Tomato and Melon Research Trials

2001 Research Progress Report

Bill Weir, Farm Advisor
Merced & Madera Counties

University of California Cooperative Extension
Merced County Office
2145 Wardrobe Ave.
Merced, CA 95340
(209) 385-7403

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FRESH MARKET TOMATO VARIETY TRIAL

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Bill Weir, Farm Advisor
Scott Stoddard, Research Associate
Merced/Madera Counties

INTRODUCTION

Fresh market tomato trials are conducted by UCCE in Kings/Tulare (Michelle LeStrange), Merced (Bill Weir), and San Joaquin (Bob Mullen) 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 for Kings, Merced, and San Joaquin, respectively).

Two tests are conducted at the same time and location. A replicated test consists of varieties or lines which have previously been in trials and grown commercially. An observed test evaluates the plant breeder's most promising lines for California's commercial growing conditions and markets. This report summarizes both the replicated and observed variety tests conducted in Merced County in 2001.

METHODS

The 2001 Fresh Market Variety Trial was conducted in the tomato growing area west of Le Grand, in Merced County. Seeds were planted in the greenhouse on March 21 and transplants were set in the field at Live Oak Farms, on May 16, 2001, for a mid season variety trial. Specific information about the field and trial is presented in Table 1.

Eleven varieties were replicated four times, and 17 varieties were observed in single plots. Variety names and sources of seeds are listed in Table 2. The trial was irrigated using sub-surface drip and grown using grower's standard cultural practices. All plots were harvested on August 8 and 9, 83 days after transplanting.

Ten consecutive feet of row were harvested from each plot, although plot size was about 45 feet. On the day of harvest, all fruit were sorted for size and quality. Red fruits were weighed separately before they were sorted by size with the mature green fruit. Market yield and grades of the replicated and observed varieties are shown in Tables 3 and 5, while fruit and vine quality characteristics are summarized in Tables 4 and 6.

Marketable yields were adjusted slightly by correcting for the percentage of red fruit. That is, market yield is the weight of mature green M, L, and XL fruit.

Reported yields may appear high compared to commercial averages. This is due to a number of reasons. We picked and graded almost all fruit on the plant (larger than 2 inches), and were not as discriminating as commercial harvesters. Additionally, converting pounds per plot to tons per acre tends to exaggerate yield because drive rows, roadways, field edges, and other poor areas in the field are not considered. Nonetheless, the relative differences between varieties are valid and do give a good indication of their potential yield and performance under field conditions.

SUMMARY

Replicated Trial.

Marketable yields for the replicated trial ranged from 2400 boxes/A for Quali T 21 (Syngenta)

to about 1100 boxes/A for UGX 895 (United Genetics). These averages are significantly different at the 95% confidence level. See Figure 1 for a yield breakdown by size.

Both Quali T 21 and PS150440 (Seminis) had more than 50% XL fruit. Small fruit and culls were not significantly different among varieties. At harvest, Shady Lady and SXT 6624 had the highest red percentage, suggesting slightly quicker maturity for these two as compared to the other varieties.

Observation Trial

Marketable yields for the observation trial were generally not as good as in the replicated trial. (Table 5). Yields ranged from about 2000 boxes/A for SRT 6722 (Sunseeds) to 980 boxes/A for AT10 (American Takii). Most fruit and vine characteristics were good, with tight blossom ends, adequate leaf cover, and only slight sunburn. Some Curly Top and/or TMV problems were noted.

REGIONAL TRIAL RESULTS

Yield results for the replicated varieties in all three counties where this trial was conducted are shown in Tables 7 & 8. Note that many of the varieties that did well in Merced (Quali T 21 & 23, PS150440, Bobcat) also did well in at least one of the other locations.

POSTHARVEST EVALUATION

Postharvest samples were taken from all three trials and evaluated for color, firmness, and composition at mature green and table-ripe stages. A complete summary follows.

ACKNOWLEDGEMENTS

We would like to acknowledge our appreciation to Steve Brewer, with LaBar's Greenhouse in Gustine, CA, for raising the transplants for this test; Mr. Bob Giampaoli, of Live Oak Farms in LeGrand for his help with planting and field maintenance, individual seed companies; and the California Tomato Commission for financial support.

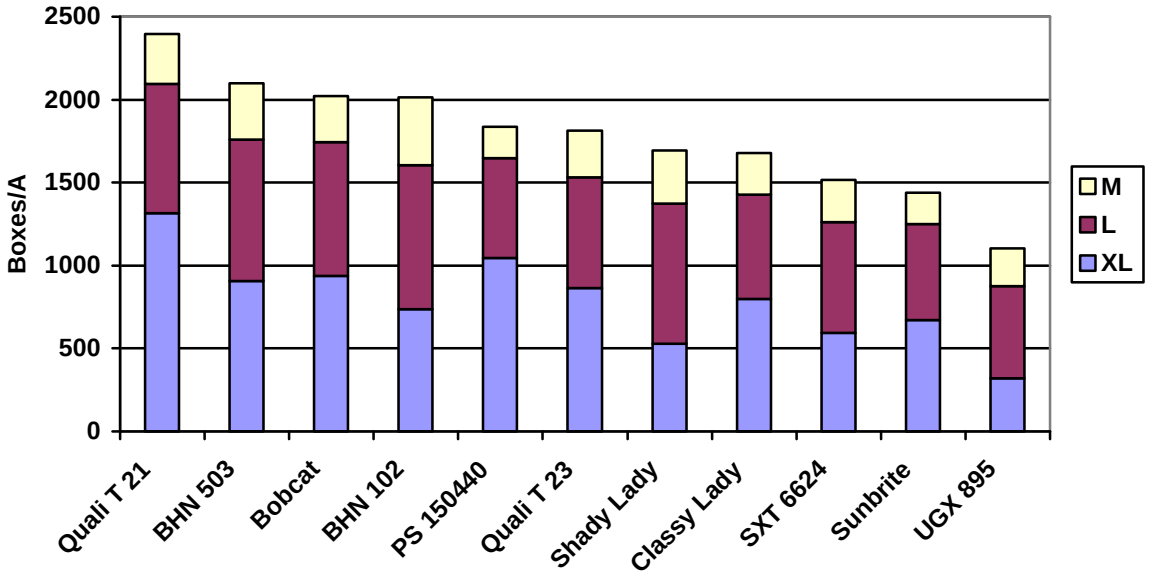

Figure 1. Merced County 2001 fresh market tomato variety trial marketable yields.

Table 1. Trial background information and protocol.

Cooperator: Bob Giampaoli
Location: Live Oak Farms near LeGrand, CA. About 1 mile east of Athlone Rd, ½ mile south of LeGrand Rd.
Soil Type: Honcut silt loam
Previous Crop: Tomatoes
Experimental design (replicated): Randomized complete block with four replications.

PLOT DESCRIPTION AND SIZE:

One row plots, 30 plants per plot; about 45 ft long. 60" beds. 16" spacing. Drip irrigated, drip tube in third year.

PROTOCOL:

Seeding date: 3/21/2001
Transplant date and method: May 16, 2001 with a commercial 3-row transplanter.
Fertility (lb/A NPK preplant and fertigated): P and K PPI, nitrogen through the drip tube.
Insect control: Monitor 4 (Methamidophos) applied for aphid and stinkbug control, Avaunt for armyworm control
Irrigation: subsurface drip irrigation
Weed control: hand hoe and mechanical cultivation.
Harvest date(s) and method(s): destructive hand harvest, one pick, 10 ft of plot, beginning August 8, 2001 (83 days after transplanting).

Table 2. 2001 mid season varieties and companies.

Company	*Replicated Trial (4 reps)*	*Observed Trial (1 rep)*
American Takii		21. AT 10 22. AT48 23. AT71 24. AT89
BHN Seed	1. BHN 102 2. BHN 503	25. BHN 454 26. BHN 500 27. BHN 524
LSL Plant Science		28. B-807
Seminis/Asgrow/Petoseed	3. PS150440 4. Sunbrite	29. PX 151123 30. XP 12298
Syngenta/Rogers/Novartis	5. Quali T 21 6. Quali T 23 7. Bobcat (old # RFT 7041)	31. RFT 8054
Sunseeds	8. Shady Lady 9. SXT 6624 10. Classy Lady	32. SRT 6718 33. SRT 6719 34. SRT 6721 35. SRT 6722 36. SRT 6724
United Genetics	11. UGX 895	37. Fair Lady

Table 3. Fresh market tomato variety trial yield and grade results, 2001.
Replicated varieties, Merced County.

			Market Yield					XL	L	M	S	Culls	total	Red
Var #	Variety	Company	Tons/A	Boxes/A				% of marketable yield			tons/A	tons/A	tons/A	%
5	Quali T 21	Syngenta	29.95	2396	a			54.9	32.6	12.5	1.3	11.8	44.5	4.3
2	BHN 503	BHN Seed	26.21	2097	a	b		43.3	40.7	16.0	2.0	13.1	43.6	8.4
7	Bobcat	Syngenta	25.29	2023	a	b		46.4	39.8	13.8	1.4	11.1	39.1	4.9
1	BHN 102	BHN Seed	25.13	2010		b	c	36.7	43.1	20.3	2.3	11.3	40.6	7.5
3	PS150440	Seminis	22.96	1837		b	c	56.9	32.7	10.3	1.2	12.6	38.6	7.4
6	Quali T 23	Syngenta	22.70	1816		b	c	47.6	36.8	15.6	1.2	13.8	38.9	5.1
8	Shady Lady	Sunseeds	21.18	1694		b	c	31.2	49.8	19.0	1.6	14.5	40.2	12.5
10	Classy Lady	Sunseeds	20.96	1677			c d	47.6	37.5	14.9	1.7	12.4	37.0	7.9
9	SXT 6624	Sunseeds	18.96	1517			c d	39.1	44.0	16.9	2.5	13.2	37.4	13.1
4	Sunbright	Seminis	17.99	1439			c d	46.7	40.2	13.1	1.1	18.2	39.9	8.1
11	UGX 895	United Genetics	13.81	1105			d	29.1	50.0	20.8	1.1	14.4	30.7	9.2
	Average		22.29	1783				43.6	40.7	15.7	1.58	13.31	39.1	8.04
	LSD 0.05		5.83	466				7.8	6.8	5.2	NS	NS	NS	5.3
	CV %			18.1				12.5	11.5	23	53.1	24.1	14.7	45.3

Market yield = XL + L + M size mature-green 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, tons per acre: Any fruit so disfigured (due to rot, cat facing, insect damage, etc.) as to be unmarketable.

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

LSD 0.05 = least significant difference at the 95% probablility level.
Yields followed by the same letter are not significantly different.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.

Table 4. Fresh market tomato fruit and vine characteristics. Merced County, 2001.
REPLICATED varieities.

