Project Number: 96-L23

1996

Progress Report

ALMOND REGIONAL VARIETY TRIALS

Planted in 1993

University of California

TABLE OF CONTENTS

ALMOND REGIONAL VARIETY TRIALS

Planted in 1993

Warren C. Micke, Mario Viveros, Joseph H. Connell, Paul Verdegaal, James T. Yeager, Mary Ann Thorpe and Thomas M. Gradziel[1]

Almond Regional Variety Trials (RVTs) were designed to evaluate newer varieties in a semi-commercial (20 to 40 trees per variety) manner and to compare them to standard varieties such as Nonpareil, Mission and currently accepted pollenizers.

Previous RVTs were established between 1974 and 1981 in Kern, Colusa, Butte, San Joaquin and Fresno Counties. Since these trials were planted over several years, they had trees of different ages and variety combinations were somewhat different. Thus, the data from these trials were not directly comparable and at this point data collection has ended.

Three new RVTs were established in 1993, and this leaflet presents data collected from these trials. These RVTs are located in Butte County at the California State University at Chico farm (CSU-Chico), in San Joaquin County at the San Joaquin Delta College farm (Delta College) near Manteca and in Kern County at a Paramount Farming Company orchard (Kern) located south of Shafter and just off of 7th Standard road. At all locations signs are in place to identify each variety.

To be comparable these three new trials were all planted in the same year and with essentially the same variety composition. The only differences in variety composition were that Fritz was not included at the CSU-Chico trial (it was in the previous trial at this location) and Dottie Won was added to the Delta College plot. Some trees were planted/replanted after 1993. A few trees of several varieties were not available in 1993. Vandalism and a tornado knocked out a few trees at CSU-Chico and normal replanting occurred at all locations.

Varieties were planted on peach rootstock; Lovell for those at CSU-Chico and Nemaguard for trees in the Delta College and Kern plots. One exception, Kapareil, is being grown on both peach and peach-almond hybrid rootstocks at all locations.

The Kern plot is planted on a Milham sandy loam soil and is irrigated with micro-sprinklers. The trial at CSU-Chico is on a Vina loam soil and is irrigated with solid-set sprinklers. The Delta College trial is on a Delhi loamy sand soil and is flood irrigated.

Standard varieties are planted 1:1 with new varieties; Nonpareil for the early-mid blooming varieties and Mission for the late blooming varieties to ensure adequate pollination. In the Kern and Delta College trials, varieties are planted as a full row of 29 to 38 trees. With longer rows at CSU-Chico, each row has three different variety sections, with 21 to 25 trees per section. In addition to Nonpareil and Mission, a plot

---

[1]Warren C. Micke is Extension Pomologist, University of California, Davis. Mario Viveros, Joseph H. Connell and Paul Verdegaal are University of California Farm Advisors in Kern, Butte and San Joaquin Counties, respectively. James T. Yeager and Mary Ann Thorpe are Staff Research Associates with the Pomology Department, University of California, Davis. Thomas M. Gradziel is Associate Professor of Pomology, University of California, Davis.

of each of seven "new standard" varieties (other varieties commonly planted today) has been included. These new standard varieties are Butte, Carmel, Fritz (not at CSU-Chico), Monterey, Padre, Price and Sonora.

The new varieties being tested in these trials are Aldrich, Chips, Donna, Dottie Won (Delta College only), Kahl, Kapareil, Jenette, Jiml, Johlyn, Livingston, Morley, Plateau, Rosetta, Ruby, Sano, Savana, Wood Colony and Yokut. While several of these varieties are not new to the almond industry, they had not been adequately tested in the uniform RVT concept. In addition six numbered selection from a University of California at Davis almond breeding program were included in these trials. These are 1-87, 1-102W, 2-19 E, 2-43W, 13-1 and 25-75.

