Project Title: **UCCE Statewide Processing Tomato Variety Evaluation Trials, 2011**

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Summary:

UCCE farm advisors conducted two early-maturity and six mid-maturity tests in 2011. The early trial resumed after a brief 2-year hiatus. Seed companies submitted 15 early lines, and 16 replicated and 13 observation entries for the mid maturity trial. Spring weather was cool and wet across most locations, and both Yolo and San Joaquin had significant problems with bacterial speck. Additionally, the San Joaquin location was impacted by late season TSWV pressure. The Fresno trials did not have much TSWV this year, but were again compromised by insufficient irrigation water. Drip irrigation was used at all locations, and all locations but the early Fresno trial were established with transplants. The Merced and Stanislaus locations used 2 rows on wide beds, with excellent results. Kern County was planted much later than normal for the area, and had only 3 reps because of space constraints.

In general, results were excellent this year, with only one missing variety from all participating counties. The early-maturity trials had an average yield of 42.9 tons/A at 5.4 Brix and good pH at 4.36. Top yielding entries were N6397, H1015, K2770, BQ140, and BQ204. The mid-maturity observational trial yields ranged from 32.7 tons/A for C298 to 57.4 tons/A for N6398, a 176% increase. Average Brix was less than the early trial, at 5.2, and pH was also inferior, at 4.54. The mid-maturity replicated trial had excellent yields, averaging > 50 tons/A at each location. Best yields occurred with H5508, which averaged 68.5 tons per acre. Brix values for this line were low, however, at 4.7%. Good soluble solids varieties this year were SUN6366, AB0311, and BQ205. Overall, pH was elevated, and many lines were > pH 4.5. Merced County especially had elevated pH, likely due to a delayed harvest.

Objectives:
The major objective is to conduct processing tomato variety field tests that evaluate fruit yield, Brix, color, and pH in replicated plots in various statewide locations of early commercial release lines. The data are combined from all test locations to analyze variety adaptability under a wide range of growing conditions. These tests are designed and conducted with input from seed companies, processors, and other allied industry and are intended to generate unbiased, third-party information to assist in making variety choice decisions.

Procedures:
Six (6) mid-maturity tests were conducted in 2011. Participating counties and Farm Advisors are shown in Table 1. Variety entries and their disease resistances are listed in Table 2. An early-maturity trial was conducted this year again in Yolo and Fresno Counties, after a brief 2-year absence. Variety selections were made in the fall of 2010 with input from tomato processors. Changes and/or additions were made by the seed companies based on seed availability.

Test locations were transplanted from early April (Yolo Co) through May 4. New varieties were usually screened one of more years in non-replicated observational trials before being selected for testing in the replicated trials. Tests were primarily conducted in commercial production fields with grower cooperators. The Fresno trials were located at the UC West Side Research and Extension Center (WSREC) near Five Points.

Each variety was planted in a one-bed, 50 to 100-foot long plot. Both double and single row plots were utilized. Plot design was a randomized complete block with four replications for the replicated trials. The observational trial consisted of one non-replicated plot directly adjacent to the replicated trial. The farm advisor organized transplanting at the same time that the rest of the field was planted. All cultural operations, with the exception of planting and harvest, were done by the grower cooperator using the same equipment and techniques as the rest of the field. All but one test location used transplants, and all locations used drip irrigation. A field day or arrangements for interested persons to visit the plots occurred at most locations. Farm Advisors were also responsible for taking soil samples and documenting growth and development.

Shortly before or during harvest, fruit samples were collected from all plots and submitted to an area PTAB station for soluble solids (reported as °Brix, an estimate of the soluble solids percentage using a refractometer), color (LED color), and pH determinations. These samples were hand picked ripe fruit directly off the plants or the harvester. The tomatoes in each plot were harvested with commercial harvest equipment, conveyed to a GT wagon equipped with weigh cells, and weighed before going to the trailers for processing.

Data were analyzed using analysis of variance procedures with SAS, both for each individual location and combining locations. In the combined analysis, the block effect was nested within each county. Significant difference tests were performed using Fisher's protected LSD at the 5% level. Kern County was missing data from one variety; least-squares means were used to substitute estimated plots yields to conduct the statistical analysis. One row of plots at the Fresno mid-maturity trial had reduced growth by having too little water to get good early growth, however TSWV was very low this season. This year was by far the best year in acquiring trial data in a long time, and overall results were excellent.

Results:
Results are presented in the following order and include combined county, yield, °Brix, color, and pH for each trial: early maturity replicated (Tables 3a – c), mid-maturity observational (Tables 4 a – e), and mid-maturity replicated (Table 5 a – e).

Early replicated. Early-maturity replicated results combining Fresno and Yolo Counties are shown in Table 3a and individual county data in Tables 3b and 3c. Yield and PTAB measurements were significantly different between varieties. N6397 and H1015 both had significantly greater yield than the standard APT410. N6397 also was in the top tier for Brix results. Overall pH values were good for all varieties this year.

Mid observational. Mid-maturity observational results combining all locations are shown in Table 4a, and individual counties in Tables 4 b – e. Variety UG 19306 was not planted in Kern County, and least squares means for the variety are reported rather than arithmetic means. When all counties were combined, significant differences were found among varieties for yield, Brix, color, and pH (Table 4a). Four of the 13 entries had statistically similar yields, ranging from 57 to 52 tons per acre (Table 4b). Nunhems dominated yields in this class. Best °Brix occurred with BQ186, at 5.7%. Fruit pH was elevated this year, ranging from 4.45 to 4.61. Because there was no replication in this test, variety by location interactions could not be performed.

A significant negative relationship was observed again this year between Brix and yield for the observation varieties (Figure 1): soluble solids decreased as yield increased, as would be expected.

Mid replicated. Mid-maturity replicated variety results combining all locations are shown in Table 5a, and individual counties in Tables 5b – e.

Using combined data, significant differences were found for all parameters measured. Best yields occurred with H5508, which averaged 68.5 tons per acre. AB2 and UG19406 were in the lowest yielding group this year. Remarkably, average yields were similar across all locations, and ranged from 50 to 59 tons, and the CV of all trials was less than 10% except for Kern County (Table 5b). This is by far the most consistent dataset for this trial in many years.