Var #	Variety	Vine Size	Leaf cover	Leaf roll	Fruit shape	Rough-ness	Blossom end	Cat-facing	Growth Cracks	Sun-burn	Zippers	Stem	Disease	Comments
1	BHN 102	VL	OK/G	N	G	S/M	M	N	N	SL	N	J	N	
2	BHN 503	L	OK	S	G	M	SL	S	N	S	SL	J	N	leaf curl, good shape
3	PS150440	L	G	N	FG	M	M	N	N	SL	N	J	N	lg blossom end
4	Sunbright	ML	OK	SL	FG	M	M	S	SL	S	SL	J	N	early
5	Quali T 21	VL	OK	SL	G	S	SL	N	SL	S	SL	SJ	Y	fleck, uneven ripen, nice shape
6	Quali T 23	M	OK/G	S	G/DG	M/MR	SL	SL	S	SL	N	J	N	growth cracks
7	Bobcat	L	OK	S	G	MR	SL	S	N	SL	N	J	N	nice shape, size
8	Shady Lady	L	OK	S	G	R	M	SL	SL	S	N	J	curly top	deep shoulders, uneven ripening
9	SXT 6624	M	OK	S	G/DG	S	SL	N	S	S	S	SJ	N	early, some fleck
10	Classy Lady	ML	OK/P	SL	FG/G	M	SL	SL	S	SL	S	J	curly top	fleck, zippers, growth cracks
11	UGX 895	L	G	SL	G/DG	M	SL	S	SL	N	N	J	Y	rough shoulders

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	
Growth Cracks:	N = none	SL = slight	S = some	
Sunburn:	N = none	SL = slight	S = some	
Zippers:	N = none	SL = slight	S = some	
Stem:	J = joint	NJ = no joint	SJ = semi joint	
Disease:	N = none	Y = some symptoms seen		

Table 5. Fresh market tomato variety trial yield and grade results, 2001.
Observational varieties, Merced County.

Var #	Variety	Company	Market Yield Tons/A	Market Yield Boxes/A	XL % of marketable yield	L % of marketable yield	M % of marketable yield	S tons/A	Culls tons/A	total tons/A	Red %
35	SRT 6722	Sunseeds	25.24	2020	31.3	48.8	19.9	2.3	10.1	39.3	6.1
25	BHN 454	BHN Seed	25.10	2008	30.1	46.8	23.1	4.4	11.1	42.8	7.9
31	RFT 8054	Syngenta	24.84	1987	42.2	44.0	13.9	3.0	12.2	41.4	5.4
32	SRT 6718	Sunseeds	24.60	1968	53.7	36.9	9.4	0.5	6.4	32.6	3.9
36	SRT 6724	Sunseeds	22.65	1812	30.4	48.9	20.6	1.8	11.0	37.6	8.8
23	AT 71	Am. Taki	22.14	1771	37.2	48.4	14.4	1.6	14.6	42.4	15.5
22	AT 48	Am. Taki	20.79	1663	36.4	44.9	18.7	1.4	6.9	31.7	10.8
24	AT 89	Am. Taki	20.13	1611	41.8	38.9	19.3	1.2	14.5	38.5	11.7
34	SRT 6721	Sunseeds	19.57	1566	47.1	39.2	13.6	2.1	14.5	37.9	7.9
37	Fair Lady	Untd.Genetics	18.94	1515	36.5	50.5	12.9	2.1	15.9	38.3	7.1
30	XP 12298	Seminis	18.83	1506	43.8	40.4	15.9	0.1	15.5	36.7	11.0
28	B 807	LSL Plant Sci	17.59	1407	59.7	35.0	5.3	0.5	17.9	37.4	7.6
29	PX 51123	Seminis	16.74	1339	41.6	38.3	20.1	1.8	9.4	30.0	11.0
33	SRT 6719	Sunseeds	16.08	1287	28.0	49.0	22.9	2.0	15.2	34.4	6.4
26	BHN 500	BHN Seed	14.64	1171	71.1	21.6	7.3	0.7	22.3	38.8	7.4
27	BHN 524	BHN Seed	14.02	1122	51.4	29.3	19.2	1.7	11.7	28.5	7.0
21	AT 10	Am. Taki	12.26	981	25.6	51.7	22.7	1.2	6.8	20.3	0.0
	Average		19.66	1572.52	41.65	41.92	16.43	1.66	12.71	35.79	7.98

Market yield = XL + L + M size mature-green 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, tons per acre: 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"

Table 6. Fresh market tomato fruit and vine characteristics. Merced County, 2001.
OBSERVATIONAL varieities.

Var #	Variety	Vine Size	Leaf cover	Leaf roll	Fruit shape	Rough-ness	Blossom end	Cat-facing	Growth Cracks	Sun-burn	Zippers	Stem	Disease	Comments
21	AT 10	ML	G	N	G/FG	MR	SL	SL	N	N	SL	J	Curly top	very upright, not attractive fruit
22	AT 48	L	OK	SL	FG	S	T	N	N	SL	SL	J	N	striping on fruit
23	AT 71	L	G	S	G	M	M	SL	N	N	SL	J	N	fruit stiping
24	AT 89	L	OK	S	G/FG	R	T	S	N	SL	S	J	N	sm fruit, lots worm damage
25	BHN 454	VL	OK	N	FG	S/M	T	N	N	S	N	J	N	spotty vine cover
26	BHN 500	ML	G	N	G/FG	M	M	SL	SL	N	N	J	N	
27	BHN 524	M	P	S	DG/G	S	T	N	SL	SL	S	NJ	Y	leaves drooping.
28	B 807	L	OK	SL	FG	MR	T	S	S	S	SL	J	N	
29	PX 51123	L	G	N	G	M	SL	N	N	N	N	J	N	
30	XP 12298	ML	OK	SL	G/FG	M	T	SL	N	S	N	J	N	
31	RFT 8054	VL	G	N	DG	M	T	SL	SL	N	SL	NJ	Curly top	
32	SRT 6718	L	G	SL	DG/G	M	SL	N	N	N	N	J	N	good size on fruit
33	SRT 6719	L	G	N	G/FG	M	SL	SL	N	N	SL	J	N	
34	SRT 6721	ML	P	S	G/FG	M	SL	S	N	S	SL	J	N	plants collapsing
35	SRT 6722	VL	G	N	G	S	SL	SL	N	N	SL	SJ	N	
36	SRT 6724	VL	G	N	G	MR	T	N	N	N	N	NJ	N	low fruit count
37	Fair Lady	VL	OK	S	FG	M	SL	SL	N	S	N	SJ	N	

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	
Growth Cracks:	N = none	SL = slight	S = some	
Sunburn:	N = none	SL = slight	S = some	
Zippers:	N = none	SL = slight	S = some	
Stem:	J = joint	NJ = no joint	SJ = semi joint	
Disease:	N = none	Y = some symptoms seen		

Table 7. Yield & Maturity of Fresh Market Tomato Varieties - Replicated Varieties
Summary of Three Fresh Market Tomato Trials - 2001

		COMBINED RESULTS			KINGS COUNTY (early season)			MERCED COUNTY (midseason)			SAN JOAQUIN CNTY (late season)		
		Yield T/A		%	Yield T/A		%	Yield T/A		%	Yield T/A		%
Variety	Company	Market	Total	Reds	Market	Total	Reds	Market	Total	Reds	Market	Total	Reds
QualiT 21	Syngenta	24.1	33.8	9.3	23.5	31.8	12.3	30.0	44.5	4.3	18.8	25.3	11.5
Bobcat	Syngenta	20.6	31.5	8.3	18.5	33.3	16.1	25.3	39.1	4.9	18.0	22.2	3.8
QualiT 23	Syngenta	20.3	31.6	10.2	21.3	29.5	12.7	22.7	38.9	5.1	17.0	26.6	12.8
PS 150440	Seminis	20.2	30.4	17.2	24.4	36.4	17.3	23.0	38.6	7.4	13.1	16.2	27.0
BHN 503	BHN Seed	19.6	31.1	15.8	20.6	29.1	28.4	26.2	43.6	8.4	11.9	20.6	10.6
BHN 102	BHN Seed	19.4	28.7	12.4	20.0	28.9	13.8	25.1	40.6	7.5	13.2	16.5	15.8
Classy Lady	Sunseeds	18.1	28.9	8.4	22.2	32.6	10.2	21.0	37.0	7.9	11.1	17.0	7.1
Sunbrite	Seminis	17.7	30.7	20.4	19.4	29.5	29.3	18.0	39.9	11.7	15.7	22.6	20.3
Shady Lady	Sunseeds	17.7	31.7	20.8	18.1	34.1	25.0	21.2	40.2	12.5	13.7	20.9	24.9
SXT 6624	Sunseeds	13.8	25.2	14.7	12.4	20.3	24.8	19.0	37.5	13.1	10.0	17.7	6.2
Average		**19.1**	**30.4**	**13.8**	**20.0**	**30.6**	**19.0**	**23.1**	**40.0**	**8.3**	**14.2**	**20.6**	**14.0**
LSD .05		4.2	5.5	6.5	6.5	8.1	9.3	5.8	8.3	5.3	5.1	5.6	13.6
CV %		20.6	16.8	44.2	21.6	17.7	30.5	18.1	14.7	45.3	24.9	18.9	65.9
Variety x Location - LSD .05		5.8	7.3	9.4									

Market Yield = average weight in pounds of four replications converted to tons and boxes per acre of all marketable extra large, large, and medium sized fruit. Small fruit were considered unmarketable this year.
TOTAL Yield = Marketable yield plus small sized and cull fruit.
Percent Red = % reds by weight of TOTAL yield including culls to indicate maturity relative to all tested varieties.

Variety x location LSD = the least significant difference for different locations of the same variety to be determined significantly different.

Table 8. Size grades for each location and combined across location for the replicated varieties in the 2001 Fresh Market Tomato Variety Trials.

		COMBINED RESULTS			KINGS COUNTY (early season)			MERCED COUNTY (midseason)			SAN JOAQUIN CNTY (late season)		
		% Market Yield			% Market Yield			% Market Yield			% Market Yield		
Variety	**Company**	**X-Large**	**Large**	**Med**	**X-Large**	**Large**	**Med**	**X-Large**	**Large**	**Med**	**X-Large**	**Large**	**Med**
QualiT 21	Syngenta	40.3	37.0	22.7	44.4	43.6	12.0	54.9	32.6	12.5	21.5	34.9	43.6
Bobcat	Syngenta	31.1	41.1	27.8	41.5	39.3	19.3	46.4	39.8	13.8	5.4	44.3	50.3
QualiT 23	Syngenta	27.4	28.0	44.6	34.6	42.4	23.0	47.6	36.8	15.6	0.0	4.8	95.2
PS 150440	Seminis	32.0	38.2	29.8	32.3	40.0	27.7	56.9	32.7	10.3	6.8	41.8	51.4
BHN 503	BHN Seed	32.2	39.7	28.1	43.6	38.0	18.4	43.3	40.7	16.0	9.6	40.4	50.0
BHN 102	BHN Seed	22.2	39.4	38.5	25.6	40.5	33.9	36.7	43.1	20.3	4.2	34.6	61.2
Classy Lady	Sunseeds	28.5	34.1	37.4	37.8	40.7	21.5	47.6	37.5	14.9	0.0	24.1	75.9
Sunbrite	Seminis	31.4	44.4	24.2	37.8	44.3	17.9	46.7	40.2	13.1	9.7	48.7	41.6
Shady Lady	Sunseeds	27.1	40.8	32.1	37.2	38.0	24.8	31.2	49.8	19.0	12.8	34.6	52.6
SXT 6624	Sunseeds	21.5	34.0	44.6	25.4	44.6	30.1	39.1	44.0	16.9	0.0	13.3	86.7
Average		**29.4**	**37.7**	**33.0**	**36.0**	**41.1**	**22.9**	**45.0**	**39.7**	**15.2**	**7.0**	**32.2**	**60.9**
LSD 0.05					9.4	NS	7.5	7.8	6.8	5.2			

San Joaquin County trials were affected by Phytophthora root rot which reduced yields and resulted in smaller than normal fruit.

