

2006

Progress Report

REGIONAL ALMOND
VARIETY TRIALS

Planted in 1993

University of California

TABLE OF CONTENTS

	<u>Page</u>
Regional Almond Variety Trials: Background, Locations, Varieties Included, Details of Trials, Data Being Collected, Notes and Observations on the 2006 Season, Contributors.....	2-6
2006 Bloom Data	
CSU-Chico.....	7-9
Delta College	10-11
Kern.....	12-13
2006 Maturity Data	
CSU-Chico.....	data not collected
Delta College	14
Kern.....	15-16
2006 Yield and Individual Kernel Weight Summary	
CSU-Chico.....	17
Delta College	18
Kern.....	19
Annual and Accumulative Yield Summary	
CSU-Chico.....	20
Delta College	21
Kern.....	22
2006 Kernel Defects.....	23-24
Alternaria Leafspot Ratings— Kern.....	25
Hull Rot Ratings— Kern.....	26

REGIONAL ALMOND VARIETY TRIALS

Planted in 1993

Bruce D. Lampinen, Joseph H. Connell, Paul Verdegaal, Mario Viveros, Samuel G. Metcalf, Claudia Negron, Mary Ann Thorpe, Thomas M. Gradziel and Warren C. Micke.¹

Background

Regional Almond Variety Trials (RAVTs) 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 RAVTs were established between 1974 and 1981 in Kern, Colusa, Butte, San Joaquin and Fresno Counties. These trials were planted over several years and had trees of different ages and variety combinations. Thus, the data from these earlier trials were not directly comparable and at this point data collection has ended.

1993 Trials

This leaflet presents data collected in 2006 from the three RAVT trials established in 1993. These trials 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. Signs are in place at all locations to identify each variety. Collection of yield data was discontinued on most varieties at the Butte RAVT in 2006 due to extensive tree damage and loss in most varieties. In 2006, only Nonpareil, Carmel, and Winters were harvested from the original CSU-Chico trial. Avalon, Carmel, Durango and Kochi were harvested from the 2001 high density plantings at the CSU-Chico trial.

To be comparable, these three new trials were all planted in the same year and with essentially the same variety composition. Thus, any differences in varietal performance among various regions should become evident. The only differences in variety composition among the trials 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, especially for the Delta College trial. Vandalism and a tornado destroyed a few trees at CSU-Chico and normal replanting has 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, was planted on both peach and peach-

¹Bruce D. Lampinen is Extension Specialist, University of California, Davis, Warren C. Micke is Extension Pomologist, Emeritus, University of California, Davis. Joseph H. Connell, Paul Verdegaal, and Mario Viveros, are University of California Farm Advisors in Butte, San Joaquin, and Kern Counties, respectively. Samuel G. Metcalf and Mary Ann Thorpe are Staff Research Associates with the Plant Science Department, University of California, Davis. Claudia Negron is a Junior Specialist in the Plant Science Department, University of California, Davis. Thomas M. Gradziel is Associate Professor in the Plant Science Department, University of California, Davis.

almond hybrid rootstocks at all locations, but data is not always included in this publication for the trees on peach-almond hybrid.

The Kern plot is planted on a Milham sandy loam soil and is irrigated with a drip system (it was irrigated with micro-sprinklers prior to 1999). 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 was flood irrigated until a microspinkler system was installed in 2004. Probably as a result of the coarse textured soil and flood irrigation, the trees in the Delta trial are generally somewhat smaller than those in the other two RAVTs. In the Delta College trial there appears to be a sandier area in the middle of the orchard where trees are more subject to periodic moisture stress.

Varieties Included

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. The rows at CSU-Chico are longer so each row has three different variety sections, with 21 to 25 trees per section. In addition to Nonpareil and Mission, a plot 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 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 RAVT concept. In addition, six numbered selections from a University of California at Davis almond breeding program were included in these trials. These are 1-87, 1-102W, 2-19E, 2-43W, 13-1 (Winters) and 25-75.

Selection 1-102w and selection 2-43w were removed from the Butte trial in 2001 since their potential was deemed to be limited under the conditions in this trial. In 2001, half rows of Kochi, Durango, Avalon and Carmel (as a standard) were planted in place of the removed selections. These varieties were harvested for the first time in 2004. Starting in 2004, selection 25-75, Aldrich, Monterey, Morley, Padre, Plateau, and Savana were not harvested at the Butte trial since the tree loss in these rows was extensive enough to make yield data unreliable. In 2006, only Nonpareil, Winters (13-1) and Carmel were harvested from the original Chico planting.

Kapareil on peach almond hybrid rootstock was removed from the Delta trial in 2001 due to poor productivity and the row was replanted with Avalon in the spring of 2002. Selection 25-75 and Savana were removed from the Delta trial in 2002 due to poor productivity. Kochi and Nonpareil were planted in place of Selection 25-75 in the spring of 2003 at the Delta trial. Additional new plantings at the Delta trial include Folsom (2004), Zinke (2004), Bluegum (2005) and Galaxy (2005).