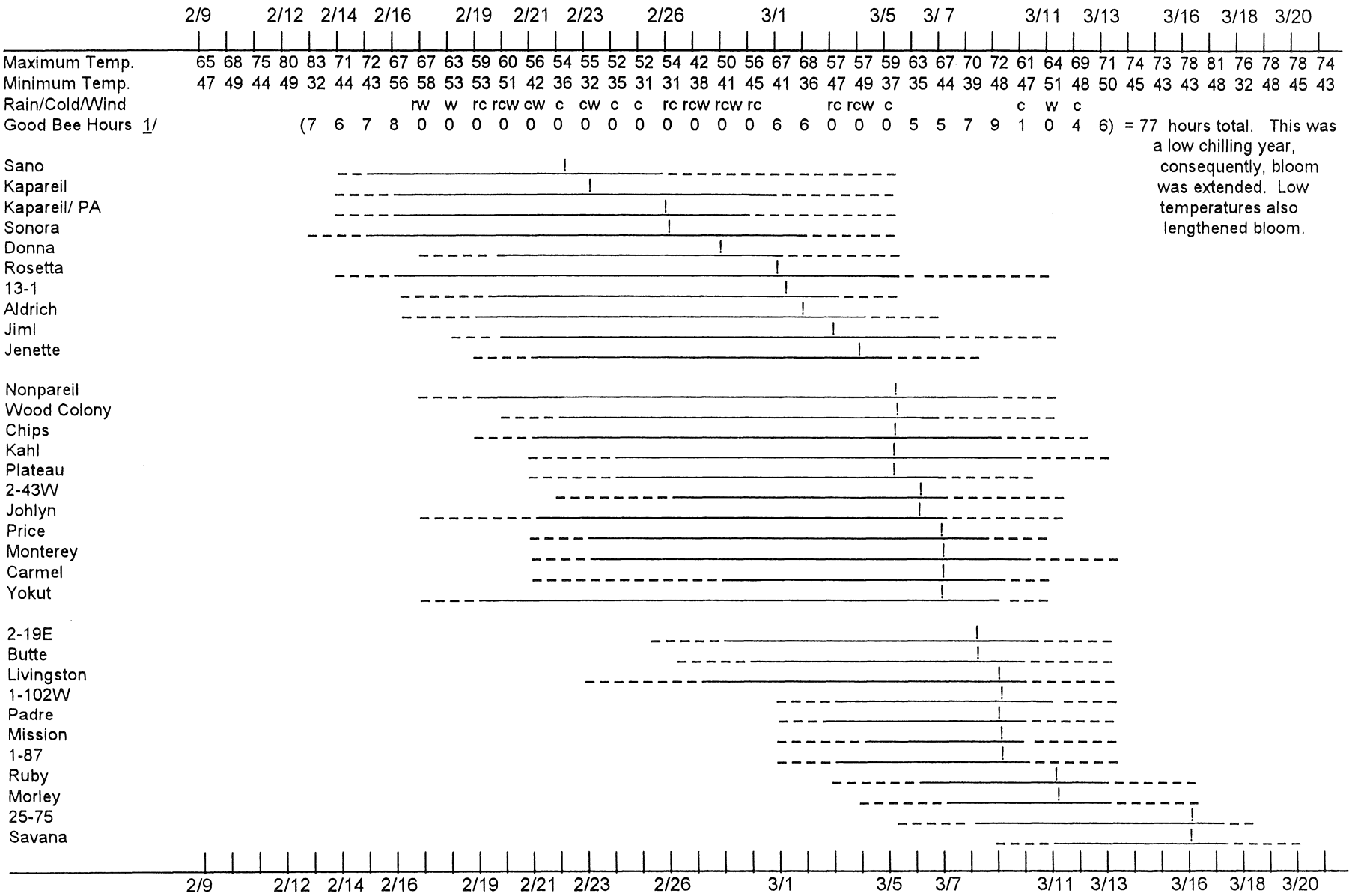
Data to be collected from these trials include bloom time, hull split/harvest, yield, and nut quality. Trees in these trials will also be observed and evaluated for growth characteristics, pest and disease susceptibility and noninfectious bud failure symptoms.

This 1996 report includes information, mostly in table form, on bloom time, hull split/harvest, yields, shelling percentage (percent kernel) and kernel defects. Production from these trees in their **fourth growing season** was affected by inclement weather at bloom in 1996. The Delta College plot was most affected, and the Kern trial was least affected. The bloom time weather so reduced the crop at the Delta College trial that only about half of the trial was harvested. Several varieties that were harvested at this location did not have an economically justifiable yield. A couple of varieties that were not harvested may have had greater production than some that were harvested.

The authors wish to thank the Almond Board of California for helping with tree purchase and for continued support of this project. The following nurseries supplied trees at reduced cost for these trials: Bright's Nursery, Burchell Nursery, Dave Wilson Nursery, Fowler Nursery, Sierra Gold Nurseries and Spoto Nursery. We particularly want to express our appreciation and thanks to the staffs of California State University at Chico, San Joaquin Delta College and Paramount Farming Company for excellent cooperation and for managing and maintaining these trials. The assistance of retired farm advisor Donald Rough, Cooperative Extension field assistants in Kern and San Joaquin Counties and field personnel of the University of California Pomology Department is gratefully acknowledged.