9 November 2001

Fresh Market Tomato Variety Trials: Postharvest Evaluations for 2001

*Marita Cantwell, Postharvest Specialist, Dept. of Vegetable Crops, UC Dav*is

Cooperators: Michelle LeStrange, Robert Mullen, Bill Weir, and Scott Stoddard, Farm Advisors, Tulare & Kings, San Joaquin, and Merced Counties, respectively, and Research Associate, Merced County

Assistants: Xunli Nie, Jacob Rudnick, and Fernando Olic, Research Associate, Mann Laboratory and Student Assistants, respectively, Dept. Vegetable Crops, UC Davis

Location: UC Davis Mann Lab and Field Trials in cooperating growers fields.

Objectives of Research:
To evaluate the most important quality characteristics of ripened fresh market tomatoes from known varieties and new experimental lines.

Executive Summary
We evaluated 10 round tomato cultivars or varieties from 3 fresh market tomato trials (Kings, Merced and San Joaquin Counties) for color, firmness and composition at the table-ripe stage. Fruit were harvested as mature-greens, but some cultivars were also harvested as vine-ripes (30-50% color). This year we used a different procedure for measuring firmness (the greater the force required to compress the fruit on a computerized texture analyzer, the firmer the tomato). We also evaluated some fruit for "slice integrity" by measuring juice loss after cutting. Quality measurements are described in **Tables 1-3** and **Figure 1**. Data for the individual trials are presented in **Tables 4 -9** and summaries comparing cultivars in the 3 trials are in **Tables 10 -12.**

Summary Merced Co. Trial. Eleven cultivars of round tomatoes were harvested at both the MG and VR stages and ripened to the table-ripe stage (**Table 6**). The MG green stage was slightly less developed than recommended for commercial harvest (some seeds were cut when fruit were sliced). Overall average red color (hue values), soluble solids and acidity at the table-ripe stage were not different, but average firmness values were less in the VR-harvested than the MG-harvested fruit. Nine cultivars picked MG were firmer at the table-ripe stage than Shady Lady. When harvested VR, 3 cultivars were firmer and seven were equal to Shady Lady. Juice loss of tomato slices was higher in one cultivar and less in 9 cultivars compared to Shady Lady. Soluble solids averaged 4.2% with 4 cultivars having higher concentrations (range 4.0-4.6%). Shady Lady had 4.1% soluble solids and 0.30% acidity. Most cultivars were equal in acidity to Shady Lady.

Summary of Three Trials
Differences between varieties often were of the same magnitude as differences for a given variety between trials, regardless of whether they were harvested MG or VR (**Summary Tables 10–11**). With some exceptions, the final red color of MG-harvested fruit varied little among cultivars (range 37.4– 40.0 hue color value). All cultivars achieved adequate red color at the

table-ripe stage. Cultivars did vary significantly in firmness (range 20.9 – 16.6 Newtons), slice integrity (range 1.8 – 3.5% juice loss), soluble solids (range 4.1-4.8%), and acidity (range 0.32 – 0.37% titratable acidity). Overall, VR harvested fruit had slightly better red color, and were slightly less firm, but generally did not vary in composition from fruit harvested MG. Average fruit firmness decreased as the season progressed with the firmest fruit in the Kings Co. Trial and the least firm in the San Joaquin Co. Trial (**Table 12**). Fruit from the Kings Co. Trial had the highest acidity, while fruit from the San Joaquin Trial had the highest sugar (soluble solids) levels. Fruit from the Merced Trial had the lowest acidity and the lowest soluble solids.

Experimental Procedures

Fruit Sampling

We harvested mature-green (MG) fruit from the 3 variety trials for 10 replicated varieties and experimental lines. For some varieties, vine-ripe (VR) fruit were harvested with 30-50% color. Typically 80 MG fruit or more were harvested in buckets, placed in plastic trays for transport to the lab, and well-formed medium-large (6x6) 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, except for the Merced Trial in which all fruit were harvested slightly less mature than recommended (fruit were mature-green 2 stage and required 4-5 days of ethylene treatment). Fruit were evaluated when they reached the **table-ripe stage** or color stage 6 on the USDA scale $\pm$ 1-2 days. This 1-2 day interval does not affect results.

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**). Flavor can be estimated measuring soluble solids (sugars) and acid contents. Table 1 describes the measurements useful to assess the postharvest potential of different fresh market tomato varieties. For firmness, it would also be useful to evaluate fruits about 1 week after reaching table-ripe to determine which varieties maintain firmness during a simulated marketing period.

Table 1. **Ripe tomato quality measurements for 2001 variety trials.**

Attribute	Measurement	Additional Information
1. Color	Objective color values using a Minolta Color meter	Data reported as "Hue"; this is a calculated color value and the most useful single value to compare tomato color; see **Table 2** for typical values for a range of tomato stages. Hue values from 35-40 usually indicate good red color.
2. Texture	2a. Compression test: compression of the fruit with a given load.	A compression test simulates hand/finger compression when consumers test tomatoes; the higher the mm of compression, the softer the fruit. Table 3 describes typical values using a manual system; requires 1 minute per fruit.
	2b. Compression test: the force to compress the fruit a distance of 5 mm is measured	We used a computerized texture analyzer equipped with a 25 mm flat cylinder moving at 0.5 mm/sec to measure this value, which is inversely related to the values in 3a. Values are expressed in Newtons (1 Newton=9.81 kg-force or 4.45 pound-force). Requires 1 minute per fruit. See **Figure 1.** Values for table-ripe fruit typically range from 15-25 N.
	2c. Slice integrity: % of juice by weight that drains from 1/3 inch (0.8 cm) slices	If the tomatoes are going to be used by food service operations, a slice integrity test provides useful information; requires 3 min per fruit. See **Table 3**. Values for table-ripe fruit typically range from 0-5%.
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. See Figure 1 for 2001 firmness measurements for comparison.

Firmness Class	Description based on Resistance to Deformation	Firmness[1] mm compression	Description based on Slicing Characteristics	Slice Integrity[2] % weight loss
Very Firm	Fruit yields only slightly to considerable pressure	0.5-1.0	No loss of juice or seeds when sliced	0-2
Firm	Fruit yields slightly to Moderate pressure	1.0-1.5	A few drops of juice or seeds lost when sliced	2-5
Moderately Firm	--	1.5-2.0	--	5-8
Moderately Soft	--	2.0-2.5	--	5-8
Soft	Fruit yields readily to Slight pressure	2.5-3.0	Some juice and seeds are lost when sliced	8-10
Very Soft	Fruit yields very readily to slight pressure	>3.0	Much of the juice and seeds is lost when sliced	>10

[1]Measured by placing a 500 g weight for 10 seconds on the equator of the fruit; see 2a in Table 1.

[2]Measured by weighing fruits before and after slicing (0.8 cm wide slices) and draining; see 2c in Table 1.

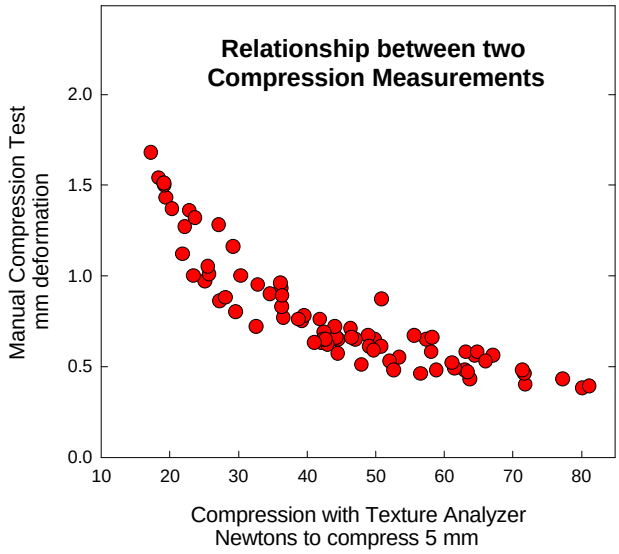

Figure 1. Relationship between manual compression test used in previous work and the 2001 measurements of force to compress 5 mm determined on a computerized texture analyzer (see Tables 1 and 3). 1 Newton= 9.81 kg-force or 4.45 pound-force.

Results in Tables

Trial 2 - Merced Co. Trial

Table 6. Quality characteristics of fresh market tomatoes harvested **MG** and **VR** from the 2001 Merced Co. trial and ripened at 20°C (68°F). Fruit were evaluated at the table-ripe stage. See Tables 1-3 for explanation of measurements; lower color values indicate redder fruits, lower firmness values indicate softer fruits.

Cultivar	Stage at Harvest	Red Color, Hue	Firmness, Newtons	Slice Integrity, % juice loss	% Soluble solids	pH	% Titratable acidity
BHN 102	MG	40.9	18.6	3.5	4.4	4.42	0.30
	VR	40.0	16.9	4.2	4.5	4.34	0.33
BHN 503	MG	39.3	19.3	2.5	4.4	4.29	0.32
	VR	40.3	17.5	3.3	4.3	4.30	0.30
Bobcat	MG	39.2	19.7	2.2	4.2	4.42	0.30
	VR	39.3	19.6	1.8	4.0	4.32	0.28
Classy Lady	MG	39.6	18.4	2.3	4.4	4.36	0.31
	VR	38.0	17.5	2.7	4.3	4.30	0.32
PS 150440	MG	39.8	19.8	2.1	4.1	4.38	0.30
	VR	38.9	19.7	3.2	4.1	4.31	0.34
QualiT 21	MG	40.4	20.1	2.1	4.1	4.39	0.28
	VR	40.6	18.5	2.4	4.2	4.36	0.30
QualiT 23	MG	37.1	20.4	2.8	4.0	4.37	0.29
	VR	39.0	18.6	2.8	4.1	4.32	0.31
Shady Lady	MG	38.1	16.3	3.5	4.1	4.40	0.30
	VR	39.1	17.7	3.4	4.1	4.34	0.30
Sunbrite	MG	38.5	18.5	2.0	4.2	4.34	0.32
	VR	38.3	17.8	2.6	4.1	4.30	0.33
SXT 6624	MG	38.7	17.1	2.8	4.4	4.36	0.32
	VR	37.6	16.9	3.2	4.5	4.29	0.33
UGX 895	MG	37.9	23.7	1.8	4.2	4.38	0.33
	VR	41.8	19.5	2.2	4.3	--	--
Average	**MG**	**39.1**	**19.3**	**2.5**	**4.2**	**4.37**	**0.31**
Average	**VR**	**39.4**	**18.2**	**2.9**	**4.2**	**4.33**	**0.31**
LSD.05		1.1	1.0	0.7	0.2	.08	.04

Color and firmness data are from 3 reps of 15 fruits; juice loss data are from 3 reps of 10 fruits; composition data are from 3 reps of composite samples of 10-15 fruit each.