2006 Data and Observations

This 2006 report includes information on bloom time, hullsplit/harvest time, yields, shelling percentage (percent kernel) and kernel defects. In addition previous years and accumulated yield data are

given. Some information on disease susceptibility is also included. Since only 6 varieties were harvested at the CSU-Chico trial in 2006, defect data is not included for this site in the overall summaries. Also hullsplit data was not collected at the CSU-Chico site in 2006.

Bloom time weather was variable this spring. At the CSU-Chico trial there were 68 good bee hours (temperatures greater than 59°F and wind less than 10 mph and no rain). At the Delta trial, the bloom period was interspersed with rainfall but there were good bees spread throughout the bloom period. At the Kern trial, chilling hour accumulation was the lowest in the last 5 years. There were also five frost events during the mid season bloom at the Kern trial. Bloom density at the Kern trial was more in those varieties that were least defoliated by *Alternaria* in 2005.

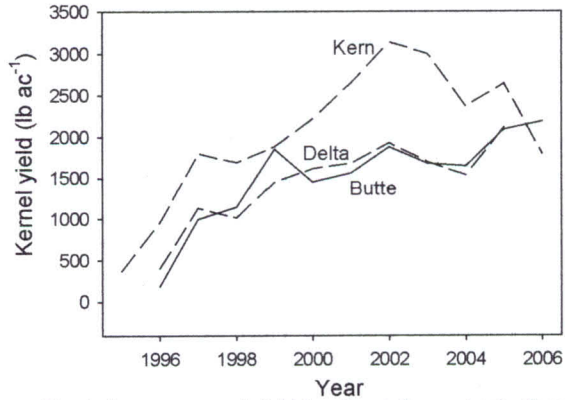


Fig. 1. Average annual yield for all varieties and selections combined at each trial (data for the Chico trial is only present until 2005 due to limited data collection in 2006)

Overall, yields were up slightly at the Delta trial and down at the Kern trial. (Fig.1). Overall yields for Chico in 2006 are not presented in Fig. 1 since only a few selected varieties were harvested.

An average accumulative yield for each variety and selection from all three locations from 1995 to 2003 is presented in Fig. 2. The cultivars with the highest accumulative yield averaged across all three sites are Ruby, Plateau, Butte, Carmel, and Padre with more than 16,000 pound per acre.

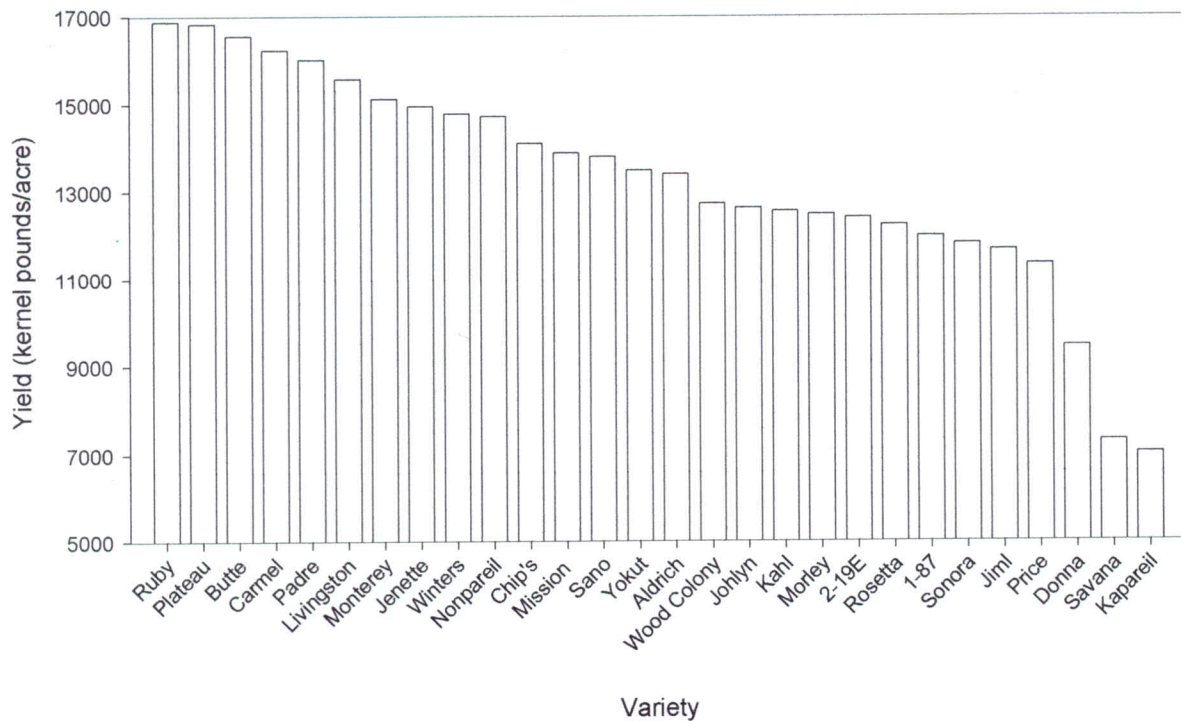


Fig. 2. Average accumulative yield (1995 -2003) of the three trials for each variety and selection