Significant differences were observed for Brix in the combined data and individual location data. Overall, 2011 was a low soluble solids year, with few varieties even achieving 6%. SUN6366 and AB0311 had the highest levels at 5.6 and 5.5% respectively. Like last year, BQ205 also performed well, while H5508 was very low, at 4.7%. The relationship between average yield and fruit soluble solids was stronger than the varieties in the observational trial (Figure 1).

The difficulty in interpreting overall yield and Brix results between varieties is that one variety may perform well in one location and not in another. Therefore, an analysis was made of the relationship between Brix and yield at each location, where first the data were normalized by dividing the value for a variety by the overall plot mean. To aid interpretation and graphing, 1 was subtracted from each quotient, which resulted in values between -1 to +1:

$$[\text{Brix}(x)/\text{Brix}(\text{avg})]-1$$

$$[\text{Yield}(x)/\text{Yield})\text{avg})]-1$$

The resulting coordinates were then plotted on an x-y axis, shown in Figure 2. Varieties that appear to the right of the centerline in each graph have better soluble solids and yield than average. Conversely, entries to the left of the centerline perform less than average for both yield and Brix relative to the others in the trial. HMX 9905, UG19006, and BQ163 appear to the right of the centerline in each, indicating superior performance across locations.

H5608, H3402, and N6394 had the best fruit color with LED ratings of 22.0 – 22.7. (Table 5 d). Fruit pH ranged from 4.38 to 4.58 (Table 5e), with AB 0311, UG19406, and H9780 having significantly lowest pH. Overall, fruit pH values were elevated relative to last year.

Significant variety by location interactions occurred for yield, °Brix, color, and pH. This indicates that certain varieties performed differently at different locations. Many of the varieties at Merced had

significantly higher pH than the other locations, which may have been a result of a delayed harvest (156 days after transplanting).

Acknowledgements:
Many thanks to CTRI and participating processors and seed companies for their continued support for this project. The cooperation from PTAB and support of the processors is also greatly appreciated. Many thanks to Gail Nishimoto for her help with the statistical analyses. And lastly, this project would not be possible without the many excellent grower cooperators who were involved with this project.

Table 1. 2011 UCCE processing tomato variety trial locations and participating advisor.

	Fresno County	Kern County	Merced County	Stanislaus County	San Joaquin County	Yolo County
Advisor	M LeStrange /T. Turini	J. Nunez	S. Stoddard	S. Stoddard	B. Aegerter	G. Miyao
Seeding date:	M: 18-Feb-11 E: 3-Mar-11		24-Feb-11	24-Feb-11	14-Mar-11	
Transplant date:	M: 26-Apr-11	4-May-2011	21-Apr-11	4-May-11	4-May-11	E: 6-Apr-11 M: 26-Apr-11
Harvest date:	E: 10-Aug-11 M: 22-Aug-11	31-Aug-11	2-Oct-11	16-Sep-11	1-Oct-11	E: 6-Aug-11 M: 12-Sep-11
Days:	E: 156 M: 118	121	164	135	150	E: 122 M: 139
Cooperator:	UC WSREC field station	Cathrine Fanucchi, Fanucchi Farms	Aric Barcellos, A-Bar Ranch, Dos Palos, CA	John Campo, Del Mar Farms, Patterson, CA.	Hal Robertson, Tracy CA	E: Joe Rominger, D.A. Rominger & Sons
Location:	WSREC, near 5-Points	S. Kern Co	Woo Ranch, S of Los Banos, Field WR6	N of Patterson, Vineyard & Hwy 33		M: Steve Meek and John Pon, JH Meek & Sons
Irrigation:	Buried drip, 60” beds	60” beds, buried drip	Drip irrigated, 2-row 80" beds	Drip irrigated, 2-row 72” beds	Drip, 1 row 60” beds	Drip, 60” beds with two rows
Plot size:	75 ft	50 ft, only 3 reps	80 - 90 ft, (7200 plants/A)	80 – 90 ft, about 7200 plants/A	100 ft	100 ft
Field variety	----		H9780 (field avg 60 T/A)	Orsetti 67212 (field avg 51 T/A)		
Notes:	Early: some TSWV; poor stand with var SVR 1245, earliest var K2769	Late planting; UG19306 not planted.	Some short plots due to lack of plants, delayed harvest	TSWV about 4 – 5%	severe speck early season and later severe TSWV, delayed harvest due to split set	severe bacterial speck in late spring, cool weather resulted in delayed harvest

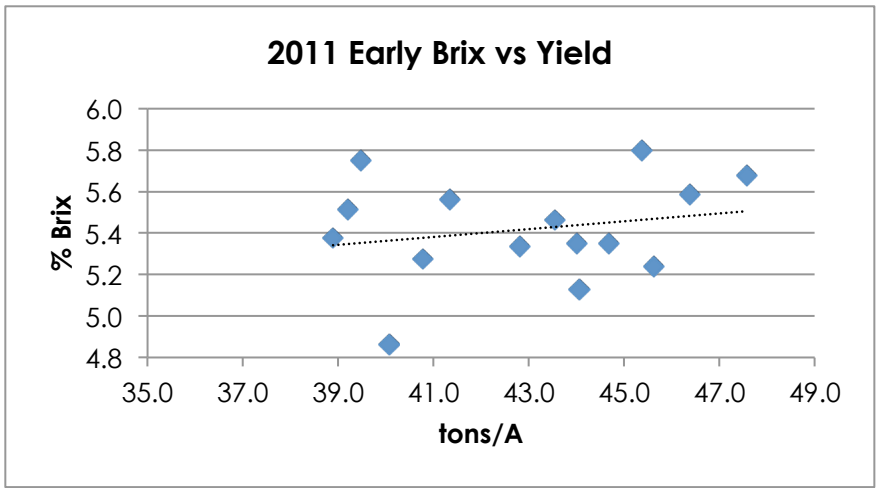
Table 2. 2011 UCCE Processing Tomato Statewide Variety Trial, early and mid maturity entries.

