

Project Title: UCCE Statewide Processing Tomato Variety Evaluation Trials, 2005

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Summary:

In 2005, 5 early and 5 mid-maturity processing tomato variety trials were conducted at multiple locations to identify varieties broadly adapted to California's diverse Central Valley production regions. Eleven replicated entries were evaluated in direct-seeded, early-maturity tests that were conducted in Contra Costa, Colusa, Fresno, and Yolo Counties. The combined locations analysis showed a variety x location interaction effect on fruit yield, color, and pH. Fruit soluble solids ($^{\circ}$ brix) were not affected by a location interaction. The Contra Costa and Colusa County trials had significantly higher yields than the single or double-row planted Fresno trials or the Yolo County trial. The overall statewide means for yield, $^{\circ}$ brix, color, and pH were 42.0 tons/A, 5.3%, 24.5, and 4.39, respectively. BOS 66508 and H 5003 performed most consistently across all locations. Statewide, both varieties yielded more than 45.0 tons/A of red fruit (<24.0 LED color) with a pH not exceeding 4.41 and that contained at least 5.5% soluble solids. High solids were also produced by the industry standard, Hypeel 45 (5.7%).

Fifteen observational and 16 replicated entries were evaluated in 3 transplanted and 2 direct-seeded mid-maturity trials. The direct-seeded trials were conducted in Fresno and Kern Counties while transplants were used in the Merced, Stanislaus, and Yolo County trials. The combined data analysis for the mid-maturity observational indicated that there were variety differences for all of the measured parameters but fruit color. HMX 4802 was the top yielding observational variety with 45.0 tons/A, but HMX 4802 could not be statistically separated from 9 other varieties. DRI 9730 and PS 607 were the lowest yielding varieties and averaged <30 tons/A. Fruit soluble solids for U 519, CPL 4863, HMX 4802, HMX 4799, U 567 and HMX 3859 were <5.4% and significantly lower than the fruit brix of all other observational varieties tested. The statewide averages for fruit color and pH were 23.6 and 4.39, respectively.

The statewide mid-maturity replicated trial means for fruit yield, $^{\circ}$ brix, color, and pH were 37.0 tons/A, 5.5%, 23.6, and 4.38, respectively. Location had an effect on all of these variety responses except color. There was nearly a 10 tons/A difference in yield between, Halley 3155 (33.0 tons/A), the lowest yielding variety, and U 232 (42.1 tons/A) the highest yielding line. High solids varieties that also yielded well included Sun 6366 and Sun 6368. H 2401 produced the most acidic fruit and Red Spring produced the least acidic fruit. Fruit of Sun 6360, Red Spring, H 5803 and 6 other varieties were significantly redder than fruit of PX 345 (25.2).

Procedures:

Variety selection, experimental design, and trial conduct: Early- and mid-maturity processing tomato varieties were uniformly evaluated in independent trials conducted by UC farm advisors using the same general experimental protocol. Varieties for entry into either the early- or the mid-maturity trials were selected for observational or replicated evaluation based on input received from processors. The replicated varieties in each trial were evaluated in a randomized complete block with 4 replications with plots that were one bed wide and 100' long. Observational varieties were tested in single-row plots without replication. Roughly 40% of the mid-season and all of the early-season maturity variety trials were direct-seeded. The remaining 60% of the mid-season maturity trials were transplanted. Test site preparation, transplant production, planting, harvesting, and field day activities were coordinated by the local advisor. Most of the trials were conducted in production fields with a grower's assistance. The Fresno County trials, however, were conducted at the Westside Research and Extension Center near Five Points, CA. After the trials were planted all of the cultural and pest management operations were conducted by the participating grower-cooperators and were the same operations as those conducted on the larger production field.

Establishment of the 2005 early-maturity trials: There were 5 early-maturity trials in 2005. Three of these were double-row planted and located in Colusa, Contra Costa, and Yolo County. The remaining two were conducted in adjacent plots in Fresno County and differed with respect to number of rows seeded per bed (single vs. double-row). Ten varieties were evaluated at all 4 locations and an additional variety, H 9997, was evaluated at only 3 locations (Table 1A). Hypeel 45, H 9280, and APT 410 served as the industry standards for soluble solid content, 1st early-maturity, and 2nd early-maturity, respectively. All of the tests were direct-seeded between mid-February and mid-March and machine-harvested between mid-July and mid-August.

Establishment of the 2005 mid-maturity trials: The mid-maturity trials were located in Kern, Fresno, Merced, Stanislaus, and Yolo counties (Table 1B). Trials were direct-seeded in the 2 south San Joaquin Valley locations whereas transplants were used to establish the 3 north San Joaquin-Sacramento Valley tests. There were 15 observational and 16 replicated mid-maturity trial entries (Table 1B). One replicated entry, Sun 6368, and two observational entries, SUN 6374 and U 519, were not included in the Stanislaus County trial. Kern's data from the observational portion of the test was not included in the combined trial analysis. All tests were planted between March and May and harvested in August or September.