In 2006 the most prevalent defects for the Delta and Kern trials were kernel doubles, blanks, worm damage and twins (Fig. 3). The Delta and Kern trials had 21 and 14 varieties with 6% or more kernel doubles (for details see Kernel Defects, page 23-24). The Delta trial had 8 and the Kern trial 4 varieties with 6% or more twin kernels. The Delta and Kern trials had 18 and 5 varieties, respectively, with 6% or more blank kernels in 2006. The Kern trial had the most worm damage with 19 varieties having 6% or higher worm damage. The Delta trial did not have any varieties with 6% or more worm damage in 2006.

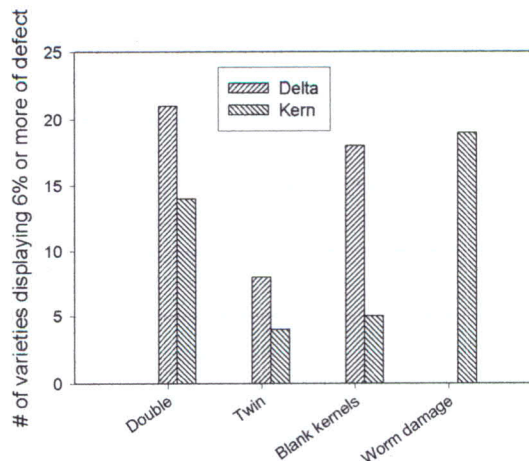


Fig. 3 . Primary kernel defects observed in 2006 by site. Data for the Chico RAVT is not included since only 6 varieties were harvested.

Over the last nine years, Kahl, Sano and Plateau have had the most double kernels. Kahl and Donna have had six percent or more blank kernels in at least one of the trials each year. Kapareil has had six percent or more worm damage every year in at least one trial.

Considerable splitting (breakage) and loss of scaffold limbs, and some entire trees, has occurred in both the CSU-Chico and Delta College trials. Several factors have contributed to splitting in these two trials. At CSU-Chico the splitting is the result of large trees with wide tree spacing and a minimal pruning program early in the orchards life. In addition, considerable shaker damage occurred at CSU-Chico. This damage introduced wood rotting fungi that have further acerbated splitting and tree losses due to trunk girdling. Splitting due to the prevailing wind, heavy crops and lack of sufficient tree tying has occurred at the Delta College plot. Loss of scaffold limbs and trees has been taken into account in calculating per acre yields. Even without the above conditions, scaffold splitting may be a problem for the Aldrich variety with its upright growth habit and narrow crotch angles. Thus, this variety will require special care in tree training.

Until the 2002 season, only Yokut at the CSU-Chico trial had shown indications of possible bud failure (BF) symptoms, but these symptoms in Yokut are likely due to a virus condition that causes infectious BF. However, in the spring of 2002, minor noninfectious bud failure was observed on the tops of 14% of the Carmel trees in the Kern trial and 12% of the Carmel trees in the Butte trial. This followed a warm 2001 May-June period that was extremely conducive to bud failure. In 2003, bud failure was again observed at the Butte site but it was not significantly worse than in 2002. In 2004 and 2005, minor bud failure was again observed on the tops of 5% of the Carmel trees in the CSU-Chico trial. No bud failure was observed on the Carmel trees at the Kern trial in 2004, 2005 or 2006. To date, no bud failure has been observed on the Carmel trees at the Delta College trial.

Selection 13-1 was released several years ago with the name ‘Winters’. It has shown good production (particularly at the CSU-Chico trial) and should be a good pollenizer for Nonpareil. Average accumulative yield across all three trials for Winters up to the 2003 season is equivalent to that of Nonpareil (Fig. 2). However, the high susceptibility of Winters to diseases (especially *Alternaria* and *Anthraco nose*) and worm damage continues to be a concern.

Acknowledgements

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 in managing and maintaining these trials. The assistance of Cooperative Extension field assistants in Kern, Butte and San Joaquin Counties and field personnel of the University of California Plant Sciences Department is gratefully acknowledged.

Full Bloom Timing -- Almond Regional Variety Trial, CSU Chico.