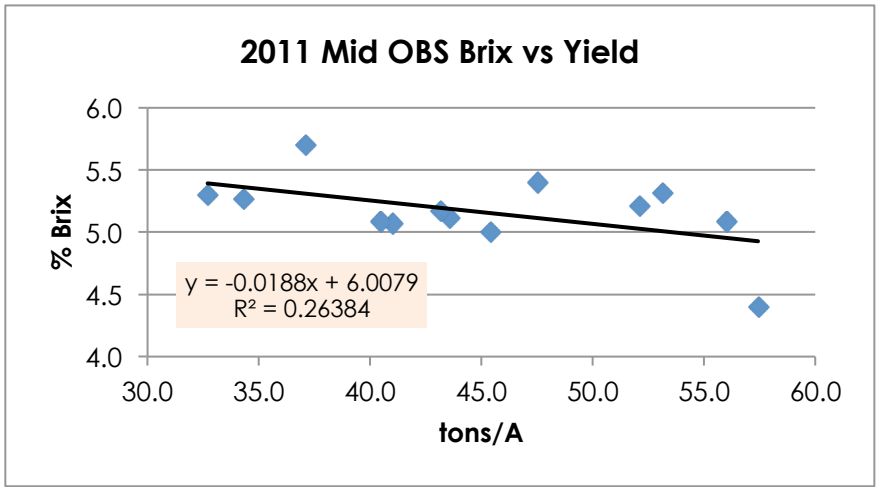
TRIAL	COMPANY	VAR	UC code	Disease Resistance	days to maturity	processed use	Brix	std compared	vine size	fruit shape	trial years
Early	Monsanto	**APT410 (STD)**	**732**	VFFNPA	114	Multiuse	med-Hi	---	---	blocky	06,07,08, 11
Replicated	Orsetti	BOS602	**1005**	VFFN	112	Multiuse	5.3	6117	med	blocky	11
	Orsetti	BOS686	**1006**	VFFN	112	Multiuse	5.3	66509	med-L	sq round	11
	Woodbridge Seeds	BQ140	**1007**	VFFNP	115	multiuse	5.5	410	small	sq round	11
	Woodbridge Seeds	BQ204	**1008**	VFFNP	102	multiuse	high	H2206	small	sq round	11
	Heinz	H1015	**1009**	VFFNP	112	early multi	high		med	blocky	11
	Heinz	**H2206 (STD)**	**951**	VF	99	Multiuse	5.1	---	small	round	07, 08, 011
	Heinz	H3044	**472**	VFFN	110	Multiuse	4.8	---	med	blocky	11
	Keithly Williams	K2769	**1010**	VFFNPA	100	---	5.4	H2206	small	round	11
	Keithly Williams	K2770	**1011**	VFFNPA TYLC	105	---	5.1	---	med	sq round	11
	Nunhems	N6397	**1012**	VFFN	116	Multiuse	high	410	Large	round	11
	Monsanto	SVR1245	**1013**	VFFNP	118	Multiuse	5.3	CXD 187	---	---	11
	Harris Moran	HMX1889	**1014**	VFFN	112	Multiuse	---	410	---	blocky	11
	United Genetics	UG 15308	**1015**	VFFNP	114	peel	5.3	410	med	sq round	11
	United Genetics	UG 15908	**1016**	VFFN Tw	114	peel	5.3	410	med	sq round	11
Mid	Monsanto	**AB 2 (STD)**	**868**	VFFP	120	Multiuse	high	3155	med	sq	2006 - 11
Replicated	Monsanto	AB 0311	**1017**	VFFNP TSWV	122	---	5.4	---	med/lg	blocky	11
	Monsanto	AB3 (DRI0303)	**971**	VFFNP	121	Multiuse	high	--	med	--	09,10, 11
	Woodbridge Seeds	BQ163	**982**	VFFNP	118	Paste/peel	5.7-5.9	AB2	med	blocky	10, 11
	Woodbridge Seeds	BQ205	**984**	VFFNP	120	paste/peel	5.7-6.2	6366	lg	blocky	10, 11
	Heinz Seed	H3402	**1018**	VFNP	120	Multiuse	5.1	---	---	blocky	11
	Heinz Seed	H5508	**986**	VFFN SW	128	paste	4.8	H9780	lg	blocky	09,10, 11
	Heinz Seed	H5608	**987**	VFFNP SW	128	MultiUse	5	H9780	V. lg	blocky	10, 11
	Heinz Seed	H7709	**997**	VFFNP	122	peeling	5.5	AB2	large	oval	10, 11
	Heinz Seed	**H9780 (STD)**	**866**	VFFNP	139	Multiuse	5.4	H9780	V. lg	blocky	09,10, 11
	Harris Moran	HM 9905	**999**	VFFN	125	Multiuse/Visc/efh	med	H8504	lg	sq	10,11
	Nunhems USA	N6385	**974**	VFFNP TSWV	125	Multiuse/Visc	med/low	AB8058	med	ElSqBlky	09,10,11
	Nunhems	N6394	**990**	VFFNP TSWV	126	Multiuse	high	AB8058/HZ2401	lg	sq/blocky	09,10,11
	Nunhems USA	**SUN6366 (STD)**	**919**	VFFNP	118	Multiuse	high	AB2/As410	med	sq/blocky	11
	United Genetics	UG 19006	**1003**	VFFNP	125	dicing paste peel	med	H8504/H9780	very strong	sq blocky	10,11
	United Genetics	UG19406	**991**	VFFNP	128	multiuse	high	H9780	strong plant	sq round	09, 10,11
Mid	Woodbridge Seeds	BQ186	**1019**	VFFFNP	122	paste	high	AB2	small	blocky	11
OBSERVED	Woodbridge Seeds	BQ265	**1020**	VFFNP	122	paste	high	AB2	med	sq round	11
	Campbells	C298	**1021**	VFFNP	118	Multiuse	5.6	6366	med	oval	11
	Campbells	C299	**1022**	VFFNP	122	Multiuse	5.6	AB2	med	oval	11
	Monsanto	DRI 0319	**1023**	VFFNP SW	122	Multiuse	5.7	AB2	lg	blocky	11
	Harris Moran	HMX 1884	**1024**	VFFNP	124	EFH	---	---	---	long sq	11
	Harris Moran	HMX 1885	**1025**	VFFNP SW	120	---	---	---	---	long sq	11
	Harris Moran	HMX1890	**1028**	VFFNP SW	121	Multiuse/Visc	med	---	large	blocky	11
	Harris Moran	HMX 9903	**998**	VFFN	118	Multiuse/Visc	high	H8892	med	sq	10,11
	Nunhems USA	N6404	**1026**	VFFNP SW	125	Multiuse	high	H8504	large	blocky	11
	Nunhems USA	N6402	**1027**	VFFNP SW	120	Multiuse	high	6366	large	blocky	11
	Nunhems USA	N6398	**1001**	VFFNP TSWV	125	multiuse/visc	med	H9780	med	blocky	10,11
	United Genetics	UG 19306	**1004**	VFFNP	130	dicing paste peel	med	H9557/H9780	vigorous	sq round	10,11

V = Verticillium Wilt race 1
FFF = Fusarium Wilt races 1 & 2 & 3
N = Root knot nematode
Bsp, P = Bacterial speck race 0
TSWV, SW = Spotted Wilt
TYLC = tomato yellow leaf curl
A = Alternaria Stem Canker

All descriptions were provided by participating seed companies. Check with seed company to confirm disease resistance.