Fruit quality and yield determinations: Ripe fruit were sampled from each plot at crop maturity and transported to PTAB for fruit °brix, color, and pH analyses. All of the trials were machine harvested except the Stanislaus mid-maturity trial that was hand-harvested. Fruit yields from this trial were estimated based on the weight of red fruit removed from plants in the middle 10' of each plot. Machine harvested trials used commercial harvest equipment that conveyed the fruit, from the entire 100' plot, to a GT wagon and electronically weighed.

Data Analysis: Combined locations and individual county data were subjected to an analysis of variance and mean separation procedures using SAS statistical software. When data were combined, a nested analysis of variance was conducted on each parameter, where the block factor was nested within location. Only when the analysis of variance yielded a significant F test, was the least significant difference (LSD) test used to separate the means.

Results:

Data interpretation and use of the least significant difference values: For most of the parameters that were measured, there was a significant location x variety interaction (indicated by a variety x location LSD value). This interaction, when present, prohibits mean comparisons using the combined data. Instead, the individual location data and their LSD values should be used. In the tables that follow, these correspond to LSD 1. In the rare instances that location did not influence variety response, the combined data can be used to make pairwise comparisons. The appropriate LSD to use in these cases depends on the variety pair selected for comparison. LSD 2 is used to compare variety means that were calculated based on the same number of observations. The LSD 3 is used to compare variety means that were calculated based on different numbers of observations. For example, in the early-maturity trials, location did not affect variety responses for fruit color. Thus, we can use the combined means to summarize the results. Mean separation for all possible variety pairs, however, requires the use of more than 1 LSD value because the mean fruit color for H 9997 was calculated using only 16

observations (4 locations x 4 plots) while 20 observations (5 locations x 4 plots) were used to calculate the means of all the other varieties in the early-maturity trials. Therefore, if we wish to compare the fruit color of H 9997 with the fruit color of any other variety the LSD 3 value would be the correct LSD to use. The LSD 2 value would be used to compare the means of variety pairs that did not include H 9997.

Replicated, early-maturity varieties: When the data were combined, a significant variety x location interaction effect was observed for fruit yield, color, and pH, but not fruit °brix (Table 2A). Fruit yields from the Yolo and Fresno County trials were statistically no different from one another but significantly lower than the yields obtained from the Colusa and Contra Costa County trials (Table 2B). Comparison of the two Fresno County trials indicated that there was no yield advantage to planting two-row beds (Fresno 2 = single row; Fresno 1 = double rows). The average yield across all locations and varieties tested was 42.0 tons/A (Tables 2A and 2B). Yields ranged from a low of 35.7 ton/A for U 446 and 37.0 for HA 3523 to a high of 47.5 tons/A for H 5003 and H 9997. The statewide average for fruit °brix was 5.3% (Table 2A and 2C). The leaders for fruit °brix were Hypeel 45 (5.7%) and H 5003 (5.7%). The lowest solids-producing varieties were H 9280 (4.9%) and U 250 (5.0%). H 9997, BOS 66508, H 5003 and HA 3523 fruit had color readings <24.0 (Table 2A and 2D). U 250 fruit had the worst color and produced a combined locations LED color reading of 26.3. PX 740 and Hypeel 45 fruit were the most acidic with pH values of 4.32 (Table 2A and 2E). Fruit from HA 3523 had a pH of 4.49, the highest pH-producing variety statewide.

Observational, mid-maturity varieties:

There were significant variety differences in fruit yield, °brix and pH when averaged across locations (Table 3A and 3B). The overall, high-yielding observational variety was HMX 4802 producing 45.0 tons/A. There were 10 other varieties, however, that comprised the high-yield group led by HMX 4802. Three of these varieties, Sun 6374, U 567, and HMX 4801 were also in the low-yield group that included varieties producing < 30 tons/A (PS 607 and DRI 9730). The overall mean for fruit °brix was 5.4% (Table 3A and 3C). Fruit °brix ranged from 5.8% for H 8004 and Sun 6371 to 4.9% for U 567. There were no significant differences among varieties for fruit color (Table 3A and 3D). Statewide, fruit color was very good and averaged 23.1. DRI 9730 and H 9780 led the group in fruit acidity with pH values of 4.29 and 4.30, respectively, and included 4 others. The pH of HMX 4801 fruit was 4.49, the least acidic variety over all locations, but included 5 others in this group (Table 3A and 3E).

Replicated, mid-maturity varieties: Fruit yields, °brix, and pH were influenced by trial location, while color was not (Table 4A). The mean yield over all locations was 37.0 tons/A (Table 4A and 4B). U 232 and Sun 6366 were the only two varieties that produced more than 40 tons/A, although UG 151 and Sun 6368 were also in the highest yielding group. The low yielders in this trial with less than 34.0 tons/A were Halley 3155, AB2, and U 005, but included 2 others in the lowest group. The leaders in fruit °brix were H 5803 (6.0%), AB2 (5.9%), HMX 3859 (5.9%) and Sun 6368 (5.8%) (Table 4A and 4C). The statewide average fruit °brix was 5.5% and none of the varieties tested had <5.0% mean soluble solids. Means for fruit color separated into 7 groups. There were 9 varieties in the top color group that was led by Sun 6360 (22.7) and Red Spring (22.7) (Table 4A and 4D). H 2401 produced the most acidic fruit with an average pH value of 4.28 (Table 4A and 4E). Other high-acid varieties (pH<4.35) included AB2, U 232, and H 9665.