Summary Table 10. Quality characteristics of fresh market tomatoes harvested **MG** from the three 2001 trials. Fruit were treated with ethylene, ripened at 20°C (68°F), and evaluated at the table-ripe stage (USDA Color Chart stage 6).

Cultivar	Trial	Red Color, Hue	Firmness, Newtons	Slice Integrity, % juice loss	% Soluble solids	pH	% Titrat-able acidity
BHN 102	Kings	--	--	--	--	--	--
	Merced	40.9	18.6	3.5	4.4	4.42	0.30
	San Joaq.	38.7	14.8	--	5.2	4.37	0.33
	Ave.	39.8±1.6	16.7±2.7	3.5	4.8±0.6	4.40±0.03	0.32+.02
BHN 503	Kings	38.0	17.9	4.5	4.4	4.31	0.39
	Merced	39.3	19.3	2.5	4.4	4.29	0.32
	San Joaq.	39.9	19.6	--	4.8	4.39	0.32
	Ave.	39.1±0.9	18.9±0.9	3.5±1.4	4.5±0.2	4.33±0.05	0.34±.04
Bobcat	Kings	35.5	20.9	2.7	4.3	4.43	0.35
	Merced	39.2	19.7	2.2	4.2	4.42	0.30
	San Joaq.	38.5	22.0	--	4.5	4.41	0.34
	Ave.	37.7±2.0	20.9±1.2	2.4±0.4	4.3±0.2	4.42±.01	0.33±.03
Classy Lady	Kings	36.9	18.2	3.6	4.5	4.39	0.36
	Merced	39.6	18.4	2.3	4.4	4.36	0.31
	San Joaq.	--	--	--	--	--	--
	Ave.	38.2±1.9	18.3±0.2	3.0±0.9	4.4±0.1	4.38±.02	0.34±.04
PS 150440	Kings	37.6	21.0	3.0	4.1	4.42	0.34
	Merced	39.8	19.8	2.1	4.1	4.38	0.30
	San Joaq.	--	--	--	--	--	--
	Ave.	38.7+1.5	20.4+0.8	2.6+0.6	4.1+0.0	4.40+.03	0.32+.03
QualiT 21	Kings	38.1	20.2	2.6	4.5	4.33	0.36
	Merced	40.4	20.1	2.1	4.1	4.39	0.28
	San Joaq.	39.9	20.7	--	5.2	4.38	0.33
	Ave.	39.5±1.2	20.3±0.3	2.4±0.4	4.6±0.6	4.37±.03	0.32±.04
QualiT 23	Kings	37.0	20.9	2.4	4.6	4.38	0.36
	Merced	37.1	20.4	2.8	4.0	4.37	0.29
	San Joaq.	38.1	19.0	--	4.7	4.34	0.33
	Ave.	37.4±0.6	20.1±1.0	2.6±0.3	4.4±0.4	4.36±.03	0.33±.04
Shady Lady	Kings	37.7	18.2	3.1	4.4	4.42	0.38
	Merced	38.1	16.3	3.5	4.1	4.40	0.30
	San Joaq.	43.8	15.2	--	4.6	4.35	0.34
	Ave.	40.0±3.4	16.6±1.5	3.3±0.3	4.4±0.2	4.39±.04	0.34±.04
Sunbrite	Kings	41.2	21.5	1.7	4.6	4.32	0.40
	Merced	38.5	18.5	2.0	4.2	4.34	0.32
	San Joaq.	36.9	14.7	--	4.8	4.34	0.38
	Ave.	38.9±2.2	18.2±3.4	1.8±0.2	4.5±0.3	4.33±.04	0.37±.04
SXT 6624	Kings	37.5	18.4	2.7	4.7	4.47	0.39
	Merced	38.7	17.1	2.8	4.4	4.36	0.32
	San Joaq.	--	--	--	--	--	--
	Ave.	38.1±0.8	17.8±0.9	2.8±0.1	4.6±0.2	4.42±.08	0.36±.05

Color and firmness data are from 3 reps of 15 fruits; juice loss data are from 3 reps of 10 fruits; composition data are from 3 reps of composite samples of 10-15 fruit each.

Summary Table 11. Quality characteristics of fresh market tomatoes harvested **VR** from the three 2001 trials. Fruits were evaluated at the table-ripe stage (USDA Color Chart stage 6). See Tables 1-3 for explanation of measurements; lower color values indicate redder fruits, lower firmness values indicate softer fruits.

Cultivar	Trial	Red Color, Hue	Firmness, Newtons	Slice Integrity, % juice loss	% Soluble solids	pH	% Titrat-able acidity
PS 150440	Kings Co.	38.7	21.5	2.4	4.1	4.41	0.34
	Merced Co.	38.9	19.7	3.2	4.1	4.31	0.34
	San Joaq. Co.	--	--	--	--	--	--
	Average	38.8±0.2	20.6±1.2	2.8±0.6	4.1±0.0	4.36+.07	0.34±0
QualiT 21	Kings Co.	--	--	--	--	--	--
	Merced Co.	40.6	18.5	2.4	4.2	4.36	0.30
	San Joaq. Co.	37.6	17.8	--	4.8	4.38	0.33
	Average	39.1±2.1	18.2±0.5	2.4	4.5±0.4	4.37±.02	0.32±.02
QualiT 23	Kings Co.	--	--	--	--	--	--
	Merced Co.	39.0	18.6	2.8	4.1	4.32	0.31
	San Joaq. Co.	36.2	17.6	--	4.6	4.34	0.34
	Average	37.6±2.0	18.1±0.7	2.8	4.4±0.4	4.33±.01	0.32±.02
Sunbrite	Kings Co.	37.7	19.5	2.4	4.4	4.33	0.43
	Merced Co.	38.3	17.8	2.6	4.1	4.30	0.33
	San Joaq.Co.	35.6	15.4	--	4.8	4.33	0.37
	Average	37.2±1.4	17.6±2.0	2.5±0.2	4.4±0.4	4.32±.02	0.38±.05

Color and firmness data are from 3 reps of 15 fruits; juice loss data are from 3 reps of 10 fruits; composition data are from 3 reps of composite samples of 10-15 fruit each.

Summary Table 12. Average quality characteristics of fresh market tomatoes harvested **MG** or **VR** from three trials in 2001. MG fruit were treated with ethylene, completed ripening at 20°C (68°F), and were evaluated at the table-ripe stage (USDA Color Chart stage 6). See Tables 1-3 for explanation of measurements; lower color values indicate redder fruits, lower firmness values indicate softer fruits.

Trial	# cultivars	Red Color, Hue	Firmness, Newtons	Slice Integrity, % juice loss	% Soluble solids	pH	% Titratable acidity
Harvested MG							
Kings Co.	10	37.7	19.8	3.0	4.4	4.39	0.37
Merced Co.	11	39.1	19.3	2.5	4.2	4.37	0.31
San Joaq. Co.	10	40.0	18.2	--	4.8	4.38	0.33
	Ave.	**38.9±1.2**	**19.1±0.8**	**2.8±0.4**	**4.5±0.3**	**4.38±.01**	**0.34±.03**
Harvested VR							
Kings Co.	3	37.9	20.4	2.1	4.4	4.38	0.38
Merced Co.	11	39.4	18.2	2.9	4.2	4.33	0.31
San Joaq.Co.	5	36.7	17.3	--	4.7	4.39	0.33
	Ave.	**38.0±1.4**	**18.6±1.6**	**2.5±0.6**	**4.4±0.2**	**4.37±.03**	**0.34±.04**

PROCESSING TOMATO VARIETY TRIAL
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION:

The University of California Cooperative Extension conducts field scale variety trials each year in several different counties throughout the state in the areas where processing tomatoes are grown. Results can assist growers and processors determine best varieties to use for different areas. New varieties and breeding lines are compared to established varieties for their performance in yield, °Brix (% soluble solids), color, and pH.

Two tests are usually conducted at each location: replicated and observed. As in previous years, we planted both tests. The trials were initiated on San Juan Ranch, south of Dos Palos in Merced County. Single row beds were direct seeded on April 16, 2001 using a five-row commercial planter. Nineteen commercial varieties were planted for both the replicated and observation test (Table 1.). Unfortunately, we lost the trial in early May due to harsh weather conditions. High heat and wind desiccated the germinating crop, which resulted in total stand failure. Because of time constraints, the farmer was unable to replant.

Since we have no yield data to present, instead we present here the results from the other county trials. Based on their relative location, the Fresno #1 or #3 trials probably most represent the type of growing conditions experienced in Merced County in 2001. Preliminary estimates are that 2001 average county yield was only about 31 tons/A, a 20% decrease from normal. The main reason for this substantial reduction in yield is the same as what took out our trial: harsh spring weather. Additionally, curly top disease pressure was very high this year, which further reduced yields.

Based on the yield data from the Fresno #1 and #3 replicated trials (Table 2), Heinz 9492, 9665, and 8892 did relatively well, along with Campbell's CXD 207 & 208, Halley 3155, and HyPeel 303 (Peto Seed). Soluble solids results are shown in Table 3.

A copy of the complete statewide report, including the results from the observation lines, is available upon request.

Table 1. Mid season maturing processing tomato varieties for the 2001 season

Company	*Replicated*	*Varieties*	*Observational*	*Varieties*	
Asgrow			AP 847	$VFFNP	
			AP 863	$VFFN	
CTRI	CTRI 5158	¢VFFN	CTRI 1056	¢VFFN	
Campbell	CXD 199	$VFFNP	CXD 211	$VFFNP	
	CXD 207	$VFFN	CXD 218	$VFFNP	
	CXD 208	$VFFN	CXD 220	$VFFNP	
	CXD 215	$VFFF3NP	CXD 224	$VFFNP	
	CXD 221	$VFFF3NP			
Harris Moran	HM 0830	$VFFN			
Heinz	***H 8892***	$VFFN	H 9992	$VFFNP	
	H 9492	$VFNC	H 9995	$VFFNP	
	H 9665	$VFFNP			
	H 9775	$VFFNP			
	H 9998	$VFFNP			
Lipton			U 2010	$VFFN	
N Del Monte			NDM 969	$VFFN & TMV	
Orsetti	***Halley 3155***	$VFF			
	BOS 24593	$VFFNP			
	BOS 24675	$VFFN			
Rogers			**La Rossa**	$VFF	pear
Peto	HyPeel 303	$VFFNP	PS 173	$VFFF3NP	pear
	HyPeel 347	$VFFNP	PX 849	$VFFNP	
			PX 133	$VFFNP	
Sunseeds	Sun 6332	$VFFNP	Sun 6324	$VFFNP	
			Sun 6333	$VFFNP	
			Sun 6340	$VFFNP	
United Genetics	ENP 113	$VFFNP	UG 8154	$VFFNP	

$= Hybrid
¢=open pollinated
V=Verticillium Wilt Race I Resistant
F=Fusarium Wilt Race I Resistant
Bold = standard varieties

FF= Fusarium Wilt Race I and II Resistant
FFF3 = Fusarium Wilt Race I,II, and III Resistant
N = Root Knot Nematode Resistant
P= Bacterial Speck Resistant

Table 2. Fruit yields of 2001 mid-season maturing replicated varieties.