Variety	# Days before or after Nonpareil Full Bloom ^{1/}											Average
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
Sonora	-8	-6	-9	-5	-7	-8	-1	-7	-5	-3	-8	-6.1
Sano	-12	-4	-4	-3	-7	-3	-3	-6	-6	-6	-8	-5.6
Kapareil	-11	-2	-5	-3	-7	-3	-2	-8	-1	-3	-5	-4.5
Rosetta	-4	-4	-5	-2	-7	-7	-4	-4	-7	-4	-7	-5.0
Winters (13-1)	-4	-6	-6	-2	-4	-3	0	-2	-3	-2	-6	-3.5
Donna	-6	-4	-2	-4	-4	-3	-1	-2	-4	-3	-5	-3.5
Avalon									-3	-2	-8	-4.3
Durango									-3	-1	0	-1.3
Aldrich	-3	0	0	1	-5	-2	-1	-1	-4	-1	-6	-2.0
Chips	0	-2	-1	-1	-2	-2	0	0	-3	0	-5	-1.5
Jenette	-1	3	4	2	-5	-5	-2	-2	-3	-1	-7	-1.5
Jiml	-2	0	1	3	-3	-1	0	-2	-3	-3	-6	-1.5
Nonpareil	0	0	0	0	0	0	0	0	0	0	0	0
Price	2	0	3	1	-1	-1	-1	0	2	-1	-5	-0.1
Yokut	2	-2	4	2	0	0	2	1	2	1	-5	0.6
Carmel	2	1	6	2	0	-1	0	1	2	1	1	1.4
Kahl	0	1	5	3	1	2	0	-1	1	1	-5	0.7
Wood Colony	0	-1	7	2	2	0	0	1	2	0	0	1.2
Johlyn	1	6	3	4	0	2	0	-1	2	1	-3	1.4
Monterey	2	0	6	4	0	2	0	1	2	1	0	1.6
Plateau	0	0	8	4	4	1	2	3	2	2	2	2.5
Kochi									2	2	2	2.0
Butte	3	6	8	6	4	0	3	4	2	2	2	3.6
2-19E	3	6	5	5	4	3	2	7	2	3	3	3.9
2-43W	1	0	9	5	7	---	---	---	---	---	---	4.4
Padre	4	8	9	6	4	0	3	7	3	2	3	4.5
1-102W	4	6	8	3	6	---	---	---	---	---	---	5.4
1-87	4	11	8	5	4	5	3	5	3	3	3	4.9
Livingston	4	4	7	10	7	4	3	6	3	5	6	5.4
Mission	4	8	10	6	6	5	4	6	3	2	3	5.2
Ruby	6	11	17	10	10	6	5	13	8	7	10	9.4
25-75	11	13	10	12	15	9	9	15	6	4	7	10.1
Morley	6	11	19	18	16	12	10	13	9	5	13	12.0
Savana	11	17	20	18	17	12	16	20	10	12	21	15.8

Good Bee Hours ^{2/} 77 74 43 37 24 42 61 61 54 40 68

^{1/} Full bloom as defined here equals the day when 80% of the flowers are open.

^{2/} 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.

Bloom Conditions

1996 - Cold, rainy & windy prior to Nonpareil full bloom, excellent weather from then on.

1997 - A low chilling year, cool during entire blooming period but generally good weather.

1998 - Cold, rainy & windy through much of bloom, a few good days for Butte through Mission bloom.

1999 - Cold throughout bloom, 1 good day each at Sonora & Carmel full bloom, 3 good days for last 10% of late varieties

2000 - Cold, windy & rainy throughout bloom, 3 ok days around Sonora full bloom, 1 good day after Butte full bloom.

2001 - Cold, windy & rainy throughout bloom, 3 good days Winters-Nonpareil full bloom, 2 good days-last 10% of late varieties.

2002 - Cold early bloom, good weather 10% Nonpareil bloom through Mission bloom. 3 windy days during peak Mission bloom.

2003 - Cool to cold & windy through much of bloom, late bloom warmer w/ 25 of 61 bee hours occurring after Buttes full bloom.

2004 - Cold & windy through much of bloom, warmer late in bloom with 30 of the 54 bee hours occurring after Mission full bloom.

2005 - Warm rain prior Nonpareil FB led to fast bloom w/ good variety overlap, cold for bee flight, some good days in late bloom.

2006 - Warm thru 30% Nonpareil bloom, cold thru mid-bloom, Butte full bloom thru Mission warm, then cold rainy weather.

Bloom Density* -- CSU Chico, Regional Variety Trial

Variety	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sonora	4	2	5	4	4	3	5	3	3	5	4
Sano	4	4	3	4	4	4	4	5	5	5	4
Kapareil	5	5	5	5	5	5	5	5	5	5	5
Rosetta	3	4	2	3	4	4	3	5	5	5	4
Winters	5	4	3	4	4	3	2	5	3	4	4
Donna	3	3	3	4	3	3	4	2	3	2	3
Aldrich	4	5	3	5	5	4	5	5	5	5	5
Chips	3	4	4	4	4	3	3	4	4	3	4
Jenette	4	5	3	5	5	4	5	3	5	5	5
Jiml	2	3	2	2	3	3	4	1	5	1	5
Nonpareil	4	4	3	4	3	3	3	2	3	3	3
Price	1	1	4	2	4	3	3	3	4	2	4
Yokut	1	3	1	2	1	4	2	4	2	4	3
Carmel	3	3	3	5	3	4	3	5	3	5	4
Kahl	2	3	2	3	2	4	3	5	2	5	3
Wood Colony	4	3	3	3	3	4	4	3	4	4	5
Johlyn	4	4	1	4	3	3	3	2	2	3	1
Monterey	4	4	2	3	3	2	4	2	3	4	4
Plateau	2	3	3	3	4	3	3	1	4	2	3
Butte	4	4	3	4	4	4	4	4	4	4	4
2-19E	3	3	2	5	2	5	2	5	2	5	3
2-43W	4	3	2	3	4	---	---	---	---	---	---
Padre	3	3	4	5	4	5	5	5	5	5	5
1-102W	4	4	4	4	4	---	---	---	---	---	---
1-87	3	3	3	3	3	4	3	3	3	4	3
Livingston	3	4	3	4	4	4	4	3	3	4	3
Mission	3	3	3	3	4	4	4	4	3	5	4
Ruby	3	3	3	3	4	3	4	4	3	3	3
25-75	2	3	3	3	4	3	3	3	3	4	3
Morley	3	3	3	3	4	4	4	4	4	5	4
Savana	4	3	3	3	2	3	2	3	2	4	2
Avalon									4	4	2
Carmel									3	4	4
Durango									4	4	4
Kochi									3	3	2