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Table 1A. General description of the early-season maturing varieties evaluated in 2005

Seed Company	Replicated Entries	Genetic Traits ^y
Harris Moran	HMX 2853	\$VFFNP
Hazera Seeds, Inc.	HA 3523	\$VFFN
Heinz Seed	H 5003	\$VFFNP
	H 9280^z	\$VFFNP
	H 9997	\$VFFNP
Lipton/Unilever Bestfoods, N.A.	U 250	\$VFFNP
	U 446	\$VFFNP
Orsetti Seed Co., Inc.	BOS 66508	\$VFFNP
Seminis Vegetable Seeds, Inc.	APT 410	\$VFFNP
	HYPEEL 45	\$VFFNP
	PX 740	\$VFFNP

^y = \$ = hybrid; ϕ = open-pollinated; V = Verticillium wilt race 1 resistance; F = Fusarium race 1 resistance; FF= Fusarium race 1 and 2 resistance; FFF= Fusarium race 1, 2, and 3 resistance; N= Nematode (*M. incognita*) resistance; P = bacterial speck (*P. syringae* pv *tomato*) resistance.

^z Varieties in bold are industry standards.

Table 1B. General description of the mid-season maturing varieties evaluated in 2005

Seed Company	Replicated Entries		Observational Entries	
	Variety	Genetic Traits ^y	Variety	Genetic Traits
AB Seeds	AB 2^z	\$VFFP		
California Pure Line Tomato Seeds, Inc.			CPL 4863- N	ϕ VFFN
DeRuiter Seeds			DRI 9730	\$VFFNP
Harris Moran	HMX 3859	\$VFFNP	HMX 4798	\$VFFFNP
			HMX 4799	\$VFFNP
			HMX 4801	\$VFFNP
			HMX 4802	\$VFFFNP
Heinz Seed	H 2401	\$VFFNP	H 8004	\$VFFNP
	H 2601	\$VFFNP	H 9780	\$VFFNP
	H 5803	\$VFFNP		
	H 8892	\$VFFN		
	H 9665	\$VFFNP		
Lipton/Unilever Bestfoods, N.A.	U 005	\$VFFNP	U 519	\$VFFNP
	U 232	\$VFFNP	U 567	\$VFFNP
Nippon Del Monte Co.			NDM 3379	\$VFFNP
Nunhems USA, Inc.	RED SPRING	\$VFFNP	SUN 6371	\$VFFNP
	SUN 6360	\$VFFNP	SUN 6374	\$VFFNP
	SUN 6366	\$VFFNP		
	SUN 6368	\$VFFNP		
	HALLEY			
Orsetti Seed Co., Inc.	3155	\$VFF	BOS 67374	\$VFFNP
Seminis Vegetable Seeds, Inc.	PS 345	\$VFFNP	PX 607	\$VFFN
United Genetics Seeds Co.	UG 151	\$VFFN		

^y and ^z See footnotes for Table 1A.

Table 2A. 2005 fruit yield, °brix, color, and pH of replicated, early-maturing varieties across all locations.

Variety	5 locations combined				
	Yield (tons/acre) ^a		°Brix	Color	pH
H 5003	47.5	A	5.7	23.9	4.41
H 9997	47.5* ^b	A	5.2*	23.4*	4.43*
BOS 66508	45.1	B	5.5	23.8	4.35
U 250	44.8	B	5.0	26.3	4.40
HMX 2853	42.4	C	5.3	25.4	4.43
APT 410	42.1	C	5.4	24.1	4.39
HyPeel 45	41.3	C D	5.7	25.1	4.32
H 9280	40.2	D E	4.9	25.3	4.37
PX 740	39.4	E	5.5	24.5	4.32
HA 3523	37.0	F	5.1	23.9	4.49
U 446	35.7	F	5.4	24.1	4.41
Mean =	42.0		5.3	24.5	4.39
LSD 1 ^c =	1.84		0.15	0.68	0.03
LSD 2 ^d =	1.95		0.16	0.72	0.03
C.V. ^e =	7.0		4.6	4.4	1.0
V x L LSD ^f =	4.1		NS ^g	1.5	0.06

^a Means followed by the same letter are not significantly different according to Fisher's unprotected least significant difference test (P=0.05).

^b * denotes a mean calculated using 16 observations. All other means were calculated using 20 observations.

^c LSD 2= the least significant difference used to make pairwise comparisons that do not include H 9997.

