% and ranged from 0.22% (L-310) to 0.33% (AT37, SRT6762).

San Joaquin County Summary - Table 6

Replicated Trial - In the San Joaquin trial, 8 cultivars were harvested at MG stage and 7 were harvested at the VR stage (Table 6). Final red color was good in all varieties except L-312 (higher hue values indicate less red color). All MG harvested fruit were very firm at the table-ripe stage and the L-312 fruit were extremely firm. Fruits of Shady Lady were the least firm. For the VR-harvested fruit, fruit were evaluated again at a slight higher color value (41-42) than the desired hue value of 40. The VR fruit also had good firmness at the table-ripe stage. Again Shady Lady was the least firm. The % soluble solids were generally low and averaged 4.2%

for both the MG- and VR-harvested fruit. The % titratable acidity averaged slightly higher (0.38%) for the VR-harvested fruit MG-harvested (0.34% on average). Although there were significant differences in % soluble solids and % titratable acidity among the varieties, the differences were small.

ROMA Tomato Variety Trials' Results

Fresno County Trial – Table 7

Four Roma varieties were harvested at the MG and VR stage in the Fresno County Trial and results are summarized in Table 7. The MG fruit all developed good color (hue <40), and had good firmness at the table-ripe stage. The cv Miroma was the least firm of the varieties. The % soluble solids were generally low, but BHN 523 had the lowest average % soluble solids (4.06%) and the highest average % titratable acidity (0.35%). PX2626 had the highest average % soluble solids (4.18%) with an average %T.A. of 0.30%. As with round tomatoes, VR harvested fruit had lower firmness than MG ripened fruit even when evaluated with less red color development. Also as with round tomatoes, the VR-harvested fruit averaged high % titratable acidity than the MG fruit although there were not differences in average % soluble solids.

San Joaquin County Trial – Tables 8 & 9

Six cultivars of Roma tomatoes were harvested at the MG and VR stages (Table 8) in the replicated Roma trial. Final red color (hue color value) was similar among varieties and between the MG and VR harvested fruit. VR-harvested fruit from all 6 cultivars were less firm than the corresponding fruit harvested at MG stage and ripened. % soluble solids were similar among varieties and average values for MG fruit were the same as VR-harvested fruit. The % titratable acidity averaged higher (0.41%) in VR fruit than MG fruit (0.37%). The % soluble solids and % titratable acidity were higher in this trial than in the Fresno County Roma trial. One cultivar (Monica) was harvested at MG stage as well as three VR stages (2 or breaker, 3 or turning, and 4-5 or pink-orange (Table 9). The MG-harvested and ripened fruit were notable firmer than the VR-harvested fruit. The % titratable acidity was higher in the VR than the MG-harvested fruit. The % soluble solids were similar except for the low value for stage 2 fruit

ROUND Tomato Variety Results in Tables

Table 4. Quality characteristics of fresh market **round** tomatoes harvested **MG** and **VR** from the 2004 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.

Variety	Company	Maturity at Harvest	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titrateable acidity, %
BHN 580	BHN	MG	39.4	18.9	4.27	4.20	0.29
Bobcat	Syngenta	MG	38.9	20.2	4.17	4.13	0.30
L-311	LSL PI Sci.	MG	44.9	22.0	4.19	4.17	0.28
QualiT 21	Syngenta	MG	41.2	23.1	4.20	4.33	0.28
QualiT 23	Syngenta	MG	38.6	20.5	4.14	4.37	0.30
Shady Lady	Sunseeds	MG	38.0	16.2	4.16	4.03	0.30
SVR 2935	Seminis	MG	41.1	24.9	4.33	4.10	0.21
BHN 580	BHN	VR	44.0	19.0	4.16	4.63	0.41
Bobcat	Syngenta	VR	44.2	19.8	4.17	3.93	0.30
L-311	LSL PI Sci.	VR	46.1	19.2	4.18	3.80	0.27
QualiT 21	Syngenta	VR	44.4	17.9	4.15	4.20	0.32
QualiT 23	Syngenta	VR	43.6	18.1	4.12	4.33	0.35
Shady Lady	Sunseeds	VR	42.9	17.0	4.13	4.20	0.35
SVR 2935	Seminis	VR	44.0	20.6	4.22	4.10	0.34
	LSD.05		0.8	1.4	0.05	0.24	0.03
	Average	MG	40.3	20.8	4.21	4.19	0.28
	Average	VR	44.2	18.8	4.16	4.17	0.33