* The density of bloom is rated annually for each variety on a subjective scale of 1 to 5 with a rating of 5 being the heaviest bloom. Consistency of bloom from one year to the next and tendencies toward alternate bloom/bearing may be indicated by these ratings. Consistently heavy bloom may also indicate consistently light cropping (see Kapareil).

SAN JOAQUIN DELTA COLLEGE
REGIONAL ALMOND VARIETY TRIAL
 2006 Rainfall and Temperature
 Manteca

February	Rain (inches)	Air Temperature		Wind > 5 mph
		Max	Min	
1	0.00	60.5	48.5	
2	0.00	67.2	47.9	
3	0.00	65.9	46.7	
4	0.04	62.7	44.0	
5	0.00	61.9	38.6	
6	0.00	65.5	35.4	
7	0.04	68.2	35.8	
8	0.00	70.5	35.1	
9	0.00	71.6	34.9	
10	0.00	71.1	35.8	
11	0.00	71.0	38.4	
12	0.00	68.2	41.0	
13	0.00	70.8	37.7	
14	0.00	68.9	38.5	6.8
15	0.00	55.7	32.4	5.8
16	0.00	55.8	26.3	
17	0.12	51.5	35.8	
18	0.12	53.2	33.2	
19	0.00	51.7	32.7	
20	0.00	56.2	29.4	
21	0.00	58.2	28.6	
22	0.00	64.3	29.2	
23	0.00	65.7	30.5	
24	0.00	70.2	31.2	
25	0.00	73.1	38.6	
26	0.28	60.9	44.0	6.8
27	0.39	63.6	53.6	12.4
28	0.04	60.7	38.9	5.6
March				
1	0.00	62.9	33.3	
2	0.24	58.1	44.4	
3	0.16	55.9	39.9	5.7
Rainfall subtotal for:		(inches)		
		<u>2006</u>	<u>2005</u>	<u>2004</u>
	January	3.32	3.48	1.58
	February	1.03	2.78	3.51
	March	4.34	4.41	0.62
	TOTAL	8.69	10.77	5.74
* Average rainfall September – May = 11.5 inches				

Bloom period = Feb.2 to March 3

EFFECTIVE BLOOM PERIOD
Kern RVT - Paramount Farming Company

Early Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Sano	01-25-06	02-10-06	02-21-06
Kapareil	01-22-06	02-10-06	02-25-06
Rosetta	01-27-06	02-17-06	02-26-06
Sonora	02-02-06	02-17-06	02-25-06
(Winters) (13-1)	01-22-06	02-14-06	02-25-06
Mid-Season Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Nonpareil	02-08-06	02-17-06	03-03-06
Price	02-02-06	02-17-06	02-24-06
Jenette	02-02-06	02-17-06	02-25-06
Yokut	02-08-06	02-17-06	02-26-06
Johlyn	01-27-06	02-17-06	03-06-06
Plateau	02-10-06	02-21-06	02-25-06
Chips	01-31-06	02-17-06	02-26-06
Kahl	02-08-06	02-17-06	02-25-06
Fritz	02-08-06	02-17-06	02-25-06
Monterey	02-10-06	02-21-06	02-27-06
Aldrich	02-10-06	02-21-06	03-01-06
Wood Colony	02-10-06	02-21-06	03-03-06
1-102W	02-14-06	02-27-06	03-05-06
Jim1	02-10-06	02-27-06	03-03-06
Donna	02-08-06	02-17-06	02-26-06
Carmel	02-10-06	02-21-06	03-05-06
2-19E	02-12-06	02-21-06	03-09-06
2-43W	02-10-06	02-24-06	03-09-06

EFFECTIVE BLOOM PERIOD
 Kern RVT - Paramount Farming Company
 (continued)

Late Season Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Livingston	02-14-06	02-27-06	03-05-06
Padre	02-14-06	02-27-06	03-08-06
1-87	02-14-06	02-27-06	03-05-06
25-75	02-17-06	02-27-06	03-08-06
Mission	02-17-06	02-27-06	03-08-06
Ruby	02-24-06	02-27-06	03-07-06
Morley	02-21-06	02-27-06	03-01-06
Savana	02-27-06	03-15-06	03-19-06

Bloom Observations:

Chilling Hours: The following table shows the number of chilling hours for November, December and January 15 for 2001-2002 to 2005-2006.