--- information not provided





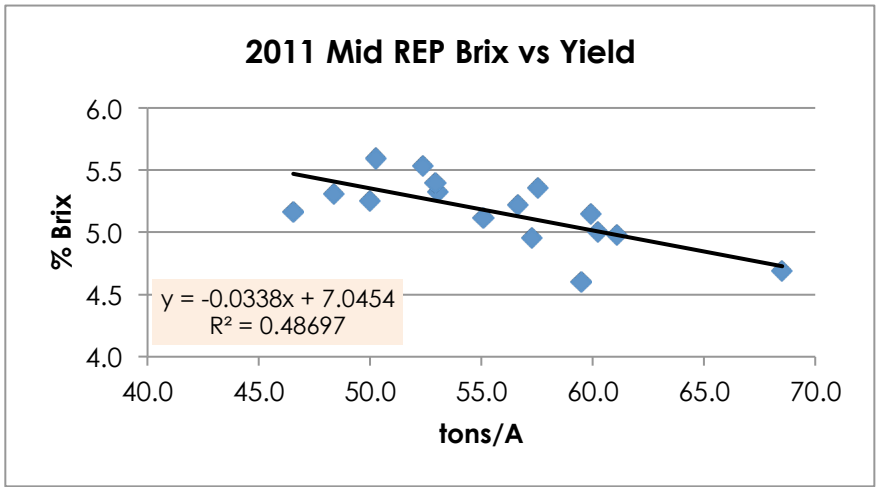


Figure 1. Relationship between tomato fruit yield and soluble solids for the varieties evaluated in 2011. There was no relationship found in the early varieties (top), but a negative correlation was observed for the mid-maturity lines. Each point is the mean of all data points within each trial.

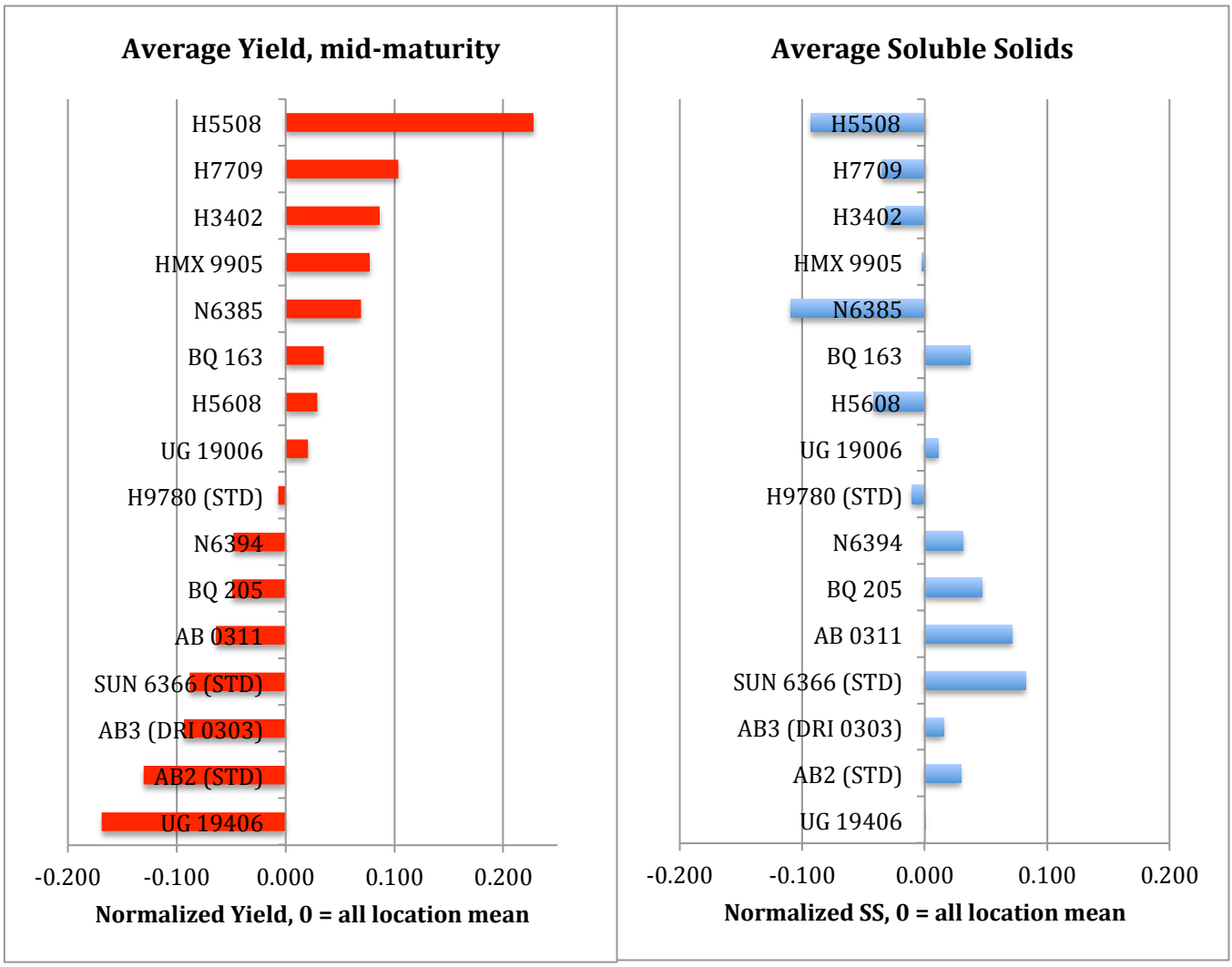


Figure 2. Normalized yield (left) and Brix (right) ratios for all mid maturity replicated entries at each trial location. Varieties that appear to the right of the centerline (0.000) have superior yield or soluble solids. For example, H5508 has 22% higher yield, but about 8% less soluble solids, than H9780. BQ163 had better than average results for both yield (~4%) and Brix (~4%).