ALMOND REGIONAL VARIETY TRIAL - 1996 BLOOM

Planted in 1993 at the California State University Farm, Chico



Dashed line encompasses 1 to 100% bloom, solid line covers 10 to 90% bloom, full bloom date marked with a I = 80% bloom.

1/ Good Bee Hours = total daylight hours between 1% bloom on Sonora and 100% bloom on Mission when temperatures are ≥ 59 F, wind ≤ 10 mph, and no rain.

This is a cooperative project between The Almond Board of California, California State University-Chico, and University of California Cooperative Extension.

Prepared by: Joseph H. Connell, U.C. Farm Advisor, Butte County. 11/3/96.

MANTECA ALMOND REGIONAL VARIETY TRIAL
1996 BLOOM
S.J. DELTA COLLEGE

% BLOOM BY ROW

North end of plot

	2/11	2/14	2/17	2/21	2/24	2/27	3/2	3/7	3/12
Nonpareil #2			10	65	80	90			
Chips			1	30	70	90			
Nonpareil #6			10	63	90				
Johlyn		10	30	52	75	90			
Nonpareil #2			15	61	90				
Dottie Won				15	25	55	90		
Nonpareil Burchell			10	48	65	85			
Jenette			10	53	80	90			
Nonpareil #6			15	58	70				
Kahl				5	10	35	90		
Nonpareil #2			10	35	68	90			
Sano	5	31	65	90					
Nonpareil #6			10	55	80				
Yokut				15	35	65	90		
Nonpareil #2			10	48	75	85			
Plateau				10	25	40	80		
Mission #5								70	
2-43W	NA								
Mission #5								85	
Morley	NA								
Savana	NA								
Mission #5							2	75	95
Nonpareil #6			5	35	65	85			
Kapareil									
Nonpareil #2			10	41	60	85			
Kapareil/PA	NA								
Nonpareil #6			5	39	75	90			
Sonora	5	30	75	89	95				
Nonpareil #2			5	42	78	95			
Rosetta			20	41	80				
Nonpareil #6			5	35	75				
13-1			10	32	78	85			
Nonpareil #2			15	41	85				
Price				5	30	55			
Nonpareil Driver/#6			10	38	66	85			

	2/11	2/14	2/17	2/21	2/24	2/27	3/2	3/7	3/12
Aldrich				20	44	62	90		
Nonpareil #6			5	35	78	85			
Wood Colony					10	40	90		
Nonpareil Stuart			5	28	78	88			
Fritz				10	35	52	95		
Nonpareil #2			5	15	45	61	90		
Jiml							5	NA	NA
Nonpareil #6			5	18	45	58	95		
Donna				10	52	70	90		
Nonpareil #2			5	10	43	82			
Carmel				5	81	90			
Nonpareil Fowler			10	15	85	90			
Monterey				5	30	75			
Nonpareil #6			5	20	72	83			
Butte				15	65	88	90		
Mission #2							10	55	94
Livingston				5	10	25	45	90	
Mission							10	63	91
1-87							15	69	84
Mission #2								55	81
Padre							2	40	89
Mission #5							2	48	83
219-E				5	25	35	80		
Mission #5							2	41	91
1-102W					5	20	40	93	
Mission #5									
Ruby						5	10	78	92
Mission #5								29	76
25-75								43	84
25-75								45	90

1996 RAINFALL

MANTECA, CA

February	Inches	Wind ≥ 8 mph	March	Inches	Wind ≥ 8 mph
1			1		
2			2		
3	0.08		3	0.24	
4	1.18	11.8	4	0.35	
5	0.04		5		
6			6	0.04	
7			7		
8			8		
9			9		
10			10	0.04	
11			11	0.04	
12	0.04		12	1.38	
13			13		
14			14	0.04	
15	0.24		15		
16			16		
17			17		
18	0.04		18		
19	0.67	8.3	19		
20	0.51	11.0	20		
21	0.31	8.0	21		
22	0.04		22		10.24
23			23		
24	0.20		24		
25			25		
26			26		
27	0.16	9.6	27		
28		10.7	28	0.04	
29	0.04	8.5	29		
			30		
			31		
Total	3.55		Total	2.17	