Month	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	2005 to 2006
November	115	160	234	200	161
December	352	299	258	349	240
January (1-15)	<u>169</u>	<u>151</u>	<u>163</u>	<u>190</u>	<u>121</u>
Total	636	610	655	739	522

This table shows that, in the past five years, the lowest chilling hours accumulation has been in 2005-2006 due to few hours of cold weather in December and January. The Nonpareil and Sonora didn't appear to be affected by the low chilling accumulation in commercial orchards. In some orchards, these varieties yielded above 3,000 meat pounds per acre.

Frost During Bloom: There were five days of frost during the full bloom period of the mid-season blooming varieties. The coldest night was on February 16 when the temperature dropped to 28°F. The varieties that were most affected were Avalon and Winters. Nevertheless, their yields were not affected by this freeze.

Bloom Density: This is based on the amount of flowers at the time of full bloom. This year's bloom density was proportional to last year's defoliation due to *Alternaria*. This is to say, varieties that defoliated the most in 2005 returned with a low density of bloom in 2006. Varieties with a poor bloom density were Carmel, Monterey, Price, Sonora, 25-75, Mission, Ruby, Kahl, Yokut, Plateau, Wood Colony, Jiml, Donna and 2-19E. Varieties with an average bloom density were Chips, Nonpareil, Johlyn, Jenette, Sano, Rosetta, Winters, Fritz and 1-102W. Varieties with excellent bloom density were 2-43W, Kapareil, Aldrich, Butte, 1-87 and Padre.

ALMOND REGIONAL VARIETY TRIAL
 2006 Hull Split Dates
 Manteca

(2006 order)	Variety	Date		1997 - 2005
		10%	90%	Average Order
1	Kapareil	14-Jul	25-Jul	1
2	Kochi	26-Jul	5-Aug	not on last year's list
3	Nonpareil	29-Jul	5-Aug	2
4	Sonora	6-Aug	14-Aug	4
5	Johlyn	7-Aug	11-Aug	5
6	Jiml	7-Aug	18-Aug	3
7	Jenette	7-Aug	21-Aug	9
8	Rosetta	10-Aug	15-Aug	10
9	Zinke	10-Aug	15-Aug	not on last year's list
10	Price	10-Aug	1-Sep	7
11	Sano	16-Aug	24-Aug	14
12	Donna	16-Aug	29-Aug	6
13	Wood Colony	16-Aug	30-Aug	20
14	Ruby	16-Aug	14-Sep	26
15	Plateau	17-Aug	28-Aug	13
16	Padre	18-Aug	29-Aug	23
17	Morley	19-Aug	24-Aug	11
18	I-87	21-Aug	28-Aug	16
19	Chips	21-Aug	28-Aug	19
20	Dottie Won	21-Aug	31-Aug	12
21	Livingston	21-Aug	1-Sep	21
22	Yokut	21-Aug	4-Sep	8
23	Mission	21-Aug	4-Sep	27
24	Aldrich	22-Aug	2-Sep	18
25	Kahl	24-Aug	8-Sep	15
26	Butte	25-Aug	3-Sep	25
27	Avalon	27-Aug	8-Sep	22
28	Winters	28-Aug	17-Sep	17
29	Carmel	2-Sep	14-Sep	24
30	Monterey	4-Sep	15-Sep	28
31	Fritz	6-Sep	19-Sep	29
	Folsom	Non-Bearing		
	Galaxy	Non-Bearing		
	Blue Gum	Non-Bearing		

HULLSPLIT PERIOD

RAVT - Paramount Farming Company (Kern Co.)

Early – Season		
	Hullsplit Period	
	Beginning*	End**
Kapareil	07-01-06	08-08-06
Nonpareil	07-13-06	08-18-06
2-19E	07-27-06	08-26-06
Sonora	07-31-06	08-29-06
Rosetta	07-31-06	08-22-06
2-43W	07-27-06	08-29-06
1-102W	07-31-06	08-26-06
Donna	07-27-06	08-22-06
Aldrich	08-08-06	08-29-06
Jiml	07-31-06	08-29-06
Jenette	07-31-06	08-26-06
Johlyn	07-19-06	09-01-06

Mid – Season		
	Hullsplit Period	
	Beginning*	End**
25-75	08-04-06	08-26-06
Winters (13-1)	08-15-06	09-07-06
1-87	07-31-06	08-22-06
Price	07-31-06	08-26-06
Plateau	07-31-06	08-26-06
Chips	07-31-06	08-29-06
Savana	08-15-06	09-05-06
Morley	08-04-06	08-29-06
Wood Colony	08-04-06	08-29-06

HULLSPLIT PERIOD

RAVT - Paramount Farming Company (Kern Co.)
(continued)

Mid to Late Season		
	Hullsplit Period	
	Beginning*	End**
Sano	08-08-06	08-26-06
Yokut	08-04-06	08-26-06
Padre	07-31-06	09-01-06
Butte	08-04-06	09-05-06
Livingston	07-31-06	09-01-06
Kahl	08-08-06	09-05-06
Carmel***		
Ruby	08-11-06	09-05-06

Late – Season		
	Hullsplit Period	
	Beginning*	End**
Mission	08-22-06	09-14-06
Monterey***		
Fritz	08-29-06	10-08-06

*Beginning means one to five percent of hullsplit.