Table 3a. 2011 Early maturity combined analysis.

	Variety	Yield tons/acre		Brix %	Color	pH
11	N6397	47.6 (01)	A	5.7 (03)	22.1 (03)	4.40 (12)
6	H1015	46.4 (02)	A B	5.6 (04)	21.0 (01)	4.43 (14)
10	K2770	45.6 (03)	A B C	5.2 (13)	23.3 (11)	4.33 (04)
4	BQ140	45.4 (04)	A B C	5.8 (01)	22.1 (03)	4.29 (02)
5	BQ204	44.7 (05)	A B C	5.4 (09)	22.3 (06)	4.38 (10)
13	HMX1889	44.1 (06)	B C D	5.1 (14)	22.5 (07)	4.44 (15)
14	UG15308	44.0 (07)	B C D	5.4 (09)	22.9 (10)	4.32 (03)
15	UG15908	43.5 (08)	B C D E	5.5 (07)	24.0 (13)	4.37 (08)
1	APT410 (STD)	42.8 (09)	C D E F	5.3 (11)	22.6 (08)	4.36 (06)
9	K2769	41.3 (10)	D E F G	5.6 (05)	23.6 (12)	4.39 (11)
2	BOS602	40.8 (11)	E F G	5.3 (12)	24.3 (14)	4.34 (05)
8	H3044	40.1 (12)	F G	4.9 (15)	22.1 (03)	4.41 (13)
12	SVR1245	39.5 (13)	G	5.8 (02)	25.5 (15)	4.24 (01)
7	H2206 (STD)	39.2 (14)	G	5.5 (06)	22.6 (08)	4.37 (07)
3	BOS686	38.9 (15)	G	5.4 (08)	21.1 (02)	4.37 (08)
	Mean	42.9		5.4	22.8	4.36
	CV	7.3		4.2	5.6	1.3
	LSD @ 0.05	3.13		0.22	1.27	0.055
	Var X Loc LSD @ 0.05	4.43		NS	NS	0.078
	# Locations	2		2	2	2

Numbers in parentheses (x) represent relative ranking within a column.
LSD = Least significant difference at the 95% confidence level. Means followed by the same letter are not significantly different. NS = not significant.
CV = coefficient of variation (%), a measure of the variability in the experiment.

Table 3b. 2011 early maturity processing tomato variety trial, Fresno County.

Variety	Yield tons/acre		Brix %	Color	pH
N6397	58.7 (01)	A	5.2 (03)	21.3 (03)	4.35 (09)
K2770	57.4 (02)	A	4.8 (13)	22.8 (11)	4.31 (03)
H1015	57.4 (03)	A	5.2 (05)	21.0 (01)	4.38 (14)
BQ140	57.2 (04)	A	5.3 (01)	21.5 (04)	4.27 (01)
UG 15908	54.3 (05)	A B	5.1 (07)	23.3 (13)	4.37 (13)
BQ204	54.1 (06)	A B	4.9 (09)	22.0 (07)	4.35 (11)
HMX1889	53.5 (07)	A B C	4.8 (14)	21.8 (06)	4.40 (15)
H3044	53.2 (08)	A B C	4.3 (15)	22.0 (07)	4.35 (10)
UG 15308	53.0 (09)	A B C	4.9 (12)	22.3 (10)	4.34 (04)
BOS686	50.9 (10)	B C D	4.9 (09)	21.0 (01)	4.36 (12)
K2769	50.7 (11)	B C D	5.2 (03)	23.3 (13)	4.34 (05)
APT410 (STD)	50.2 (12)	B C D	5.0 (08)	21.5 (04)	4.35 (08)
SVR1245	48.9 (13)	B C D	5.3 (02)	25.3 (15)	4.27 (01)
BOS602	47.8 (14)	C D	4.9 (09)	22.8 (11)	4.34 (06)
H2206 (STD)	45.7 (15)	D	5.1 (06)	22.0 (07)	4.34 (07)
Mean	52.9		5.0	22.2	4.34
CV	7.8		4.5	5.1	0.9
LSD @ 0.05	5.87		0.32	1.61	0.053

Table 3c. Early maturity processing tomato variety trial, Yolo County.

Variety	Yield tons/acre		Brix %	Color	pH
N6397	36.5 (01)	A	6.1 (03)	23.0 (06)	4.45 (12)
APT410 (STD	35.5 (02)	A B	5.7 (11)	23.8 (10)	4.38 (07)
H1015	35.4 (03)	A B	6.0 (04)	21.0 (01)	4.49 (15)
BQ204	35.2 (04)	A B C	5.8 (10)	22.5 (04)	4.42 (10)
UG 15308	35.0 (05)	A B C D	5.8 (09)	23.5 (09)	4.31 (02)
HMX1889	34.6 (06)	A B C D	5.5 (14)	23.3 (07)	4.49 (14)
K2770	33.8 (07)	B C D E	5.7 (11)	23.8 (10)	4.36 (05)
BOS602	33.7 (08)	B C D E	5.7 (13)	25.8 (14)	4.34 (04)
BQ140	33.5 (09)	B C D E	6.3 (01)	22.8 (05)	4.31 (02)
UG 15908	32.8 (10)	C D E	5.9 (07)	24.8 (13)	4.38 (06)
H2206 (STD)	32.6 (11)	D E	5.9 (05)	23.3 (07)	4.39 (09)
K2769	32.0 (12)	E F	5.9 (05)	24.0 (12)	4.44 (11)
SVR1245	30.1 (13)	F	6.2 (02)	25.8 (14)	4.21 (01)
H3044	27.0 (14)	G	5.4 (15)	22.3 (03)	4.48 (13)
BOS686	26.8 (15)	G	5.9 (08)	21.3 (02)	4.39 (08)
Mean	33.0		5.8	23.4	4.39
CV	5.2		3.9	6.0	1.6
LSD @ 0.05	2.43		0.32	2.00	0.099

Table 4a. 2011 mid-maturity processing tomato observational combined analysis.