^d LSD 3= the least significant difference used to make pairwise comparisons that include H 9997.

^e C.V.= coefficient of variation.

^f V x L LSD = the least significant difference for the variety x location interaction.

^g NS = not significant.

Table 2B. Fruit yields of replicated, early-maturing varieties across all locations and by individual county in 2005.

Variety	Yield (tons/A)					
	5 locations combined	Yolo	Fresno 1 ^a	Fresno 2 ^b	Contra Costa	Colusa
H 5003	47.5 A ^c	42.9	48.0	44.6	52.6	49.4
H 9997	47.5* ^d A	NT ^e	45.5	44.7	49.2	50.5
BOS 66508	45.1 B	39.7	41.1	37.9	54.0	52.6
U 250	44.8 B	38.4	43.9	39.3	50.2	52.0
HMX 2853	42.4 C	36.1	38.4	38.4	48.2	51.0
APT 410	42.1 C	38.8	36.7	37.7	49.0	48.4
HyPeel 45	41.3 C D	37.9	37.4	37.0	45.9	48.2
H 9280	40.2 D E	33.1	37.3	35.1	43.2	52.1
PX 740	39.4 E	37.5	36.4	33.5	42.4	47.0
HA 3523	37.0 F	33.8	35.2	32.5	36.0	47.7
U 446	35.7 F	21.6	37.7	36.5	42.5	40.3
Mean =	42.0	36.0	39.8	37.9	46.7	49.0
LSD 1 ^f =		4.4	3.2	4.1	4.3	5.0
LSD 2 ^g =	1.84					
LSD 3 ^h =	1.95					
C.V. ⁱ =	7.0	8.4	5.6	7.5	6.4	7.1
V x L LSD ^j =	4.1					

^a Double-row planted

^b Single-row planted

^c Means followed by the same letter are not significantly different according to Fisher's unprotected least significant difference test (P=0.05).

^d* denotes a mean calculated using 16 observations. All other means were calculated using 20 observations.

^e NT = not tested.

^f LSD 1 = the least significant difference for making variety comparisons within a location

^g LSD 2 = the least significant difference used to make pairwise comparisons that do not include H 9997.

^h LSD 3 = the least significant difference used to make pairwise comparisons that include H 9997.

ⁱ C.V. = coefficient of variation.

^j V x L LSD = the least significant difference for the variety x location interaction.

Table 2C. Fruit °brix of replicated early-maturing varieties across all locations and by individual county in 2005.

Variety	°brix						
	5 locations combined		Yolo	Fresno 1	Fresno 2	Contra Costa	Colusa
HyPeel 45	5.7	A	5.2	5.8	5.8	6.0	6.0
H 5003	5.7	A	5.1	5.9	5.7	5.8	6.2
BOS 66508	5.5	B	5.1	5.7	5.6	5.5	5.8
PX 740	5.5	B	5.3	5.6	5.2	5.8	5.7
APT 410	5.4	C	4.9	5.6	5.2	5.3	5.8
U 446	5.4	C	4.8	5.5	5.3	5.6	5.6
HMX 2853	5.3	C	4.9	5.2	5.0	6.0	5.7
H 9997	5.2*	D	NT	5.1	5.0	5.2	5.4
HA 3523	5.1	D E	4.6	5.1	5.1	5.2	5.4
U 250	5.0	E F	4.6	5.1	4.9	5.2	5.3
H 9280	4.9	F	4.7	4.9	4.7	5.1	5.1
Mean =	5.3		4.9	5.4	5.2	5.5	5.6
LSD 1 =			0.4	0.2	0.3	0.4	0.4
LSD 2 =	0.15						
LSD 3 =	0.16						
C.V.=	4.6		6.3	3.1	3.8	5.0	4.4
V x L LSD =	NS						

See footnotes for Table 2B.

NS= not significant.

Table 2D. Fruit color of replicated, early-maturing varieties across all locations and by individual county in 2005.

Variety	Color						
	5 locations combined		Yolo	Fresno 1	Fresno 2	Contra Costa	Colusa
H 9997	23.4*	A	NT	23.5	23.3	23.5	23.5
BOS 66508	23.8	A	24.3	23.0	22.3	24.3	25.0
H 5003	23.9	A B	26.8	22.3	23.0	24.0	23.3
HA 3523	23.9	A B	25.0	22.5	22.5	24.5	24.8
APT 410	24.1	A B	25.5	23.8	23.0	24.5	23.8
U 446	24.1	A B	26.3	23.0	22.8	23.5	25.0
PX 740	24.5	B C	24.5	24.3	24.3	24.5	24.8
HyPeel 45	25.1	C D	26.5	24.0	24.3	25.3	25.5
H 9280	25.3	D	27.5	24.3	24.0	24.5	26.3
HMX 2853	25.4	D	27.0	24.0	24.8	25.5	25.8
U 250	26.3	E	27.8	26.5	25.3	25.5	26.3
Mean =	24.5		26.1	23.7	23.6	24.5	24.9
LSD 1 =			NS	1.3	1.0	1.1	1.6
LSD 2 =	0.68						
LSD 3 =	0.72						
C.V.=	4.4		6.6	3.9	2.9	3.1	4.4
V x L LSD =	1.5						

See Table 2B footnotes.