VARIETY	Yield (tons/acre)	(11 LOCATIONS COMBINED)	SUTTER	YOLO #1	YOLO #2	SAN JOAQUIN	STANISLAUS	FRESNO #1	FRESNO #2	FRESNO #3	KERN	COLUSA #1	COLUSA #2
H9665	43.4	A	41.5	45.9	65.0	67.0	43.9	31.9	52.5	30.8	33.8	37.5	27.3
H9492	42.9	A	35.3	47.2	59.9	56.7	48.2	36.4	54.6	26.0	37.2	34.9	35.2
H9775	42.8	A	41.1	45.7	62.1	70.8	43.8	32.5	53.5	30.6	27.6	32.9	30.0
H 8892	41.6	A B	35.8	49.4	54.8	67.0	49.2	36.1	52.1	25.3	27.6	31.0	29.4
HyPeel 303	40.2	B C	32.2	36.6	61.9	57.6	45.4	34.6	52.4	28.0	29.0	35.0	29.2
CXD 208	39.3	C D	37.5	40.9	57.5	62.7	51.0	36.3	46.2	21.7	17.8	32.8	28.2
CXD 215	38.1	C D E	35.4	37.3	53.1	67.2	41.7	31.3	48.3	25.6	17.1	35.3	27.3
HyPeel 347	37.8	D E F	35.4	42.1	55.4	56.4	37.6	27.7	51.5	23.8	23.9	32.7	29.3
HM 0830	37.5	D E F	35.5	43.0	59.6	69.8	39.9	32.5	50.2	17.8	10.9	30.4	22.5
BOS 24675	37.3	D E F G	36.0	37.4	54.2	66.5	32.9	31.7	49.1	24.5	19.6	30.4	27.4
CXD 207	37.2	D E F G	38.3	40.4	53.4	53.3	39.1	36.0	45.0	26.3	18.5	32.6	26.4
CXD 199	37.2	D E F G	36.2	40.9	55.4	53.7	32.6	32.8	43.5	18.0	28.5	34.9	32.3
Sun 6332	37.1	D E F G	36.1	39.0	51.3	60.6	33.9	29.4	42.6	18.6	33.3	37.7	25.9
Halley 3155	36.8	E F G	34.6	42.4	53.3	56.4	26.4	33.9	47.3	25.9	23.1	33.1	28.8
ENP 113	36.5	E F G	33.9	39.0	50.6	61.0	32.7	36.2	46.4	23.8	20.9	34.0	22.7
BOS 24593	36.2	E F G	39.8	33.3	53.2	55.8	32.9	30.8	45.5	25.6	19.9	34.1	26.9
CTRI 5158	35.6	F G H	33.5	37.4	49.4	55.7	33.2	29.1	45.4	22.9	24.9	34.3	25.7
H9998	35.1	G H	30.1	33.9	47.6	61.0	40.9	33.0	44.8	20.6	23.8	28.7	21.4
CXD 221	33.4	H	36.1	37.3	49.9	53.9	20.4	29.2	40.5	18.1	28.0	32.0	22.3
MEAN	38.2		36.0	40.5	55.1	60.7	38.2	32.7	48.0	23.9	24.5	33.4	27.3
LSD @ 0.05	2.2		N.S.	4.1	5.6	8.0	11.9	4.5	4.9	5.7	12.8	N.S.	7.0
CV (%)	13.9		13.7	7.1	7.2	9.3	22.0	9.8	7.2	16.8	36.9	12.3	18.1
VARIETY X LOCATION LSD @ 0.05	7.4												

Yolo1 = transplanted, Yolo2 = direct seeded, Colusa1=direct seeded, Colusa2=transplanted, Fresno1 = 7/25 harvest, Fresno2=8/13 harvest, Fresno3=9/14 harvest

Table 3. Fruit °Brix levels for the 2001 mid-season replicated trial, averaged of all counties and by county.

VARIETY	Brix (%)	(10 LOCATIONS COMBINED)	SUTTER	YOLO #1	YOLO #2	SAN JOAQ	STANISLAUS	FRESNO #1	FRESNO #2	FRESNO #3	KERN	COLUSA #1	COLUSA #2
CXD 221	5.7	A	6.2	5.7	5.5	5.2	6.4	5.5	5.4	6.2		5.7	5.6
CXD 208	5.5	B	5.7	6.6	5.3	4.9	4.8	5.3	5.3	5.9		5.5	5.6
Halley 3155	5.4	B C	5.9	5.5	5.5	5.3	5.3	5.3	5.3	5.7		5.2	5.4
CXD 207	5.4	B C D	5.5	6.4	5.4	5.1	4.6	5.1	5.3	6.0		5.4	5.3
HM 0830	5.4	B C D	5.7	5.8	5.2	5.0	4.8	5.1	5.2	5.9		5.4	5.5
ENP 113	5.3	C D E	5.6	5.9	5.4	5.2	5.0	5.1	4.7	5.6		5.0	5.5
Sun 6332	5.3	D E F	5.7	5.9	5.3	5.2	5.0	5.1	4.8	5.2		5.1	5.4
CXD 199	5.2	E F G	5.6	5.6	5.1	4.8	4.6	5.0	4.9	6.2		5.1	5.3
HyPeel 347	5.2	E F G	6.1	5.2	5.0	5.2	5.1	4.8	5.1	5.3		4.9	5.3
H9492	5.2	E F G H	5.6	5.4	4.9	4.8	4.3	5.1	5.0	5.9		5.3	5.3
BOS 24675	5.1	F G H	5.6	5.3	5.1	5.1	5.0	5.0	4.9	6.0		4.6	4.9
CXD 215	5.1	G H I	5.8	5.5	4.7	4.6	5.4	4.9	5.0	5.2		4.7	5.3
H9998	5.1	G H I	5.4	5.6	4.9	4.9	4.7	4.6	4.6	5.5		5.1	5.5
H9665	5.1	G H I	5.5	5.7	4.7	4.8	4.6	4.9	4.8	5.5		5.2	5.2
H 8892	5.0	H I	5.4	5.7	4.9	4.7	4.4	4.7	4.7	5.6		5.1	5.2
HyPeel 303	5.0	H I	5.7	5.5	4.8	5.0	4.1	4.9	4.9	5.3		5.0	5.0
H9775	5.0	I	5.3	5.4	4.7	4.8	4.3	4.8	4.7	5.4		5.2	5.1
CTRI 5158	4.9	I J	5.2	5.1	5.1	4.7	4.3	4.9	5.0	5.3		5.0	4.9
BOS 24593	4.8	J	5.3	5.1	4.8	4.8	4.5	4.7	4.4	5.2		4.5	5.1
MEAN	5.2		5.6	5.6	5.1	4.9	4.8	5.0	4.9	5.6		5.1	5.3
LSD @ 0.05	0.1		0.4	0.4	0.4	0.4	0.6	0.3	0.5	0.7		0.4	N.S.
CV (%)	6.4		5.5	5.3	4.9	5.2	8.3	4.7	6.5	8.2		5.9	7.9
VARIETY X LOCATION LSD @ 0.05	0.5												

Yolo1 = transplanted, Yolo2 = direct seeded, Colusa1=direct seeded, Colusa2=transplanted, Fresno1 = 7/25 harvest, Fresno2=8/13 harvest, Fresno3=9/14 harvest. No PTAB data collected at the Kern Co trial.

ALBION FOLIAR MICRONUTRIENTS ON FRESH MARKET TOMATOES
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

Foliar applied micronutrients are an effective way to correct nutrient deficiencies and supplement additional nutrients to the crop during the growing season. For maximum uptake, multiple applications should be made during the rapidly growing portion of the crop's life cycle. Tissue samples should be taken to determine the nutrient status of the crop so that a foliar fertilizer application can be made.

The objective of this trial was to evaluate foliar applications of Albion Metalosate Crop Up, K, and Ca on yield of fresh market tomatoes.

METHODS

Trial was initiated on transplanted fresh market tomato field (variety Merced) when crop was near full bloom. There were 6 treatments of varying combinations of rates and timings of foliar application. Treatments were:

1. Untreated control (UTC)
2. 200 lbs/A potassium sulfate (SOP) + 1.5 qts/A Crop Up applied at full bloom.
3. 200 lbs/A potassium sulfate only.
4. 200 lbs/A SOP + 3.0 qts/A Crop Up applied at full bloom.
5. 200 lbs/A SOP + 1.5 qts/A Crop Up applied at full bloom + 2 + 4 weeks.
6. 200 lbs/A SOP + 2 qts/A Metalosate K + 2 qts/A Metalosate Ca at full bloom + 2 + 4 weeks.

Plots were hand harvested about 90 days after transplanting by cutting 5 feet of row from each plot, then field sorting and weighing. Because a limited harvest area was used, yields are presented as lbs per 5 ft.

Full trial protocol summarized on the following page.

RESULTS

The nutrient composition for Metalosates Crop Up, K, and Ca are listed in Table 1. Albion's micronutrients are chelated using amino acids. Chelation keeps micronutrients such as iron, zinc, copper, etc., more stable and available to the plant.

Soil samples were taken to 24" by sampling the top two feet of each bed at the start of the experiment. In general, P and K levels were adequate, whereas the micronutrients zinc and iron were low (Table 2).

Leaf and petiole samples were taken before treatments were applied on May 9 and again after all treatments were imposed on June 12, 2001. These dates correspond with the crop at approximately full bloom and at first ripe fruit. The results for selected nutrients are listed in Table 3. Most of the nutrients fell within recommended sufficiency ranges, with the possible exception of zinc, which averaged a little low at 30 ppm. Recommended tomato leaf and petiole nutrient sufficiency levels are presented in Table 4. Treatment 5 had significantly higher copper and zinc concentrations, reflecting the third application of Crop Up. No other significant differences were found.

We averaged a little over 1100 boxes per acre in this trial, with a 41% cull rate (Table 5). This yield and cull rate are worse than average,

and reflect the challenging spring growing conditions that occurred in 2001. No significant differences were found between any of the treatments. The lack of a yield response was probably because the crop was well supplied with nutrients throughout the growing season.

ACKNOWLEDGEMENTS

Many thanks to Mr. Larry Bianchi and Mr. Mike Navaro with Bianchi & Sons, Mr. Mark Hoatson with Simplot, and Mr. Ludwig Voet with Albion Labs for their cooperation and help with these tests.

Table 1. Nutrient content of the Albion Metalosate products used in this test.

Nutrient	*Crop Up* %	*K* %	*Ca* %
N	3.0		6.0
K		30.0	
Ca			6.0
Mg	0.5		
S	2.5		
B	0.025		
Cu	0.25		
Fe	0.25		
Mn	2.5		
Zn	1.25		

Table 2. Soil test results by depth and sufficiency ranges for select nutrients.

Analysis	*Depth 0-12”*	*12-24”*	*Sufficiency range*
	---------- ppm ---------		
NO_3-N	48	40	----
P	32	4	> 12
K	134	79	> 100
Ca	3378	4259	----
Mg	534	746	----
Na	94	118	----
B	0.6	0.5	0.1 – 1.0
Cu	0.8	0.9	> 0.2
Fe	4.7	3.4	> 5
Mn	5.4	2.0	> 1.0
Zn	0.7	0.3	> 0.7
pH	7.7	8.0	5 – 8
E.C. mmhos/cm	0.6	0.3	< 2
CEC meq/100 g	22.0	28.1	variable

Soil sample taken May9, 2001.