Color and firmness data are from 3 replicates of 15 fruits; composition data are from 3 replicates of composite samples of 15 fruit. Data were analyzed as 2-way ANOVA. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

Table 5. Quality characteristics of fresh market **round** tomatoes harvested **MG** from the 2004 Fresno County observational trial and ripened at 20°C (68°F). Fruit were evaluated at the table-ripe stage. See Tables 1-3 for explanation of measurements. Varieties are listed alphabetically.

Variety	Company	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titrateable acidity, %
AT 37	American Taki	39.7	14.6	4.13	4.43	0.33
BHN 654	BHN	40.2	18.5	4.26	4.47	0.30
BHN 681	BHN	39.3	17.7	4.16	4.50	0.32
BHN 682	BHN	39.9	14.1	4.24	4.30	0.27
L-312	LSL PI Sci.	41.2	20.6	4.22	4.53	0.28
L-310	LSL PI Sci.	46.3	25.4	4.39	4.43	0.22
RFT 500305	Syngenta	37.4	16.7	4.18	4.33	0.31
RFT 500311	Syngenta	38.0	18.6	4.21	4.00	0.27
RFT 500312	Syngenta	38.7	16.3	4.15	3.93	0.29
SRT 6762	Sunseeds	39.9	14.3	4.16	4.27	0.33
SRT 6763	Sunseeds	38.3	16.9	4.20	4.43	0.33
SRT 6764	Sunseeds	40.1	17.8	4.13	4.60	0.30
SRT 6765	Sunseeds	41.3	15.6	4.21	4.37	0.31
	LSD.05	0.8	1.2	0.07	0.24	0.04
	Average	40.0	17.4	4.21	4.36	0.30

Color and firmness data are from 3 replicates of 15 fruits; composition data are from 3 replicates of composite samples of 15 fruit. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

Table 6. Quality characteristics of fresh market **round** tomatoes harvested **MG** and **VR** from the 2004 San Joaquin County replicated trial and ripened at 20°C (68°F) and evaluated at the table-ripe stage. See Tables 1-3 for explanation of measurements. Varieties are listed alphabetically.

Variety	Company	Maturity at Harvest	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titrateable acidity, %
BHN 580	BHN	MG	41.6	25.6	4.30	5.43	0.36
Bobcat	Syngenta	MG	40.8	24.0	4.24	4.50	0.32
Catalyst		MG	40.9	26.0	4.21	4.70	0.38
L-312	LSL PI Sci.	MG	47.7	35.4	4.25	4.97	0.31
QualiT 21	Syngenta	MG	40.8	24.3	4.26	5.23	0.33
QualiT 23	Syngenta	MG	41.0	24.0	4.19	4.53	0.34
Shady Lady	Sunseeds	MG	40.4	22.0	4.25	5.03	0.35
SVR2935	Seminis	MG	40.0	26.0	4.32	5.17	0.32
	LSD.05		0.9	2.2	0.05	0.40	0.03
BHN 580	BHN	VR	42.3	25.2	4.28	4.97	0.36
Bobcat	Syngenta	VR	42.7	22.5	--	--	--
Catalyst		VR	42.7	23.7	4.22	4.43	0.35
L-312	LSL PI Sci.	VR	45.6	27.0	4.19	4.57	0.43
QualiT 23	Syngenta	VR	43.6	21.4	4.17	4.73	0.41
Shady Lady	Sunseeds	VR	42.3	19.7	4.25	4.70	0.38
SVR2935	Seminis	VR	41.4	24.1	4.25	5.27	0.36
	LSD.05		1.2	2.9	0.06	0.66	0.05
	Average	MG	41.6	25.9	4.25	4.94	0.34
	Average	VR	42.9	23.4	4.23	4.78	0.38

For MG fruit color and firmness data are from 3 replicates of 13 fruits; composition data are from 3 replicates of composite samples of 13 fruit. For VR fruit, fruit number varied from 13 to 20; composition data from 3 replicates comprised of 4-7 fruit. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

Roma Tomato Variety Results

Table 7. Quality characteristics of fresh market **Roma** tomatoes harvested **MG** and **VR** from the 2004 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.