Shaded dates = Bloom period

EFFECTIVE BLOOM PERIOD

Kern RVT - Paramount Farming Company

1996

Early Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Sano	2-08	2-15	2-19
Kapareil	2-12	2-15	2-20
Rosetta	2-12	2-16	2-21
Sonora	2-13	2-19	2-25
13-1	2-13	2-20	2-24

Mid-Season Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Nonpareil	2-15	2-19	2-22
Price	2-15	2-18	2-28
Jenette	2-15	2-20	2-29
Yokut	2-15	2-19	2-29
Johlyn	2-15	2-19	2-22
Plateau	2-16	2-19	2-22
Chips	2-16	2-19	2-21
Kahl	2-16	2-19	2-21
Fritz	2-17	2-22	2-26
Monterey	2-17	2-22	3-1
Aldrich	2-18	2-22	2-26
Wood Colony	2-18	2-23	3-2
1-102W	2-18	2-22	3-7
Jiml	2-18	2-22	3-1
Donna	2-18	2-18	2-22
Carmel	2-18	2-29	3-3
2-19E	2-18	2-22	3-1
2-43W	2-18	2-22	3-3

Late Season Blooming Varieties			
	Bloom Period		
	Beginning	**Full**	**End**
Butte	2-19	3-1	3-8
Livingston	2-19	3-1	3-9
Padre	2-19	3-7	3-4
1-87	2-20	3-2	3-9
25-75	2-22	3-2	3-10
Mission	2-24	3-2	3-9
Ruby	2-27	3-3	3-6
Morley	2-28	3-3	3-11
Savana	2-29	3-11	3-17

Bloom Observations

Good Blooming Varieties: Nonpareil, Chips, Jenette, Sano, Sonora, Rosetta, Aldrich, Donna, Carmel, Monterey, Mission, Ruby, Padre and Butte

Average Blooming Varieties: Wood Colony, Livingston, 1-87 and 2-19E

Poor Blooming Varieties: Johlyn, Kahl, Yokut, Morley, Kapareil, 13-1, Price, Fritz, Jiml, 1-102W and 25-75

Chilling Hours: 336 hours below 45°F

1996 Harvest Dates
Almond Regional Variety Trial, CSU-Chico

Early (8-29-96)	Early-Mid (9-10-96)	Mid-Late (9-24-96)	Late (9-30-96)
Nonpareil	Chips	Aldrich	Mission
Kapareil	Donna	Butte	
	Jenette	Carmel	
	Jiml	Kahl	
	Johlyn	Monterey	
	Livingston	Morley	
	Plateau	Padre	
	Rosetta	Price	
	Sonora	Ruby	
	1-87	Sano	
	1-102W	Savana	
	2-19E	Wood Colony	
	2-43W	Yokut	
	25-75	13-1	

MANTECA ALMOND REGIONAL VARIETY TRIAL
1996 HULL SPLIT
S.J. DELTA COLLEGE

% HULL SPLIT

	7/28	8/13	8/18	8/27	9/4
Nonpareil	60	100			
Chips	10	70	100		
Johlyn	NC	NC			
Dottie Won	30	85	100		
Jenette	10	100			
Kahl	NC	NC			
Sano	10	85	100		
Yokut	0	85	100		
Plateau	10				
2-43W		10	30	78	84
Morley	0	20	45	100	
Savana	0	10	40	92	
Kapareil	NC	NC			
Kapareil/PA	NA				
Sonora	75	100			
Rosetta	NC	NC			
13-1	5	100	100		
Price	5	100			
Aldrich	10	100			
Wood Colony	5	100			
Fritz	10	100			
Jiml	NC				
Donna	80	100	100		
Carmel	5	100			
Monterey	0	90	100		
Butte	0	70	100		
Livingston	0	0	NA	NA	NA
1-87	0	100	100		
Padre	5	30	75	100	
219-E	50	100	100		
1-102W	55	100	100		
Ruby	NC				
25-75	60	15	100		
25-75	58	85	100		
Mission	0	5	5	30	56

Notes: NC - light to no crop
NA - not available
Nonpareil and Mission data are averages of all rows

HULLSPLIT PERIOD

Kern RVT - Paramount Farming Company

1996

EARLY - SEASON		
	Hullsplit Period	
	Beginning*	**End****
Kapareil	6/24	7/13
Nonpareil	7/03	7/29
2-19E	7/09	8/19
Sonora	7/17	8/13
Rosetta	7/17	8/13
2-43W	7/17	8/19
1-102W	7/17	8/13
Donna	7/17	8/24
Aldrich	7/17	8/24
Jiml	7/18	8/24
Jenette	7/20	8/19
Johlyn	7/20	8/24