Table 4. UCCE* recommended tomato leaf and petiole nutrient sufficiency levels.

Nutrient	*Early Bloom*	*1” Fruit*	*1st ripe fruit*
N (%) leaf	4.6 – 5.2	3.5 – 4.5	2.7 – 3.8
P (%)	0.3 – 0.5	0.25 – 0.4	>0.2
K (%)	2 – 4	1.6 – 3.0	0.8 – 2.0
Petiole NO3-N ppm	12,000	6,000	3,000
Petiole PO4-P ppm	3,000	2,500	2,000
Ca (%)	2 – 4	1.8 – 3.6	2 – 4
Mg (%)	1 – 2		1 – 2
S (%)	0.5 – 1.3	0.5 – 1.3	0.5 – 1.3
B ppm	21 – 150		
Cu ppm	5 – 80		
Fe ppm	21 – 400		
Mn ppm	11 – 500		
Zn ppm	5 – 50		

* Otto and Branson, 1981. Hartz et al, 1998.

TITLE: ALBION METALOSATES ON FRESH MARKET TOMATOES
MERCED, 2001

OBJECTIVE: Evaluation of foliar applications of Albion micronutrients to fresh market tomatoes.

SITE LOCATION & COOPERATOR: Bianci. Corner of Buchanon Hollow and Plainsburg Rds, near LeGrand, CA

TREATMENTS:

1. UTC
2. 200 lbs SOP/A + 1.5 qts/A Crop Up applied at full bloom
3. 200 lbs SOP/A only
4. 200 lbs SOP/A + 3.0 qts/A Crop Up applied at full bloom
5. 200 lbs SOP/A + 1.5 qts/A Crop Up at full bloom, 2, and 4 weeks later
6. 200 lbs SOP/A + 2 qts/A K + 2 qts/A Ca at full bloom, 2, and 4 weeks later.

FIELD TREATMENT RANDOMIZATION: **PLOT SIZE**

404	**402**	**403**	**406**	**401**	**405**
306	**303**	**301**	**305**	**302**	**304**
203	**205**	**206**	**201**	**204**	**202**
101	**102**	**103**	**104**	**105**	**106**

30 ft long x 1 bed (5')

PROTOCOL:

- host crop and variety. Fresh market tomatoes, green pick. Merced variety.
- planting date. Transplanted 3/21/2001.
- fertilizer/irrigation. Furrow
- treatments: amt applied, volume, date & time

  1st application 5/9/01. SOP applied plus foliar Plants about 1 ft tall and full bloom. 2nd application 5/30/01 to treatments 5 and 6. Tomatoes with 1" fruit. 3rd application 6/8/01 treatments 5 and 6. Tomatoes 2"+. Used Solo back pack sprayer using 1.5 gals water per treatment.

- harvest date and method. Hand pick 5 ft of bed on 6/22/2001. Field sort.

MEASUREMENTS:

- growth notes
- plant sampling: what and when. Leaf and petiole samples taken May 9 and June 12, 2001.
- other sampling (soil, water). Soil samples taken May 7, 2001.
- yield. Box yields, size breakdown, and red%.
- quality measurements. None taken.

RESULTS:

Table 3. Effect of foliar Albion Crop Up and Metalosate K and Ca on tomato leaf and petiole tissue analysis after all treatments had been applied (June 12). Merced County, 2001.

Treatment	*N*	*NO3*	*K*	*Ca*	*Fe*	*B*	*Cu*	*Zn*
	%	*ppm*	*%*	*%*	*ppm*	*ppm*	*ppm*	*ppm*
Pre-treatment tissue sample*	5.4	3850	2.68	4.78	498	46	12	30
1. UTC	4.2	2786	1.6	5.2	244	61	8	22
2. 1.5 qts/A Crop Up, full bloom	4.2	2817	1.5	5.1	258	56	8	22
3. 200 lbs/A SOP sidedressed	4.4	2768	1.7	5.3	254	68	10	24
4. 3.0 qts/A Crop Up, full bloom	4.1	2670	1.6	4.9	244	52	9	22
5. 1.5 qts/A Crop Up, 3 applications	4.4	2869	1.6	5.2	257	54	16	65
6. 2 qts/A K and Ca, 3 applications	4.3	2998	1.9	5.2	228	58	9	24
Average	**4.3**	**2818**	**1.65**	**5.1**	**247**	**58**	**9.8**	**30**
LSD 0.05	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**2.3**	**5.3**
CV (%)	**5**	**7**	**11**	**9**	**13**	**18**	**19.3**	**14.5**

* Pre-treatment tissue sample average of 4 reps. Sample taken May 9, 2001, and not included in the statistical analysis.
LSD 0.05 = least significant difference at the 95% probability level. Yields followed by the same letter are not significantly different.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.

Table 5. Effect of foliar applied Albion Crop Up and Metalosates K and Ca on yield and size of fresh market tomatoes, Merced County, 2001. One time harvest from 5 ft of each plot.

Treatment	*Mkt Yld Lbs/5 ft*	*XL %*	*L %*	*M %*	*S Lbs*	*Culls Lbs*	*Reds %*
1. UTC	19.9	15.6	33.5	50.9	9.0	6.8	5.7
2. 1.5 qts/A Crop Up, full bloom	16.4	15.7	46.9	37.4	7.1	8.6	6.9
3. 200 lbs/A SOP sidedressed	16.6	16.8	25.5	57.7	7.7	6.0	6.8
4. 3.0 qts/A Crop Up, full bloom	15.8	8.9	26.3	64.8	7.0	6.2	8.1
5. 1.5 qts/A Crop Up, 3 applications	14.3	15.8	36.5	47.7	6.5	8.0	9.0
6. 2 qts/A K and Ca, 3 applications	15.3	13.0	40.0	47.0	7.8	4.8	4.6
Average	**16.4**	**14.3**	**34.7**	**50.9**	**7.5**	**6.7**	**6.8**
LSD 0.05	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV (%)	**24**	**72**	**35**	**30**	**38**	**35**	**89**

Market yield = XL + L + M size mature-green fruit, average of four replications. To convert to 25 lb boxes per acre, multiply by 69.7.
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 at harvest.
Culls, lbs per 25 sq ft. 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% probability level. Yields followed by the same letter are not significantly different.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.

ECO SMART HERBICIDE EVALUATION
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

The objective of this trial was to evaluate post-applications of different rates of Eco Smart contact herbicide DR-A-035 to processing tomatoes.

METHODS

Site location was on San Juan Ranch, near Dos Palos, CA. Host crop was Heinz 8892 processing tomatoes, double-row planted on a 5 ft bed in mid-March, 2001. Crop was furrow irrigated. Grower's standard weed control method was Tillam pre-plant incorporated and mechanical cultivation.

Treatments:

1. Untreated control (UTC)
2. DR-A-35 + surfactant at 4 gals/A
3. DR-A-35 + surfactant at 8 gals/A

Treatments were applied by hand using a Solo backpack sprayer and applied on June 7 and June 13, 2001. A randomized block design was used with 4 replications, and plot size was one bed by 20 ft long. Weather conditions for the first application were 91° F, sunny, 28% RH, and 81° F, sunny, breezy, and 27% RH for the second application. Both applications were made in the morning. The herbicides were post directed to the sides of the beds.

Weed control and crop phytotoxicity ratings were made one week after application, on June 13 and June 21. Crop phyto only occurred on the lower, outer leaves that were next to the furrow. Since Eco Smart 035 is a contact herbicide only, only those plant parts that directly contacted the spray developed necrotic tissue. As a result, even though parts of the crop were hit with the herbicide, no loss of yield occurred.

RESULTS

Eco Smart 035 caused a significant increase in weed burn and crop phytotoxicity as compared to the untreated check plots on both evaluation dates (Table 1.). However, the weeds and crop both continued growing after the applications. The 8 gal/A rate caused greater tissue necrosis than the 4 gallon rate. Some weed burn was noted in the UTC plots by the second evaluation, especially in the nutsedge. This was attributed to the farmer's pre-plant application of Tillam.

Eco Smart DR-A-035 provided quick burn down of nutsedge and nightshade in this trial, however, since it is a non-selective herbicide, some crop damage was also noted. This damage was minimized by using a directed spray. Yields were not evaluated, but no yield loss was expected from the slight crop phyto we experienced.

ACKNOWLEDGEMENTS

Many thanks to Mr. Dan Burns of San Juan Ranch for his cooperation with this test. Also thanks to Matt Beene and Larry Burrow, county agriculture technicians, for their help.

Table 1.. Weed burn and crop phytotoxicity from Eco Smart contact herbicide applied to processing tomatoes in Merced County, 2001.

	June 13		*June 21*	
Treatment	*Weed burn**	*Crop phyto**	*Weed burn*	*Crop phyto*
1. UTC	0.50	0.0	2.25	0.0
2. DR-A-035 4 gals/A	2.25	1.5	3.50	1.25
3. DR-A-035 8 gals/A	5.00	2.0	6.50	2.25
Average	2.6	1.2	4.1	11.2
LSD 0.05	0.64	1.0	2.0	1.1
CV (%)	14	50	28	55

* Weed burn and crop phytotoxicity are subjective ratings taken on the above dates, and are ranked on a subjective scale where 0 = nothing and 10 = total necrosis and/or death of tissue.
Herbicides applied June 7 and June 13, 2001.
Main weeds were yellow nutsedge and nightshade.
LSD 0.05 = Least Significant Difference at the 95% confidence level. Means separated by more than this difference are significantly different.
CV = coefficient of variation, a measure of the variability in the experiment.

BASF CABRIO FUNGICIDE ON TOMATOES AND WATERMELON
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

Cabrio EG fungicide is a new, reduced risk fungicide with a broad spectrum control qualities. It controls water molds, downy mildews, fruit rots, rusts, powdery mildews, leafspots, and blights. Like many fungicides, it is best applied as a preventative treatment, but Cabrio also has curative properties with some residual control. Cabrio belongs to the strobilurin class of fungicides, which include products such as Abound and Quadris (Syngenta), Flint (Bayer), and Sovran (BASF). Thus, there is a chance for resistance to occur if used in conjunction with these other materials.

Cabrio is not yet registered for use on vegetables and is currently not available for sale, but when available use rates for most vegetable crops will be around 8 – 16 oz product per acre.

Powdery mildew was a bigger problem in Merced County this year than in many years. Therefore, these powdery mildew control trials were well timed. The objective of these trials was to evaluate foliar applications of Cabrio EG fungicide on control of powdery mildew under field conditions in fresh market tomatoes and watermelons.

METHODS

Two field sites were used in different locations, both in Merced County. The watermelon site was located near Atwater, CA on a drip irrigated seedless watermelon field. The other was located near LeGrand, CA, on a furrow irrigated fresh market tomato field. Both field sites were commercial fields near the end of the growing season, and both had received one application of a fungicide to control powdery mildew prior to the initiation of these trials. Treatments were:

Watermelon Field:

1. Untreated control (UTC)
2. Cabrio 12 oz/A
3. Flint 2.5 oz/A (label rate)

Tomato Field:

1. Untreated control (UTC)
2. Quadris 6.2 fl oz/A (label rate)
3. Cabrio 12 oz/A

Plots were sprayed three times and evaluated weekly. Since this is an unregistered chemical, the plots were destroyed before harvest. No yield data were taken. Complete trial description and protocol are listed on the following page.