**End means 100% hullsplit.

***No data due to Alternaria infestation.

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 crop.

2006 Yield Summary for the Regional Almond Variety Trial at California State University at Chico Farm, Butte County. Planted in 1993.

Variety	No. of nuts/tree	Average kernel weight (g)	Shelling percentage	Kernel pounds per	
				tree	Acre ¹
Carmel	21527	1.22	52.0	57.9	3708
Winters (13-1)	24411	0.98	52.7	52.5	3359
Nonpareil	18231	1.17	55.9	46.9	3002

¹Based on a spacing that gives 64 trees per acre.

2006 Yield Summary for the Regional Almond Variety Trial at California State University at Chico Farm, Butte County. High density planted in 2001 (128 trees/acre).

Variety	No. of nuts/tree	Average kernel weight (g)	Shelling percentage	Kernel pounds per	
				tree	Acre
Durango	7068	1.26	53.7	19.6	2515
Kochi	5569	1.26	54.5	15.5	1982
Avalon	5081	1.19	65.3	13.3	1702
Carmel	3797	1.32	53.2	11.1	1415

2006 Yield Summary for the Regional Almond Variety Trial at San Joaquin Delta College Farm, Manteca, San Joaquin County. Planted in 1993.

Variety	No. of nuts/tree	Average kernel weight (g)	Shelling percentage	Kernel pounds per	
				tree	Acre ¹
Monterey	14790	1.32	44.6	42.9	3220
Yokut	12442	1.42	57.9	39.0	2923
Winters (13-1)	15917	1.11	53.2	38.8	2908
Fritz	16187	1.04	55.4	37.1	2781
Jiml	11791	1.39	57.8	36.0	2700
Nonpareil	12138	1.34	71.4	35.8	2686
Livingston	12869	1.26	71.4	35.8	2683
Plateau	12037	1.33	47.3	35.4	2653
Carmel	12889	1.23	59.7	35.0	2627
Chips	13449	1.16	58.0	34.3	2573
Aldrich	12377	1.10	57.9	30.0	2249
Kahl	12774	1.05	45.2	29.5	2212
Dottie Won	11920	1.12	51.9	29.4	2202
Sonora	8574	1.50	71.9	28.3	2119
Padre	11864	1.06	54.1	27.7	2078
Jenette	10279	1.21	85.7	27.4	2058
Price	10980	1.06	65.6	25.6	1919
Butte	11276	1.00	51.8	24.9	1866
Morley	10352	1.08	46.1	24.7	1854
Wood Colony	8027	1.38	58.4	24.4	1827
Johlyn	8991	1.21	69.6	24.0	1800
Donna	10051	1.06	46.3	23.5	1763
Mission	8400	1.21	50.7	22.2	1663
1-87	10879	0.91	68.4	21.7	1628
Rosetta	5786	1.54	51.5	19.6	1468
Sano	5417	1.51	52.9	18.0	1351
Ruby	6418	1.23	53.9	17.4	1304

2002 planting					
Avalon	3517	1.35	69.4	10.5	784
Kochi	858	1.56	68.4	3.0	222

¹Based on a spacing that gives 75 trees per acre.

2006 Yield Summary for the Regional Almond Variety Trial at Paramount Farming Company, Shafter, Kern County. Planted in 1993.

Variety	No. of nuts/tree	Average kernel weight (g)	Shelling percentage	Kernel pounds per	
				tree	acre ¹
Nonpareil	17314	1.14	69.2	43.6	3746*
Aldrich	19545	0.91	66.4	39.2	3369
Butte	19210	0.92	62.6	38.8	3333
1-87	17840	0.79	54.1	31.0	2670
Padre	14218	0.99	50.0	31.0	2666
2-43W	13438	0.99	55.6	29.3	2520
2-19E	12092	1.07	51.8	28.5	2451
Sonora	10700	1.20	70.3	28.3	2432
Livingston	10547	1.13	56.2	26.2	2254
1-102W	8131	1.43	68.9	25.6	2202
Jenette	9761	1.16	70.2	24.9	2141
Rosetta	7313	1.46	49.5	23.5	2025
Johlyn	8648	1.17	69.2	22.2	1910
Morley	10532	0.94	45.6	21.9	1879
Wood Colony	8341	1.18	51.6	21.6	1858
Mission	8299	1.09	46.6	19.8	1705
Jiml	7151	1.25	63.9	19.7	1696
Ruby	7322	1.20	46.8	19.3	1659
Chip's	7438	1.06	53.7	17.3	1488
Kapareil/PA	7735	0.99	72.5	16.9	1453
Yokut	5987	1.27	52.6	16.8	1445
Price	6724	1.12	63.9	16.6	1429
Monterey	5857	1.26	57.9	16.3	1398
Kahl	6265	1.09	47.2	15.0	1289
Winters (13-1)	6378	1.02	53.4	14.3	1232
Plateau	5109	1.27	41.1	14.3	1229
Fritz	6690	0.93	59.2	13.7	1181
25-75	7197	0.84	50.4	13.3	1148
Kapareil	6599	0.87	69.0	12.6	1085
Savana	3511	1.14	56.4	8.8	756
Donna	3032	1.01	51.3	6.8	581
Sano	1859	1.50	52.7	6.2	530
Carmel	1567	1.26	59.0	4.4	375