MID-SEASON		
	HULLSPLIT PERIOD	
	Beginning*	**End****
25-75	7/20	8/28
13-1	7/23	8/13
1-87	7/23	8/19
Price	7/23	8/24
Plateau	7/23	8/28
Chips	7/29	8/28
Savana	7/29	8/28
Morley	7/29	8/19
Wood Colony	7/29	8/28

MID to LATE SEASON		
	Hullsplit Period	
	Beginning*	End**
Sano	8/02	8/25
Yokut	8/02	8/28
Padre	8/05	8/28
Butte	8/05	9/05
Livingston	8/05	9/05
Kahl	8/05	9/05
Carmel	8/05	9/10
Ruby	8/13	9/05

LATE-SEASON		
	Hullsplit Period	
	Beginning*	End**
Mission	8/24	9/08
Monterey	7/29	9/15
Fritz	8/28	10/02

*Beginning means one to five percent of hullsplit.

**End means 100% hullsplit.

NOTE: The length of the hullsplit period depended on crop load. Varieties that had a big crop took longer to complete hullsplit than varieties with a light.

1996 Yield Summary for the Almond Regional Variety Trial at C.S.U.-Chico. Planted in 1993.

Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling %	Kernel Pounds Per Tree	Kernel Pounds Per Acre[1/]
Early-Mid Blooming Varieties					
Monterey	4365	1.22	47.8	11.7	749
Carmel	4272	1.23	53.2	11.6	741
Sonora	4326	1.20	79.1	11.4	732
Wood Colony	4419	1.16	50.9	11.3	724
Donna	3592	1.15	55.6	9.1	582
Price	3884	0.98	72.6	8.4	538
Johlyn	3062	1.24	67.3	8.4	537
Nonpareil	3004	1.19	61.4	7.8	498
13-1	2265	1.33	59.8	6.6	425
Sano	1834	1.44	53.0	5.8	372
Plateau	1748	1.46	47.7	5.6	360
Yokut	1822	1.40	56.0	5.6	359
Chips	2060	1.18	52.0	5.4	344
Jenette	1363	1.45	67.2	4.4	279
Aldrich	1660	1.18	54.5	4.3	275
Jiml	1346	1.38	55.6	4.1	262
Rosetta	1296	1.36	41.1	3.9	248
Kahl	1311	1.12	41.3	3.2	208
Kapareil	459	1.04	70.8	1.1	68
Kapareil/P.A.	257	1.09	74.0	0.6	39
Late-Very Late Blooming Varieties					
Padre	3631	1.06	52.9	8.4	541
Savana	3095	1.03	70.6	7.0	451
Ruby	2652	1.20	50.1	7.0	448
Butte	3125	1.01	54.0	6.9	443
Livingston	2662	1.13	60.9	6.6	425
Mission	2621	1.04	42.5	6.0	383
2-43W	1957	1.12	59.7	4.8	309
25-75	2502	0.87	56.3	4.8	308
2-19E	1817	1.08	46.3	4.3	276
Morley	1547	1.00	48.7	3.4	219
1-87	1413	0.96	51.3	3.0	190
1-102W	759	1.35	57.1	2.3	144

[1/]64 Trees per acre

1996 Yield Summary for the Almond Regional Variety Trial at San Joaquin Delta College, Manteca. Planted in 1993.

Variety[1/]	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling %	Kernel Pounds Per Tree	Kernel Pounds Per Acre[2/]
Early-Mid Blooming Varieties					
Chips	2136	1.19	59.7	5.6	420
Yokut	1014	1.50	61.0	3.3	251
Jenette	1014	1.35	70.9	3.0	226
Wood Colony	922	1.39	66.2	2.8	211
Donna	778	1.31	67.8	2.2	169
Monterey	653	1.42	53.3	2.0	153
Fritz	707	1.15	54.7	1.8	134
Sonora	505	1.48	80.2	1.6	123
Nonpareil	531	1.31	64.8	1.5	115
Carmel	491	1.41	64.9	1.5	114
Dottie Won	558	1.09	46.4	1.3	100
Aldrich	189	1.09	56.9	0.5	34
Late-Very Late Blooming Varieties					
Ruby	1897	1.34	56.0	5.6	419
Butte	1857	1.07	56.0	4.4	328
Padre	1054	1.27	54.0	2.9	221
Mission	1115	1.19	49.7	2.9	219
1-102W	1035	1.27	57.5	2.9	217
1-87	475	1.01	62.8	1.1	79
25-75	438	1.03	67.7	1.0	75
Livingston	374	1.18	68.9	1.0	73

[1/]Only about half of this trial was harvested in 1996 because of low yields.