RESULTS

Cabrio significantly reduced the percent incidence of powdery mildew at the tomato site on all three evaluations (Table 1) as compared to the check plots. The field was showing about 10% infection at the start of this experiment on September 28, 2001. By October 8, the fungicide treatments (Cabrio or Quadris), had reduced the incidence to an average of 4 – 8%. These low rates of infection remained for the duration of this experiment. There was no significant difference in powdery mildew control between Cabrio and Quadris at any of the evaluations.

On October 17, the severity ratings for the check plots were significantly higher than Cabrio, but there were no significant differences at the other observation dates. In

general, severity ratings were quite low during this experiment for all plots. While powdery mildew symptoms were visible on many plants, the disease did not progress to the point of causing crop loss or death (Figure 1).

At the watermelon site, the incidence of powdery mildew was very high, close to one-third of all leaves were infected at the start of the trial on September 17 (Table 2). However, the incidence rate dropped to less than 10% for all plot by September 25, which shows the effect of the earlier field application of Flint by the farmer. Though old infections on leaves were dark and necrotic, little new symptoms could be seen at this time, and therefore all severity rating were zero. By October 9, powdery mildew infections were beginning to grow again, and by the end of the trial on October 17, the incidence of infection was significantly less in the Cabrio and Flint plots as compared to the untreated control. Severity ratings were not different at any time.

While watermelon has some resistance to most strains of powdery mildew, this field would have been lost if a fungicide application had not been made. Figure 2 shows the complete loss that occurred in the corner of this field where there was an applicator error and no product was applied.

Cabrio EG fungicide showed powdery mildew control for both tomatoes and watermelons as good as Flint and Quadris, two fungicides currently registered. At both locations, control was slightly better than the other fungicides, though this difference was not significant. No crop phytotoxicity was noted from Cabrio at either field site.

ACKNOWLEDGEMENTS

Many thanks to Mr. Dave Souza, Mr. Bob Giampauli, Mr. Mike Marchini, and Mr. Mark Hoatson for their cooperation with this trial, and Mr. John Helm with BASF for product and support.

Figure 1. Powdery mildew on tomatoes.

Figure 2. Crop loss to powdery mildew. In background is the fungicide trial.

BASF "CABRIO" FUNGICIDE ON FRESH MARKET TOMATOES
MERCED, 2001

OBJECTIVE: Evaluate foliar applications of Cabrio fungicide for the prevention of mildews and late blight on tomatoes

SITE LOCATION & COOPERATOR: Bob Giampaoli, Live Oak Farms. Site is located south of LeGrand Rd about ½ mile east of Plainsberg Rd.

TREATMENTS:

1. UTC
2. Grower standard (Quadris flowable fungicide [Zeneca] at 6.2 fl oz/A)
3. Cabrio @ 12 oz/A

Treatments foliar applied when fruit at 2" stage. Field had received one previous application of preventive material (Maneb).

FIELD TREATMENT RANDOMIZATION: **PLOT SIZE**

403	**401**	**402**	**501**	**502**	**503**	**602**	**603**	**601**	**1 bed x 25 ft**
101	**102**	**103**	**202**	**203**	**201**	**303**	**301**	**302**	

PROTOCOL:

- host crop and variety: fresh market tomatoes variety Quali T 23.
- planting date. Mid July.
- fertilizer/irrigation. Furrow irrigated.
- treatments: amt applied, volume, date & time

  Treatments applied 9/28/01 using Solo backpack sprayer with 2 gallons water. Used 6 g of Cabrio and 4 ml of Quadris. Sunny, light breeze, low humidity. No visible signs of disease at time of application.
  2nd application made 10/8/01. Some powdery mildew spots in plots. Same rates.
  3rd application made 10/17/01. Light mildew pressure.

- harvest date and method. Crop destroyed by hand chopping 10/26/01. No harvest weights taken.

MEASUREMENTS:

- plant sampling: Disease incidence and severity evaluations made 10/8, 10/17, and 10/24.
- yield. Not taken.

NOTES:

******* THIS IS A CROP DESTRUCT *******

BASF FUNGICIDE "CABRIO" ON WATERMELONS
MERCED, 2001

OBJECTIVE: Evaluate foliar applications of Cabrio for prevention and cure of powdery mildew on watermelons.

SITE LOCATION & COOPERATOR: Dave Souza, D&S Farms, Atwater, CA. Site is located near the corner of Bert Crane and Moran Rds, south of Atwater.

TREATMENTS:

1. UTC
2. Cabrio @ 12 oz product/A
3. Flint at label rate (2.5 oz/A)

Field was showing signs of infection when selected and had already been sprayed once with Flint prior to initiation of this trial. Had been picked twice.

FIELD TREATMENT RANDOMIZATION: **PLOT SIZE**

302	**303**	**603**	**301**	**602**	**601**
203	**201**	**202**	**502**	**501**	**503**
101	**102**	**103**	**401**	**403**	**402**

1 bed x 25 feet

PROTOCOL:

- host crop and variety: Seeded and seedless watermelons.
- planting date. early June
- fertilizer/irrigation. Drip irrigation under plastic
- treatments: amt applied, volume, date & time

  1st application made 9/17/01 with Solo backpack sprayer using boom with 2 gallons water. 6 g of Cabrio and 1.2 g of Flint. Field showed presence of some powdery mildew, but was in remission from previous spray to whole field.

  2nd app made 9/25/01. Same rates, no disease pressure.

  3rd app made 10/11/01 using 8 g of Cabrio and 1.7 g of Flint in 2 gallons of water (equivalent to 83 gals/A).

- harvest date and method. *Yields were not taken in trial. Vapam put to entire field on 10/18/2001.*

MEASUREMENTS:

- growth notes: plants at 3rd pick when first applied fungicides. No other disease problems seen.
- plant sampling: disease severity and incidence ratings made 9/18, 9/25, 10/9, and 10/17.

NOTES: **** THIS IS A CROP DESTRUCT *********

Results:

Table 1. Effect of BASF Cabrio fungicide on powdery mildew control in fresh market tomatoes, Merced County 2001.

Treatment	*October 8*		*October 17*		*October 24*	
	Incidence %	*severity*	*Incidence %*	*severity*	*Incidence %*	*severity*
1. UTC	11.7	1.2	10.8	1.8	13.3	1.8
2. Quadris 6.2 oz/A	8.3	1.0	5.0	1.2	7.5	1.3
3. Cabrio 12 oz/A	4.2	0.5	3.0	1.0	5.2	1.3
Average	**8.1**	**0.9**	**6.3**	**1.3**	**8.7**	**1.5**
LSD 0.10	**5.2**	**NS**	**2.8**	**0.4**	**4.0**	**NS**
CV (%)	**62**	**76**	**42**	**31**	**44**	**47**

Incidence rated from 0 to 100%, where 0 = no leaves showing symptoms of powdery mildew and 100 = all leaves showing symptoms.
Severity rated on a 0 – 10 scale, where 0 = nothing and 10 = complete necrosis/death.
Plots were sprayed Sept. 28, Oct. 8, and Oct. 17. Field had just started to show disease pressure at the onset of this experiment.

LSD 0.10 = least significant difference at the 90% confidence level. Means separated by less than this amount are not significantly different.
CV = coefficient of variation, a measure of variability in the experiment.

Table 2. Effect of BASF Cabrio fungicide on powdery mildew control in watermelons, Merced County 2001.

Treatment	*Sept 18*		*Sept 25*		*Oct 9*		*Oct 17*	
	Incidence %	*severity*	*Incidence %*	*severity*	*Incidence %*	*severity*	*Incidence %*	*severity*
1. UTC	29.2	1.2	7.5	0	25.0	2.3	25.0	2.8
2. Cabrio 12 oz/A	30.8	1.8	5.8	0	10.0	2.0	11.7	1.3
3. Flint 2.5 oz/A	27.5	1.6	6.7	0	15.8	1.7	16.7	1.8
Average	**29.2**	**1.5**	**6.7**	**0**	**16.9**	**2.0**	**17.8**	**2.0**
LSD 0.10	**NS**	**NS**	**NS**	**---**	**NS**	**NS**	**9.8**	**NS**
CV (%)	**79**	**71**	**74**	**---**	**69**	**70**	**43**	**64**

Incidence rated from 0 to 100%, where 0 = no leaves showing symptoms of powdery mildew and 100 = all leaves showing symptoms.
Severity rated on a 0 – 10 scale, where 0 = nothing and 10 = complete necrosis/death.
Plots were sprayed Sept. 17, Sept. 25, and Oct. 11. Field had started to show disease pressure before the onset of this experiment, and had been sprayed once with Flint.

LSD 0.10 = least significant difference at the 90% confidence level. Means separated by less than this amount are not significantly different.
CV = coefficient of variation, a measure of the variability in the experiment.

MOTH TRAPPING RESULTS
2001 Research Progress Report

Bill Weir – Farm Advisor
Scott Stoddard – Research Associate
Merced & Madera Counties

INTRODUCTION

In 2001, UCCE Merced County participated in a regional project where pheromone bucket traps were used to monitor noctuid (caterpillar) pests. Farm Advisors from throughout the Central Valley participated.

The purpose of this project was to monitor flights of various species of adult moths whose larvae are common pests in tomatoes and melons to better detect potential pest problems and to validate degree day models for these pests. Pheromone traps were monitored from March through December by counting the number of trapped moths each week.

Pheromone traps are used in tree crops, and when combined with developmental degree day models, timing of pesticide sprays for certain worm pests can be determined. Currently, no such program exists for tomatoes; rather, PCA's take counts of worm larvae and eggs to determine if a pesticide spray is needed. Pheromone traps could prove helpful for determining when high numbers of adults are present and more intensive sampling for larvae may be needed in the field.

METHODS

Pheromones:

- Beet Armyworm (BAW).
- Western Yellow Striped Armyworm (WYSA).
- Black Cutworm (BCW).
- Varigated Cutworm (VGC).
- Cabbage Looper (CL)
- Corn Earworm/tomato fruitworm (CEW)

Start Date: Traps set March 27, 2001.
End Date: December 21, 2001.

Location:
East Merced County (Live Oak Farms). Near corner of Buchanon Hollow and Minturn Rds, LeGrand, CA.

West Merced County (Silva Acres). Near the corner of Henry Miller Rd and Hwy 165, Los Banos, CA.

Set Up:
Two sets of bucket traps at each site, for a total of 12 traps per site. One trap for each worm species placed along two sides of the field.

Protocol:
Traps checked weekly and number of each moth species recorded. Pheromones changed monthly and pest strips every 3 months.

RESULTS

Average trap counts per day and the corresponding accumulated growing degree days for each species for LeGrand and Los Banos is shown in Figures 1 and 2. No degree day curve for corn earworm is shown since there is no model developed for this species.