Variety	Company	Maturity at harvest	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titrateable acidity, %
BHN 523	BHN	MG	38.2	23.4	4.09	4.23	0.32
Miroma	Syngenta	MG	38.9	21.4	4.14	4.30	0.28
PX 2626	Seminis	MG	38.7	25.0	4.19	4.53	0.29
SD 257	LSL PI Sci	MG	37.2	22.4	4.12	4.27	0.31
BHN 523	BHN	VR	42.9	19.3	4.03	4.17	0.38
Miroma	Syngenta	VR	44.5	17.7	4.18	4.17	0.29
PX 2626	Seminis	VR	42.6	21.2	4.17	4.43	0.31
SD 257	LSL PI Sci	VR	42.6	20.1	4.10	4.23	0.36
	LSD.05		0.5	1.3	0.09	0.19	0.02
	Average	MG	38.3	23.0	4.13	4.33	0.30
	Average	VR	43.1	19.6	4.12	4.25	0.34

Color and firmness data are from 3 replicates of 15 fruits; composition data are from 3 replicates of composite samples of 15 fruit. Data were analyzed as 2-way ANOVA. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

Table 8. Quality characteristics of fresh market **Roma** tomatoes harvested **MG** and **VR** from the 2004 San

Joaquin County replicated trial and ripened at 20°C (68°F). Fruit were evaluated at the table-ripe stage as determined visually. See Tables 1-3 for explanation of measurements. Varieties are listed alphabetically.

Variety	Company	Maturity at harvest	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titrateable acidity, %
BHN 523	(BHN)	MG	39.1	29.7	4.17	5.37	0.38
Mariana	(Sakata)	MG	40.5	29.0	4.24	5.20	0.35
Miroma	(Syngenta)	MG	40.1	24.4	4.23	5.57	0.37
Monica	(Sakata)	MG	38.8	27.8	4.21	5.50	0.38
RFT 8109	(Syngenta)	MG	39.3	25.3	4.20	5.37	0.36
SD 257	(LSL PI Sci.)	MG	38.4	29.8	4.24	5.13	0.36
LSD.05			0.8	2.3	ns	ns	ns
BHN 523	(BHN)	VR	41.1	23.9	4.10	5.60	0.45
Mariana	(Sakata)	VR	40.3	23.3	4.25	5.47	0.41
Miroma	(Syngenta)	VR	40.7	20.9	4.21	5.43	0.43
Monica	(Sakata)	VR	39.3	18.7	4.26	5.67	0.42
RFT 8109	(Syngenta)	VR	41.1	19.7	4.20	5.40	0.38
SD 257	(LSL PI Sci.)	VR	40.6	22.3	4.29	5.50	0.38
	LSD.05		ns	2.4	0.07	ns	0.03
	Average	MG	39.4	27.7	4.22	5.36	0.37
	Average	VR	40.5	21.5	4.22	5.51	0.41

For MG fruit, color and firmness data are from 3 replicates of 10-13 fruits; composition data are from 3 replicates of composite samples of 10-13 fruit. For VR fruit, fruit number varied from 20-40; composition data from 3 replicates comprised of 7-13 fruit. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

Table 9. Quality characteristics of fresh market **Roma** tomatoes (cv **Monica**) harvested **MG** and at three stages of **VR** from the 2004 San Joaquin County replicated trial and ripened at 20°C (68°F). Fruit were evaluated at the table-ripe stage as determined visually. See Tables 1-3 for explanation of measurements.

Maturity at harvest	Red Color, Hue	Firmness, Newtons	Soluble solids, %	pH	Titrateable acidity, %	
MG	38.8	27.8	4.21	5.50	0.38	
VR Stage 2 (breaker)	40.7	20.6	4.12	5.63	0.50	
VR Stage 3 (turning)	39.1	19.2	4.24	5.67	0.45	
VR Stage 4-5 (pink-orange)	39.3	18.7	4.26	5.67	0.42	
	LSD.05	ns	2.3	0.08	ns	0.04

Data are average of 40 MG fruit and 20 fruit for each VR stage. Lower hue color values indicate redder fruits, lower firmness values indicate softer fruits.

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.