	Variety	Yield tons/acre						Brix %	Color	pH
11	N6398	57.4 (01)	A					4.4 (13)	22.5 (04)	4.52 (06)
9	N6404	56.0 (02)	A					5.1 (09)	23.7 (10)	4.51 (05)
10	N6402	53.1 (03)	A	B				5.3 (03)	22.2 (03)	4.58 (09)
13	UG 19306*	52.1 (04)	A	B				5.2 (06)	23.6 (09)	4.46 (02)
5	DRI 0319	47.5 (05)		B	C			5.4 (02)	23.5 (08)	4.45 (01)
12	HMX 1890	45.4 (06)		B	C			5.0 (12)	22.5 (04)	4.61 (13)
7	HMX 1885	43.6 (07)			C	D		5.1 (08)	21.7 (02)	4.47 (03)
2	BQ265	43.2 (08)			C	D		5.2 (07)	25.5 (13)	4.48 (04)
6	HMX 1884	41.0 (09)			C	D	E	5.1 (11)	22.8 (06)	4.58 (10)
8	HM 9903	40.5 (10)			C	D	E F	5.1 (09)	20.8 (01)	4.58 (11)
1	BQ186	37.1 (11)				D	E F	5.7 (01)	24.5 (12)	4.60 (12)
4	C299	34.3 (12)					E F	5.3 (05)	23.2 (07)	4.55 (07)
3	C298	32.7 (13)					F	5.3 (04)	23.7 (10)	4.57 (08)
	Mean	45.0						5.2	23.1	4.54
	CV	15.8						6.0	5.9	1.5
	LSD @ 0.05	8.18						0.36	1.57	0.076
	LSD @ 0.05 to compare UG 19306 vs others	8.58						0.38	1.65	0.080
	Locations	6						6	6	6

** Variety 1004 UG 19306 was not planted in Kern County. Least squares means for the variety are reported rather than arithmetic means.*

Numbers in parentheses (x) represent relative ranking within a column.
LSD = Least significant difference at the 95% confidence level. Means followed by the same letter are not significantly different. NS = not significant.
CV = coefficient of variation (%), a measure of the variability in the experiment.

Table 4b. Mid maturity observational combined analysis: Yield.

Variety	Yield tons/acre						Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
N6398	57.4	A					50.3	79.5	55.6	38.7	51.0	69.4
N6404	56.0	A					62.8	60.3	62.2	38.1	46.6	66.3
N6402	53.1	A	B				50.7	56.5	63.4	45.6	41.8	60.8
UG 19306	52.1	A	B				56.4	52.4	58.6	39.3		64.2
DRI 0319	47.5		B	C			57.4	51.1	48.8	34.2	30.1	63.6
HMX 1890	45.4		B	C			42.2	57.8	50.0	44.4	38.0	40.1
HMX 1885	43.6			C	D		52.4	52.3	50.1	40.5	21.6	44.5
BQ265	43.2			C	D		41.6	49.1	43.3	37.6	34.5	52.9
HMX 1884	41.0			C	D	E	52.1	40.4	51.1	35.1	28.9	38.6
HM 9903	40.5			C	D	E F	40.6	53.1	39.6	42.4	26.3	40.9
BQ186	37.1				D	E F	45.6	30.9	33.3	32.7	38.7	41.4
C299	34.3					E F	44.8	38.8	31.6	32.4	23.8	34.6
C298	32.7					F	29.6	33.2	27.1	36.3	27.5	42.5
Mean	45.0											
CV	15.8											
LSD @ 0.05	8.18											

LSD @ 0.05 to compare UG 19306 to others

8.58

** Variety 1004 UG 19306 was not planted in Kern County. Least squares means for the variety are reported rather than arithmetic means. .*

Table 4c. 2011 Mid maturity observational combined analysis: Brix.

Variety	Brix %						Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
BQ186	5.7	A					5.8	5.9	6.3	5.5	5.2	5.5
DRI 0319	5.4	A	B				5.3	5.2	5.4	6.0	4.7	5.8
N6402	5.3		B	C			5.4	4.7	4.8	6.1	5.7	5.2
C298	5.3		B	C			5.1	5.1	5.0	5.5	5.7	5.4
C299	5.3		B	C			4.9	5.3	4.9	5.7	5.2	5.6
UG 19306	5.2		B	C			5.1	4.5	5.0	5.8		5.9
BQ265	5.2		B	C			4.8	5.1	5.2	5.4	4.7	5.8
HMX 1885	5.1		B	C			5.2	4.7	4.7	5.7	4.6	5.8
HM 9903	5.1		B	C			4.8	4.9	5.0	5.9	4.8	5.1
N6404	5.1		B	C			5.0	4.7	5.0	5.7	4.7	5.4
HMX 1884	5.1		B	C			5.0	4.7	5.4	5.8	4.6	4.9
HMX 1890	5.0			C			4.9	4.7	4.7	5.4	4.9	5.4
N6398	4.4				D		4.3	4.4	4.3	4.8	4.1	4.5
Mean	5.2											
CV	6.0											
LSD @ 0.05	0.36											

LSD @ 0.05 to compare variety UG 19306 vs other varieties =

0.38

** Variety 1004 UG 19306 was not planted in Kern County. Least squares means for the variety are reported rather than arithmetic means.*

Observation varieties were not replicated so the statistical analysis could be performed on the combined data only.

Table 4d. 2011 mid maturity observational combined analysis: Color.

Variety	Color					Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
HM 9903	20.8	A				20.0	21.0	20.0	21.0	21.0	22.0
HMX 1885	21.7	A	B			21.0	21.0	21.0	23.0	23.0	21.0
N6402	22.2	A	B	C		22.0	23.0	23.0	20.0	23.0	22.0
HMX 1890	22.5		B	C		24.0	22.0	23.0	22.0	22.0	22.0
N6398	22.5		B	C		22.0	22.0	22.0	22.0	23.0	24.0
HMX 1884	22.8		B	C		22.0	22.0	23.0	23.0	24.0	23.0
C299	23.2		B	C	D	23.0	24.0	27.0	21.0	21.0	23.0
DRI 0319	23.5			C	D	22.0	24.0	25.0	23.0	24.0	23.0
UG 19306	23.6			C	D	23.0	23.0	26.0	24.0		22.0
N6404	23.7			C	D	22.0	25.0	26.0	22.0	25.0	22.0
C298	23.7			C	D	24.0	24.0	25.0	22.0	24.0	23.0
BQ186	24.5				D E	22.0	27.0	25.0	28.0	22.0	23.0
BQ265	25.5				E	27.0	26.0	27.0	25.0	24.0	24.0
Mean	23.1										
CV	5.9										
LSD @ 0.05	1.57										

LSD @ 0.05 to compare variety UG 19306 vs other varieties = 1.65

** Variety 1004 UG 19306 was not planted in Kern County. Least squares means for the variety are reported rather than arithmetic means.*

Table 4e. 2011 mid maturity observational combined analysis: pH.