In general, peak trap numbers corresponded to high field pressure. Cabbage loopers and corn earworm usually had higher trap counts than the other species. Loopers were the most sprayed pest in 2001.

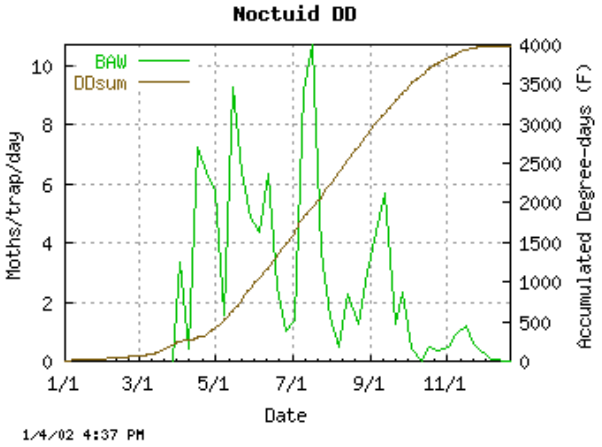

Figure 1a. LeGrand BAW.

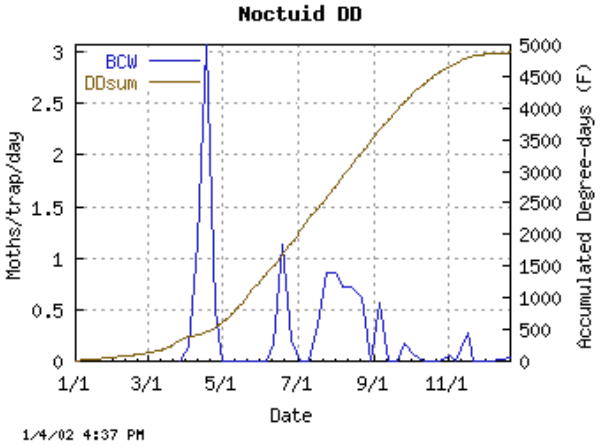

Figure 1b. LeGrand BCW.

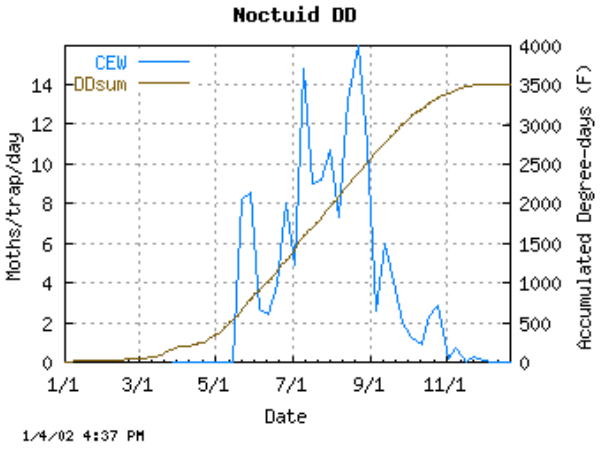

Figure 1c. LeGrand CEW.

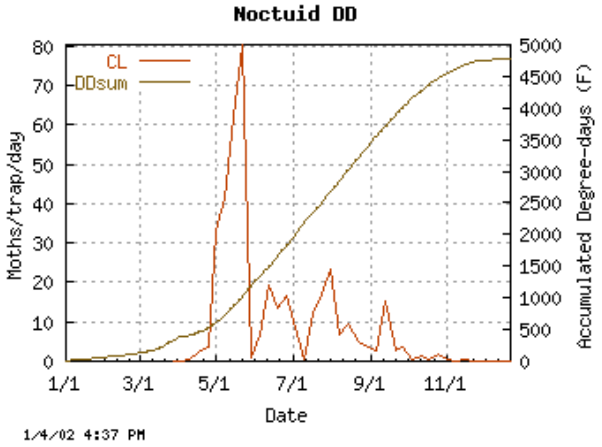

Figure 1d. LeGrand CL.

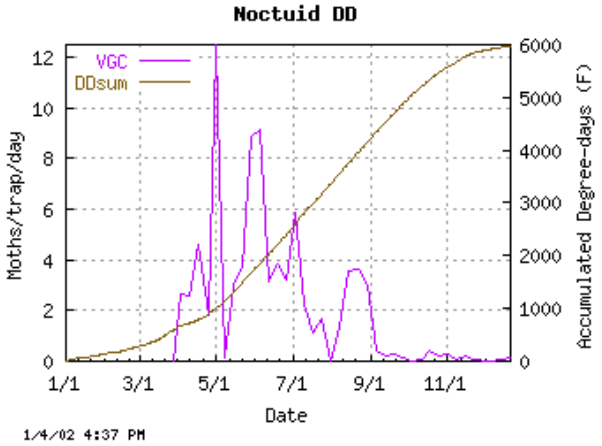

Figure 1e. LeGrand VGC.

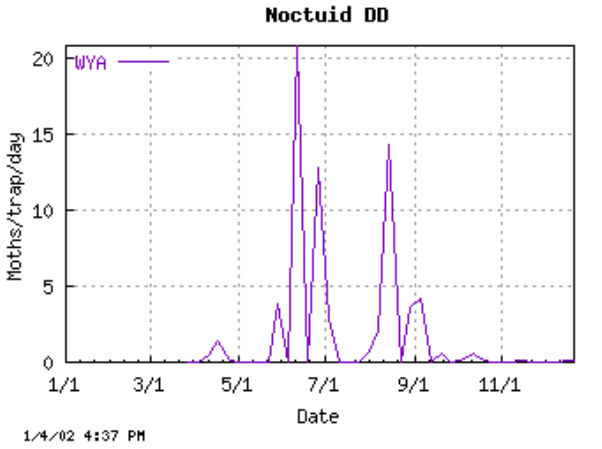

Figure 1f. LeGrand WYSA.

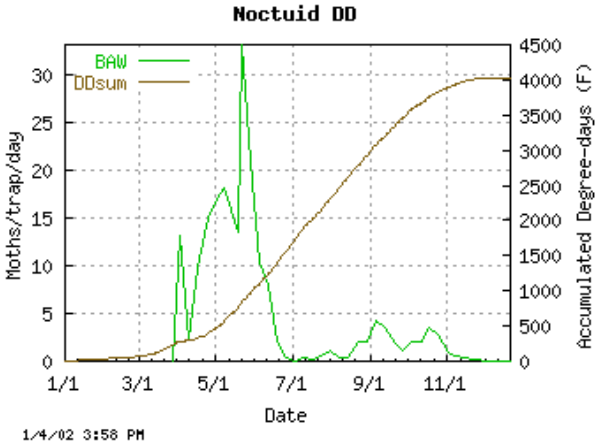

Figure 2a. Los Banos BAW.

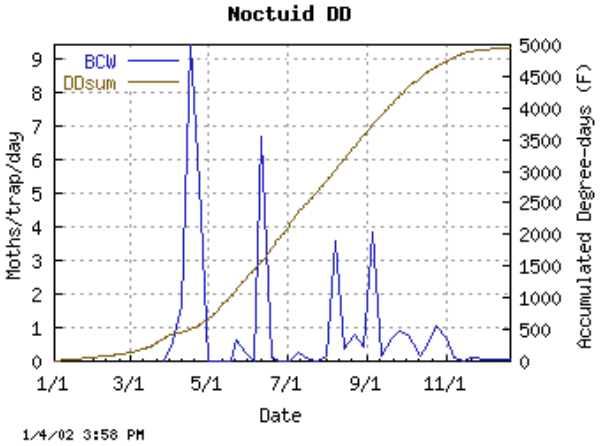

Figure 2b. Los Banos BCW.

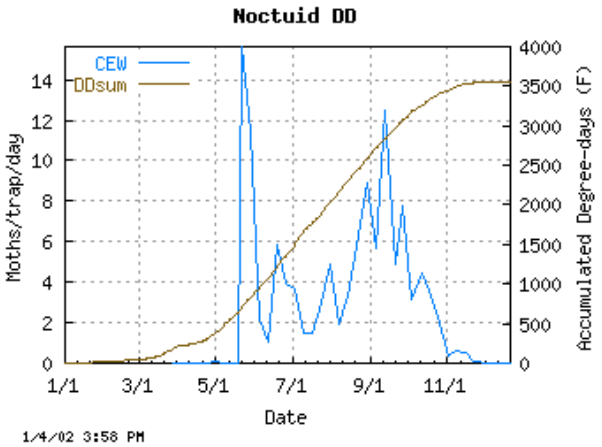

Figure 2c. Los Banos CEW.

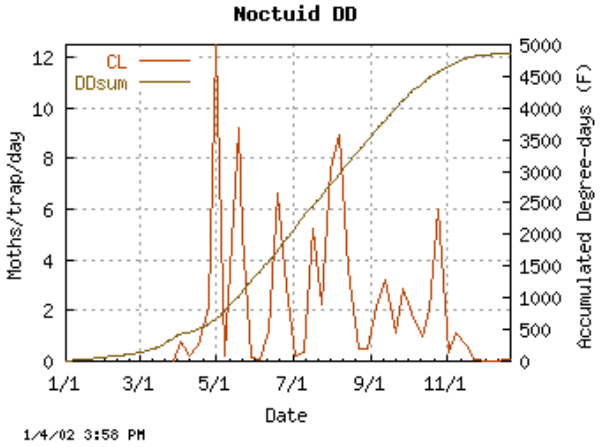

Figure 2d. Los Banos CL.

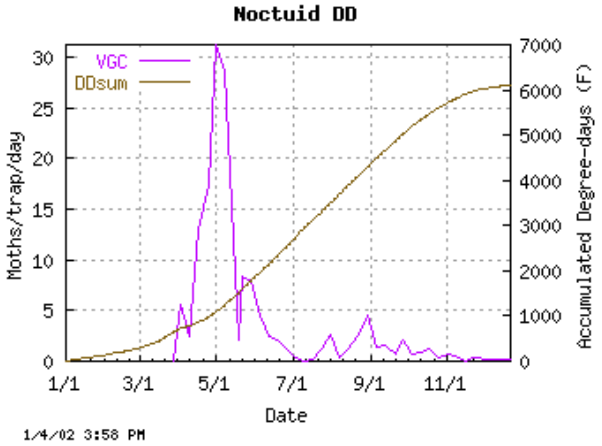

Figure 2e. Los Banos VGC.

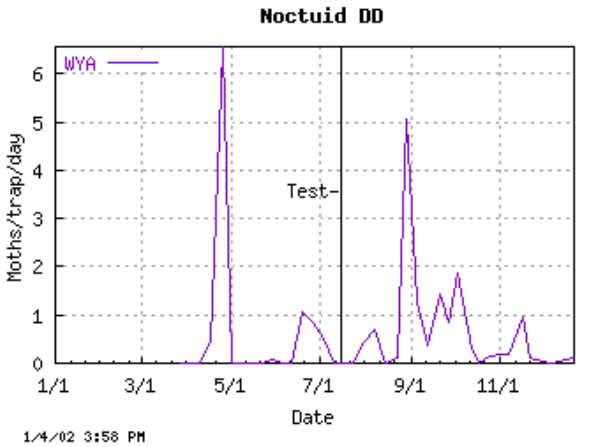

Figure 2f. Los Banos WYSA.