[2/]75 Trees per acre.

1996 Yield Summary for the Almond Regional Variety Trial at Paramount Farming, Kern County. Planted in 1993.

Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling %	Kernel Pounds Per Tree	Kernel Pounds Per Acre[1/]
Early-Mid Blooming Varieties					
Plateau	5509	1.28	45.1	15.6	1340
Kahl	6321	1.10	45.4	15.3	1319
Yokut	5621	1.24	50.5	15.3	1316
Fritz	6474	1.03	51.5	14.7	1261
Carmel	5038	1.32	55.0	14.6	1260
13-1	6211	1.04	51.6	14.2	1224
Johlyn	5443	1.18	67.0	14.2	1221
Sano	4384	1.46	58.2	14.1	1209
Monterey	4376	1.38	45.5	13.3	1141
Wood Colony	4874	1.23	57.1	13.2	1136
Jenette	3944	1.27	61.5	11.1	952
Donna	5414	0.91	45.0	10.9	935
Chips	4664	1.00	50.4	10.3	882
Sonora	3537	1.26	70.3	9.8	843
Nonpareil	3396	1.22	62.4	9.1	782
Price	3230	1.22	60.5	8.7	746
Jiml	2376	1.39	61.0	7.3	626
Rosetta	1777	1.43	44.6	5.6	481
Aldrich	2030	1.19	62.5	5.3	459
Kapareil	590	0.98	64.7	1.3	110
Late-Very Late Blooming Varieties					
Padre	8609	1.00	51.6	18.9	1624
Ruby	6488	1.14	49.2	16.3	1406
Butte	7628	0.94	54.6	15.9	1364
Mission	6808	1.05	43.6	15.7	1353
2-43W	5043	1.08	58.3	12.0	1028
2-19E	4344	1.17	47.5	11.2	963
25-75	5293	0.81	57.0	9.4	808
Livingston	3114	1.29	61.1	8.8	760
Savana	3369	1.09	63.6	8.1	697
1-87	3262	0.98	50.8	7.1	607
1-102W	1714	1.43	59.8	5.4	464
Morley	1775	1.11	46.1	4.3	372

[1/]86 Trees per acre

KERNEL DEFECTS OBSERVED IN 1996

Significant defects noted in the 1996 harvest of the three Regional Variety Trials are outlined below. The trees were only in their fourth growing season, and the crop was light and variable among varieties. Defects listed may only become important if they continue to show in the same varieties over the next several years as the trees mature.

	Trial		
Defect	CSU-Chico	Delta College[1]	Kern
Varieties with 20% or more double kernels	Kahl	Dottie Won Monterey Aldrich	Monterey Kahl Donna Plateau
Varieties with significant worm damage (including ant damage)	Kapareil 13-1	Donna Sonora Dottie Won Monterey 25-75 Nonpareil	Kapareil
Varieties with 10% or more blank kernels	Price	25-75 Donna Livingston	Kahl
Varieties showing considerable kernel shrivel	Price Yokut Donna Chips Morley	Ruby 1-87 1-102W Wood Colony Chips	Ruby Mission Yokut Plateau Donna Fritz 2-19E

[1]Only some of the varieties at Delta College were evaluated in 1996. For a list of those varieties that were evaluated see the table on yields from this trial.

VARIETY RATING AS SUSCEPTIBILITY TO ALMOND ALTERNARIA LEAFSPOT BASED ON PERCENT OF DEFOLIATION*

AlmondAlternaria 1996

Regional Almond Variety Trial - Kern County

Defoliation (%)			
0-10	**10-20**	**30-60**	**60-80**
Aldrich	Carmel	Fritz	Savana
Butte	Donna	Kahl	Wood Colony
Chips	Jiml	Mission	Yokut
Jenette	Kapareil	Sonora	
Johlyn	Mission	2-43W	
Livingston	Morley		
Monterey	Price		
Nonpareil	Ruby		
Padre	Sano		
Plateau	1-102W		
Rosetta			
1-87			
2-19E			
13-1			
25-75			

***The Rating was done by Beth Teviotdale and Mario Viveros, September 2, 1996.**