Variety	pH					Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
DRI 0319	4.45	A				4.40	4.34	4.42	4.44	4.48	4.64
UG 19306	4.46	A				4.30	4.43	4.41	4.51		4.70
HMX 1885	4.47	A				4.45	4.36	4.47	4.40	4.47	4.68
BQ265	4.48	A	B			4.37	4.34	4.44	4.47	4.50	4.77
N6404	4.51	A	B	C		4.51	4.41	4.56	4.57	4.46	4.54
N6398	4.52	A	B	C		4.47	4.43	4.53	4.50	4.45	4.73
C299	4.55		B	C	D	4.40	4.36	4.61	4.55	4.43	4.94
C298	4.57			C	D	4.38	4.51	4.57	4.54	4.53	4.86
N6402	4.58			C	D	4.43	4.42	4.56	4.60	4.63	4.81
HMX 1884	4.58			C	D	4.49	4.47	4.55	4.54	4.53	4.89
HM 9903	4.58			C	D	4.58	4.55	4.57	4.47	4.46	4.86
BQ186	4.60				D	4.51	4.50	4.57	4.49	4.56	4.97
HMX 1890	4.61				D	4.59	4.50	4.57	4.57	4.53	4.91
Mean	4.54										
CV	1.5										
LSD @ 0.05	0.076										

LSD @ 0.05 to compare variety UG 19306 vs other varieties= 0.080

Observation varieties were not replicated so the statistical analysis could be performed on the combined data only.

Table 5a. 2011 mid maturity processing tomato replicated combined analysis.

	Variety	Yield tons/acre												Brix %	Color	pH
7	H5508	68.5 (01)	A											4.7 (15)	23.2 (07)	4.42 (05)
9	H7709	61.1 (02)		B										5.0 (13)	23.5 (10)	4.50 (11)
6	H3402	60.2 (03)		B										5.0 (12)	22.6 (02)	4.54 (14)
11	HMX 9905	59.9 (04)		B	C									5.1 (10)	24.0 (14)	4.56 (15)
12	N6385	59.5 (05)		B	C	D								4.6 (16)	23.7 (12)	4.51 (12)
4	BQ 163	57.5 (06)			C	D	E							5.4 (04)	23.2 (05)	4.47 (09)
8	H5608	57.3 (07)				D	E	F						5.0 (14)	22.0 (01)	4.51 (13)
15	UG 19006	56.6 (08)					E	F						5.2 (08)	23.2 (05)	4.42 (04)
10	H9780 (STD)	55.1 (09)						F	G					5.1 (11)	23.7 (11)	4.42 (03)
13	N6394	53.0 (10)							G	H				5.3 (05)	22.7 (03)	4.58 (16)
5	BQ 205	52.9 (11)							G	H				5.4 (03)	24.0 (13)	4.45 (06)
2	AB 0311	52.4 (12)								H	I			5.5 (02)	22.9 (04)	4.38 (01)
14	SUN 6366 (STD)	50.2 (13)									I	J		5.6 (01)	24.9 (16)	4.50 (10)
3	AB3 (DRI 0303)	50.0 (14)									I	J		5.3 (07)	23.4 (09)	4.46 (08)
1	AB2 (STD)	48.4 (15)										J	K	5.3 (06)	24.1 (15)	4.45 (07)
16	UG 19406	46.5 (16)											K	5.2 (09)	23.3 (08)	4.41 (02)
	Mean	55.6												5.2	23.4	4.47
	CV	7.5												4.9	4.9	1.4
	LSD @ 0.05	2.42												0.15	0.66	0.037
	Variety X Location LSD @ 0.05	5.93												0.36	1.61	0.091
	# Locations	6												6	6	6

LSD = Least significant difference at the 95% confidence level. Means followed by the same letter are not significantly different.
NS = not significant.
CV = coefficient of variation (%), a measure of the variability in the experiment.
Variety x location LSD = LSD when comparing varieties across locations.
Numbers in parenthesis are the relative ranking of each variety within a column.

Table 5b. 2011 mid-maturity replicated combined analysis: YIELD.

Variety	Yield tons/acre										Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
H5508	68.5	A									58.6	77.4	62.5	66.5	64.5	80.7
H7709	61.1		B								60.7	61.4	57.8	62.9	61.8	62.1
H3402	60.2		B								52.6	65.9	56.6	53.8	66.8	67.2
HMX 9905	59.9		B	C							59.7	62.5	60.4	53.9	58.8	63.8
N6385	59.5		B	C	D						49.9	69.7	59.9	51.9	61.9	64.2
BQ 163	57.5			C	D	E					54.1	66.4	54.8	52.6	58.0	59.4
H5608	57.3				D	E	F				56.0	68.5	56.8	44.5	60.1	58.3
UG 19006	56.6					E	F				54.0	58.5	54.8	57.3	55.5	59.4
H9780 (STD)	55.1						F	G			54.2	54.6	55.2	46.1	59.4	62.2
N6394	53.0							G	H		53.3	58.2	57.3	49.1	47.6	51.4
BQ 205	52.9							G	H		56.4	54.1	54.0	46.5	50.1	55.8
AB 0311	52.4								H	I	54.8	58.8	52.7	39.6	48.2	59.0
SUN 6366 (STD)	50.2									I J	45.2	47.0	47.0	42.0	62.9	60.6
AB3 (DRI 0303)	50.0									I J	51.6	46.4	54.1	48.6	54.1	46.0
AB2 (STD)	48.4									J K	54.5	46.1	52.1	47.3	42.2	46.6
UG 19406	46.5									K	42.5	50.4	47.6	40.2	41.2	56.0
Mean	55.6										53.6	59.1	55.2	50.2	55.8	59.5
CV	7.5										5.6	7.1	7.0	6.8	12.0	6.6
LSD @ 0.05	2.42										4.27	5.95	5.54	4.86	11.15	5.63
Variety X Location LSD @ 0.05	5.93															

Table 5c. 2011 mid-maturity replicated combined analysis: BRIX.