NS = not significant.

Table 2E. Fruit pH of replicated, early-maturing varieties across all locations and by individual county in 2005.

Variety	pH						
	5 locations combined		Yolo	Fresno 1	Fresno 2	Contra Costa	Colusa
PX 740	4.32	A	4.31	4.30	4.29	4.34	4.37
HyPeel 45	4.32	A	4.31	4.29	4.27	4.32	4.43
BOS 66508	4.35	B	4.38	4.32	4.28	4.33	4.46
H 9280	4.37	B C	4.38	4.33	4.34	4.32	4.46
APT 410	4.39	C D	4.42	4.35	4.36	4.34	4.47
U 250	4.40	D E	4.45	4.37	4.31	4.39	4.50
H 5003	4.41	D E	4.40	4.35	4.36	4.40	4.51
U 446	4.41	D E	4.51	4.38	4.38	4.37	4.44
H 9997	4.43*	E	NT	4.40	4.40	4.41	4.51
HMX 2853	4.43	E	4.48	4.42	4.39	4.38	4.48
HA 3523	4.49	F	4.54	4.45	4.41	4.52	4.55
Mean =	4.39		4.42	4.36	4.35	4.37	4.47
LSD 1 =	0.03						
LSD 2 =	0.03						
LSD 3 =			0.06	0.06	0.06	0.06	0.07
C.V. =	1.0		1.0	1.0	1.0	1.0	1.0
V x L LSD =	0.06						

See Table 2B footnotes.

Table 3A. 2005 fruit yield, °brix, color, and pH of observational mid-maturing varieties across all locations.

Variety	4 locations combined							
	Yield (tons/A) ^a					° brix	Color	pH
HMX 4802	45.0	A				5.1	24.5	4.46
HMX 4799	40.8	A	B			5.0	22.0	4.43
BOS 67374	40.4	A	B	C		5.5	22.0	4.36
CPL 4863	40.2	A	B	C		5.1	23.0	4.39
NDM 3379	40.0	A	B	C		5.5	23.8	4.41
H 9780	39.3	A	B	C		5.4	24.3	4.30
H 8004	38.8	A	B	C		5.8	23.0	4.35
SUN 6374	37.4 ^{*b}	A	B	C	D	5.7	23.4	4.37
U 567	36.3	A	B	C	D	4.9	23.5	4.45
HMX 4801	35.9	A	B	C	D	5.4	22.0	4.49
U 519	34.8 [*]		B	C	D	5.2	22.4	4.46
HMX 4798	32.6		B	C	D	5.6	23.0	4.39
Sun 6371	31.5			C	D	5.8	22.5	4.34
PS 607	29.3				D	5.5	22.8	4.40
DRI 9730	29.2				D	5.7	24.0	4.29
	Mean =	37.2				5.4	23.1	4.39
	LSD 2 ^c =	9.1				0.4	NS ^d	0.08
	LSD 3 ^e =	9.8				0.39	NS	0.08
	LSD 4 ^f =	10.5				0.42	NS	0.09
	C.V. ^g =	17.1				5.0	5.9	1.3

^a Means followed by the same letter are not significantly different according to Fisher's unprotected least significant difference test (P=0.05).

^b * denotes a mean calculated using 16 observations. All other means were calculated using 20 observations.

^c LSD 2 = the least significant difference used to make pairwise comparisons that do not include Sun 6374 or U 519

^d NS = not significant.

^e LSD 3 = the least significant difference used to make pairwise comparisons that include Sun 6374 or U 519.

^f LSD 4 = the least significant difference used to make pairwise comparisons between Sun 6374 and U 519.

^g C.V.= coefficient of variation.

Table 3B. Fruit yields of observational, mid-maturing varieties across all locations and by individual county in 2005.

Variety	Yield (Tons/A)								
	4 locations combined			Fresno	Merced	Stanislaus	Yolo		
HMX 4802	45.0	A			55.1	41.1	37.8	46.0	
HMX 4799	40.8	A	B		51.7	24.6	43.2	43.8	
BOS 67374	40.4	A	B	C	53.0	26.1	29.3	53.4	
CPL 4863	40.2	A	B	C	55.4	25.7	36.4	43.2	
NDM 3379	40.0	A	B	C	48.4	22.5	40.8	48.3	
H 9780	39.3	A	B	C	63.9	20.0	24.4	49.1	
H 8004	38.8	A	B	C	60.2	23.5	24.6	47.0	
SUN 6374	37.4*	A	B	C	D	49.7	26.4	NT	47.3
U 567	36.3	A	B	C	D	49.2	20.2	27.3	48.3
HMX 4801	35.9	A	B	C	D	48.3	21.9	29.3	44.2
U 519	34.8*		B	C	D	49.8	25.8	NT	39.9
HMX 4798	32.6		B	C	D	54.7	20.3	10.7	44.6
Sun 6371	31.5			C	D	49.5	19.5	13.9	43.2
PS 607	29.3				D	48.1	17.7	13.1	38.3
DRI 9730	29.2				D	48.4	19.4	3.6	45.3
Mean =	37.2					52.4	23.6	26.3	45.5
LSD 2 =	9.1								
LSD 3 =	9.8								
LSD 4 =	10.5								
C.V. =	17.1								

See Table 3A footnotes.

NT = Not Tested

Table 3C. Fruit °brix of observational, mid-maturing varieties across all locations and by individual county in 2005.

Variety	° brix									
	4 locations combined			Fresno	Merced	Stanislaus	Yolo			
H 8004	5.8	A				5.5	6.4	5.2	6.0	
SUN 6371	5.8	A				5.1	6.5	5.8	5.6	
SUN 6374	5.7*	A				5.5	5.8	NT	5.9	
DRI 9730	5.7	A				5.5	6.3	5.7	5.1	
HMX 4798	5.6	A	B			5.4	5.8	5.8	5.3	
PS 607	5.5	A	B			5.0	6.3	5.3	5.5	
BOS 67374	5.5	A	B	C		5.1	5.9	5.5	5.4	
NDM 3379	5.5	A	B	C		5.1	6.2	5.4	5.1	
H 9780	5.4	A	B	C	D	5.2	6.0	5.2	5.3	
HMX 4801	5.4	A	B	C	D	5.1	5.6	5.4	5.5	
U 519	5.2*		B	C	D	E	4.7	6.1	NT	5.0
CPL 4863	5.1			C	D	E	4.9	5.6	4.8	5.2
HMX 4802	5.1				D	E	4.7	5.2	5.1	5.2
HMX 4799	5.0					E	4.7	5.2	4.7	5.3
U 567	4.9					E	4.4	5.5	5.3	4.5
Mean =	5.4						5.1	5.9	5.3	5.3
LSD 2 =	0.39									
LSD 3 =	0.42									
LSD 4 =	0.45									
C.V. =	5.0									

See Table 3A footnotes.

Table 3D. Fruit color of observational mid-maturing varieties across all locations and by individual county in 2005.

Variety	Color				
	4 locations combined	Fresno	Merced	Stanislaus	Yolo
HMX 4799	22.0	25	20	21	22
HMX 4801	22.0	26	21	20	21
U 519	22.4*	25	20	NT	23
Sun 6371	22.5`	28	19	21	22
PS 607	22.8	25	20	24	22
H 8004	23.0	27	20	23	22
CPL 4863	23.0	26	22	22	22
HMX 4798	23.0	24	21	24	23
SUN 6374	23.4*	28	21	NT	22
U 567	23.5	26	22	22	24
NDM 3379	23.8	31	21	21	22
DRI 9730	24.0	28	21	24	23
H 9780	24.3	28	20	23	26
HMX 4802	24.5	29	23	23	23
Mean =	23.1	26.9	20.8	22.3	22.6
LSD =	NS				
C.V. =	5.9				

See Table 3A footnotes.

Table 3E. Fruit pH of observational mid-maturing varieties across all locations and by individual county in 2005.

Variety							pH			
	4 locations combined						Fresno	Merced	Stanislaus	Yolo
DRI 9730	4.29	A					4.34	4.31	4.22	4.30
H 9780	4.30	A					4.26	4.31	4.26	4.37
Sun 6371	4.34	A	B				4.30	4.33	4.34	4.37
H 8004	4.35	A	B	C			4.38	4.34	4.29	4.38
BOS 67374	4.36	A	B	C			4.36	4.37	4.30	4.39
SUN 6374	4.37*	A	B	C	D		4.36	4.37	NT	4.45
CPL 4863	4.39	B		C	D	E	4.36	4.45	4.32	4.42
HMX 4798	4.39	B		C	D	E	4.51	4.46	4.36	4.23
PS 607	4.40	B		C	D	E	4.44	4.32	4.34	4.49
NDM 3379	4.41	B		C	D	E	F	4.38	4.40	4.39
HMX 4799	4.43	C			D	E	F	4.46	4.40	4.34
U 567	4.45	D			E	F	4.51	4.41	4.36	4.53
HMX 4802	4.46	E			F	4.46	4.47	4.39	4.52	
U 519	4.46*	E			F	4.48	4.41	NT	4.55	
HMX 4801	4.49	F			4.63	4.42	4.37	4.52		
Mean =	4.39						4.42	4.38	4.33	4.43
LSD 2 =	0.08									
LSD 3 =	0.09									
LSD 4 =	0.09									
C.V. =	1.3									

See Table 3A footnotes

Table 4A. 2005 fruit yields, °brix, color and pH of replicated, mid-maturing varieties across all locations.