Variety	Brix %										Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
SUN 6366 (STD)	5.6	A									5.6	5.4	5.4	6.0	5.1	6.0
AB 0311	5.5	A	B								5.5	5.1	5.4	6.0	5.3	5.9
BQ 205	5.4		B	C							5.3	4.9	5.1	5.7	5.4	6.1
BQ 163	5.4			C	D						5.2	4.8	5.3	6.1	5.3	5.6
N6394	5.3			C	D						5.1	4.7	5.1	6.1	5.3	5.7
AB2 (STD)	5.3			C	D	E					5.2	4.9	5.1	5.8	5.3	5.7
AB3 (DRI 0303)	5.3				D	E	F				5.2	5.0	5.1	5.7	4.9	5.7
UG 19006	5.2				D	E	F				5.1	4.6	5.3	5.6	5.1	5.8
UG 19406	5.2					E	F				5.0	4.8	5.0	5.7	5.0	5.5
HMX 9905	5.1						F	G			5.1	5.0	5.1	5.6	5.0	5.2
H9780 (STD)	5.1						F	G	H		5.0	4.7	5.2	5.6	4.8	5.3
H3402	5.0							G	H	I	4.8	4.6	5.0	5.6	4.8	5.2
H7709	5.0								H	I	4.8	4.7	5.1	5.2	4.8	5.2
H5608	5.0									I	4.5	4.4	5.0	5.9	4.8	5.1
H5508	4.7									J	4.6	4.1	4.7	5.3	4.5	4.8
N6385	4.6									J	4.5	4.5	4.4	5.3	4.4	4.6
Mean	5.2										5.0	4.8	5.1	5.7	5.0	5.4
CV	4.9										3.8	4.2	5.3	6.0	5.6	4.0
LSD @ 0.05	0.15										0.27	0.28	0.38	0.48	0.46	0.31
Variety X Location LSD @ 0.05	0.36															

Table 5d. 2011 mid-maturity replicated combined analysis: COLOR.

Variety	Color								Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
H5608	22.0	A							21.8	21.0	22.3	22.3	22.3	22.5
H3402	22.6	A	B						22.8	22.3	22.5	22.8	22.3	23.0
N6394	22.7	A	B	C					23.3	23.3	22.5	21.8	22.7	22.5
AB 0311	22.9		B	C	D				22.5	23.5	25.3	22.0	22.0	22.0
BQ 163	23.2		B	C	D	E			23.3	22.8	23.5	23.8	24.0	22.0
UG 19006	23.2		B	C	D	E			21.8	23.5	24.8	24.0	23.0	22.0
H5508	23.2		B	C	D	E			22.5	23.0	24.5	23.8	23.3	22.3
UG 19406	23.3			C	D	E	F		22.3	23.8	26.8	22.5	22.3	22.0
AB3 (DRI 0303)	23.4				D	E	F	G	23.3	23.8	24.0	23.5	23.7	22.5
H7709	23.5				D	E	F	G	24.0	23.3	23.0	23.0	24.3	23.8
H9780 (STD)	23.7					E	F	G	23.0	23.8	23.5	25.0	23.7	23.0
N6385	23.7					E	F	G	22.8	22.5	24.3	25.0	23.7	24.3
BQ 205	24.0						F	G	22.8	24.8	26.3	24.0	23.7	22.3
HMX 9905	24.0							G	24.8	24.8	24.3	23.3	23.3	23.5
AB2 (STD)	24.1							G	23.5	25.3	25.5	23.8	23.0	23.3
SUN 6366 (STD)	24.9							H	24.5	26.0	26.8	24.5	24.0	23.5
Mean	23.4								23.0	23.6	24.3	23.4	23.2	22.8
CV	4.9								5.0	4.3	6.3	4.5	3.6	4.4
LSD @ 0.05	0.66								1.65	1.44	2.18	1.52	1.40	1.41
Variety X Location LSD @ 0.05	1.61													

Table 5e. 2011 mid-maturity replicated combined analysis: pH.

Variety	pH									Yolo	San Joaquin	Stanislaus	Fresno	Kern	Merced
AB 0311	4.38	A								4.29	4.28	4.42	4.32	4.40	4.59
UG 19406	4.41	A	B							4.29	4.36	4.36	4.39	4.33	4.71
H9780 (STD)	4.42	A	B	C						4.36	4.38	4.42	4.29	4.43	4.63
UG 19006	4.42		B	C	D					4.32	4.38	4.38	4.35	4.38	4.70
H5508	4.42		B	C	D					4.35	4.44	4.40	4.42	4.41	4.50
BQ 205	4.45			C	D	E				4.39	4.37	4.45	4.35	4.45	4.68
AB2 (STD)	4.45				D	E				4.33	4.38	4.57	4.32	4.43	4.70
AB3 (DRI 0303)	4.46					E	F			4.40	4.43	4.43	4.37	4.45	4.70
BQ 163	4.47					E	F	G		4.40	4.45	4.45	4.33	4.45	4.74
SUN 6366 (STD)	4.50						F	G		4.38	4.49	4.56	4.42	4.46	4.69
H7709	4.50						F	G		4.40	4.46	4.50	4.45	4.41	4.77
N6385	4.51							G		4.47	4.47	4.51	4.37	4.44	4.77
H5608	4.51							G		4.38	4.53	4.52	4.38	4.45	4.77
H3402	4.54								H	4.50	4.53	4.57	4.44	4.48	4.74
HMX 9905	4.56							H	I	4.49	4.51	4.60	4.46	4.48	4.82
N6394	4.58								I	4.52	4.51	4.61	4.51	4.56	4.79
Mean	4.47									4.39	4.43	4.48	4.38	4.44	4.70
CV	1.4									1.1	1.1	1.5	1.7	1.2	1.7
LSD @ 0.05	0.037									0.071	0.067	0.098	0.106	0.088	0.113
Variety X Location LSD @ 0.05	0.091														