Variety	5 locations combined							
	Yield (tons/A)			°brix	Color	pH		
U 232	42.1	A ^a			5.1	23.2	4.34	
Sun 6366	40.1	A	B		5.6	23.8	4.42	
UG 151	39.2	A	B	C		5.2	23.1	4.45
Sun 6368	39.0 ^{*b}	A	B	C		5.8 [*]	24.2 [*]	4.44 [*]
PX 345	38.8	B		C		5.4	25.2	4.38
H 9665	37.9	B		C		5.0	24.0	4.34
H 8892	37.4	B		C	D	5.3	23.1	4.38
Red Spring	37.2	C		D	E	5.2	22.7	4.47
Sun 6360	37.2	C		D	E	5.2	22.7	4.41
H 2401	37.2	C		D	E	5.4	23.2	4.28
H 5803	36.7	C		D	E	6.0	22.9	4.38
HMX 3859	34.6	D		E	F	5.9	24.3	4.45
H 2601	34.4	E		F		5.4	24.2	4.38
U 005	33.5	F				5.4	24.5	4.35
AB 2	33.3	F				5.9	23.7	4.33
Halley 3155	33.0	F				5.6	23.3	4.35
Mean =	37.0				5.5	23.6	4.38	
LSD 2 ^c =	2.9				0.2	1.0	0.03	
LSD 3 ^d =	3.1				0.2	1.1	0.03	
C.V. ^e =	12.5				6.5	7.0	1.2	
V x L LSD ^f =	6.4				0.5	NS	0.07	

^a Means followed by the same letter are not significantly different according to Fisher's unprotected least significant difference test (P=0.05).

^b * denotes a mean calculated using 16 observations. All other means were calculated using 20 observations.

^c LSD 2= the least significant difference used to make pairwise comparisons that do not include Sun 6368.

^d LSD 3= the least significant difference used to make pairwise comparisons that include Sun 6368.

^e C.V.= coefficient of variation.

^f V x L LSD = the least significant difference for the variety x location interaction.

Table 4B. Fruit yields of replicated, mid-maturing varieties within and across locations and by individual county in 2005

Variety	Yield (tons /A)								
	5 locations combined			Yolo	Stanislaus	Fresno	Merced	Kern	
U 232	42.1	A ^a			44.8	33.2	60.1	27.3	44.9
Sun 6366	40.1	A	B		43.8	31.5	57.1	24.8	43.5
UG 151	39.2	A	B	C	40.0	38.1	53.3	21.3	43.5
Sun 6368	39.0 ^{*b}	A	B	C	44.2	NT ^c	54.1	24.7	33.2
PX 345	38.8		B	C	45.5	29.9	61.4	26.8	30.2
H 9665	37.9		B	C	37.7	26.8	60.2	26.7	38.1
H 8892	37.4		B	C	41.9	28.9	56.2	27.4	32.6
Red Spring	37.2			C	39.0	39.1	53.5	19.3	35.3
Sun 6360	37.2			C	39.0	35.0	54.2	23.5	34.3
H 2401	37.2			C	44.1	27.9	57.3	28.4	28.1
H 5803	36.7			C	39.6	31.0	56.6	27.4	28.6
HMX 3859	34.6			D	38.9	31.3	52.5	25.3	25.2
H 2601	34.4				34.8	29.0	55.4	21.0	31.8
U 005	33.5				32.9	23.6	58.0	21.2	31.7
AB 2	33.3				46.4	26.7	48.7	28.6	16.1
Halley 3155	33.0				43.2	27.5	52.9	22.9	18.4
Mean=	37.0				41.0	30.6	55.7	24.8	32.2
LSD 1 ^d =					2.6	NS ^e	6.9	4.7	7.8
LSD 2 ^f =	2.9								
LSD 3 ^g =	3.1								
C.V. ^h =	12.5				4.4	20.9	8.6	13.3	17.0
V x L LSD ⁱ =	6.4								

^a Means followed by the same letter are not significantly different according to Fisher's unprotected least significant difference test (P=0.05).

^b * denotes a mean calculated using 16 observations. All other means were calculated using 20 observations.

^c NT = not tested.

^d LSD 1 = the least significant difference for making variety comparisons within a location

^e NS = not significant.

^f LSD 2 = the least significant difference used to make pairwise comparisons that do not include Sun 6368.

^g LSD 3 = the least significant difference used to make pairwise comparisons that include Sun 6368.

^h C.V.= coefficient of variation.

ⁱ V x L LSD = the least significant difference for the variety x location interaction.

Table 4C. Fruit °brix of replicated, mid-maturing varieties across all locations and by individual county in 2005

Variety	°brix						
	5 locations combined	Yolo	Stanislaus	Fresno	Merced	Kern	
H 5803	6.0	A	5.7	5.8	5.5	6.2	6.7
AB 2	5.9	A	5.4	5.6	5.8	5.9	6.9
HMX 3859	5.9	A B	5.3	5.6	5.7	6.3	6.5
Sun 6368*	5.8*	A B	5.2	NS	5.7	6.2	6.2
Halley 3155	5.6	B C	5.3	5.7	5.6	5.3	6.3
Sun 6366	5.6	C D	5.2	5.7	5.5	5.9	5.6
H 2401	5.4	C D E	5.1	5.3	5.2	5.6	6.1
U 005	5.4	D E F	5.2	5.1	5.1	5.6	6.0
H 2601	5.4	D E F G	5.2	5.0	4.9	5.7	6.0
PX 345	5.4	D E F G	5.2	5.0	5.1	5.5	6.1
H 8892	5.3	E F G H	5.1	5.0	5.2	5.5	5.8
Red Spring	5.2	F G H I	4.9	4.8	5.1	5.5	5.8
Sun 6360	5.2	F G H I	4.9	4.9	4.9	5.4	5.9
UG 151	5.2	G H I	5.2	4.8	4.7	5.7	5.5
U 232	5.1	H I	4.9	5.2	5.0	5.9	4.7
H 9665	5.0	I	5.1	4.8	4.7	5.3	5.4
Mean =	5.5		5.2	5.2	5.2	5.7	5.9
LSD 1 =			0.4	0.4	0.4	0.3	0.9
LSD 2 =	0.2						
LSD 3 =	0.2						
C.V. =	6.5		4.8	5.4	5.3	4.2	10.1
V x L LSD =	0.5						

See Table 4B footnotes.

Table 4D. Fruit color of replicated, mid-maturing varieties across all locations and by individual county in 2005.

Variety	Color														
	5 locations combined					Yolo	Stanislaus	Fresno	Merced	Kern					
Sun 6360	22.7	A					23.0	21.3	25.0	20.0	24.0				
Red Spring	22.7	A					22.3	23.3	23.8	19.8	24.5				
H 5803	22.9	A	B				22.5	21.0	25.5	20.8	24.8				
UG 151	23.1	A	B	C			23.0	22.0	24.3	21.0	25.0				
H 8892	23.1	A	B	C			23.5	21.8	25.3	20.3	24.8				
H 2401	23.2	A	B	C	D			24.5	18.0	26.5	21.8	25.3			
U 232	23.2	A	B	C	D			23.5	22.3	26.3	20.0	24.0			
Halley 3155	23.3	A	B	C	D	E			23.8	22.5	23.8	21.5	25.0		
AB 2	23.7	A	B	C	D	E	F			23.5	22.8	25.0	21.5	25.5	
Sun 6366	23.8	B		C	D	E	F			23.0	23.3	24.8	21.0	27.0	
H 9665	24.0	C			D	E	F			24.5	22.3	26.8	21.3	25.0	
H 2601	24.2	D				E	F	G			23.5	22.5	26.5	20.5	27.8
Sun 6368	24.2*	D				E	F	G			24.3	NS	25.8	21.5	25.3
HMX 3859	24.3	E			F	G					24.5	24.0	25.3	21.8	25.8
U 005	24.5	F				G					24.5	23.3	26.0	22.3	26.3
PX 345	25.2	G									24.5	23.8	28.5	22.8	26.3
Mean =	23.6						23.6	22.3	25.5	21.1	25.4				
LSD 1 =							1.2	NS	1.6	1.7	2.0				
LSD 2 =	1.0														
LSD 3 =	1.1														
C.V. =	7.0						3.6	13.3	4.4	5.5	5.4				
V x L LSD =	NS														

See Table 4B footnotes.

Table 4E. Fruit pH of replicated, mid-maturing varieties across all locations and by individual county in 2005.

Variety						pH				
	5 locations combined					Yolo	Stanislaus	Fresno	Merced	Kern
H 2401	4.28	A				4.38	4.17	4.35	4.25	4.25
AB 2	4.33	B				4.40	4.22	4.34	4.32	4.36
U 232	4.34	B				4.42	4.24	4.45	4.33	4.26
H 9665	4.34	B	C			4.38	4.29	4.42	4.35	4.30
U 005	4.35	B	C	D		4.44	4.24	4.39	4.38	4.29
Halley 3155	4.35	B	C	D	E	4.35	4.28	4.37	4.42	4.34
H 5803	4.38		C	D	E	F	4.47	4.26	4.45	4.39
H 8892	4.38			D	E	F	4.42	4.29	4.42	4.39
PX 345	4.38				E	F	4.47	4.28	4.40	4.41
H 2601	4.38					F	4.42	4.31	4.47	4.37
Sun 6360	4.41					F	G	4.51	4.32	4.48
Sun 6366	4.42						G	H	4.50	4.33
Sun 6368	4.44*							H	I	4.49
HMX 3859	4.45							H	I	4.52
UG 151	4.45							I		4.53
Red Spring	4.47							I		4.56
Mean =	4.38									4.45
LSD 1 =										0.10
LSD 2 =	0.03									
LSD 3 =	0.03									
C.V. =	1.2									
V x L LSD=	0.07									
						1.6	0.7	1.0	0.9	1.3

See Table 4B footnotes.