¹Based on a spacing that gives 86 trees per acre.

*At the Kern RAVT in 2006, there was considerable early drop of pollenizer varieties that were picked up during the Nonpareil harvest and hence Nonpareil yields were likely less than indicated while many pollenizer yields were likely higher than indicated in 2006.

Annual Yield Summary (1996-2006) and Accumulative Yield (1996-2003) for the Regional Variety Trial at California State University at Chico Farm, Butte County. Planted in 1993.

Variety	Yield (kernel pounds/acre ¹)											
	1996	1997	1998	1999	2000	2001	2002	2003	Accum. until 2003	2004	2005	2006
Winters (13-1)	425	2076	784	2736	2446	2677	2479	3333	16956	2425	2571	3359
Plateau	360	1215	2367	2007	1943	2160	2361	1675	14089	.	.	²
Carmel	741	1240	1260	1700	1934	2070	2320	2330	13595	2830	2455	3708
Nonpareil	494	1427	1127	1952	1762	1846	2587	2000	13195	1897	2257	3002
Livingston	425	1449	1275	1765	1607	2283	2350	1795	12949	2015	2367	²
Ruby	448	1208	1315	1823	1828	1676	1859	2002	12158	1640	2182	²
Aldrich	275	1813	1005	1388	1494	1663	2920	1545	12104	.	.	²
Monterey	749	1535	1531	1410	2279	1541	2032	816	11894	.	.	²
Butte	443	1169	1549	1404	1509	1705	2001	2064	11844	1817	2734	²
Chip's	344	817	1188	1030	1434	1490	3195	2063	11561	1977	.	²
Johlyn	537	1047	1046	1870	1595	1457	2036	1864	11452	1494	2313	²
Wood Colony	724	978	951	1464	1695	1781	2318	1387	11298	1665	1824	²
Morley	219	1102	1189	1364	1846	2053	1741	1661	11176	.	.	²
Sano	372	1036	1020	1558	2128	1552	1918	1514	11098	1780	2333	²
Mission	383	941	890	1018	1616	1483	2304	2409	11044	1938	2100	²
Rosetta	248	1039	840	1422	1727	2041	1451	2015	10783	1601	.	²
Padre	541	1013	832	1258	1402	1833	1929	1466	10274	.	.	²
Jenette	279	868	672	1407	1932	1290	1939	1670	10057	1964	2380	²
Jiml	262	873	738	1633	1948	1484	2371	720	10029	1682	.	²
1-87	190	1295	1074	1340	1454	1711	1802	1038	9903	1023	1411	²
Yokut	359	765	896	1204	1126	1964	1621	1700	9634	1559	2388	²
Sonora	732	494	1152	1262	1510	1165	1498	1726	9538	952	1819	²
Kahl	208	672	1070	1301	1034	1491	1280	2096	9153	1160	2197	²
2-19E	276	1299	454	1345	906	1828	964	2023	9095	1171	2025	²
Price	538	931	990	1230	1066	1469	1244	1602	9069	745	1718	²
25-75	308	668	815	1103	1910	1433	1835	722	8794	.	.	²
Savana	451	1079	815	992	958	1106	1169	1717	8287	.	.	²
Donna	582	913	712	1003	1255	1118	1294	957	7835	1707	1482	²
Kapareil	68	1129	280	941	1029	1364	1093	1237	7141	1294	1604	²
2-43W	309	1615	1081	1527	1740	³	.	.	.	.	.
1-102W	144	1266	436	1481	1926	³	.	.	.	.	.

High density (128 trees/acre) plantings 2001.

Variety										2004	2005	2006
Durango	.	.	.	.	.	.	.	.	.	1089	1300	2515
Avalon	.	.	.	.	.	.	.	.	.	511	1958	1702
Kochi	.	.	.	.	.	.	.	.	.	237	1181	1982
Carmel	.	.	.	.	.	.	.	.	.	.	1521	1415

¹ Based on a spacing that gives 64 trees per acre.

² Selections were not harvested due to non-uniform tree stand remaining.

³ Selections were removed from the Butte RAVT.

Annual Yield Summary (1996-2006) and Accumulative Yield (1996-2006) for the Regional Variety Trial at San Joaquin Delta College Farm, Manteca, San Joaquin County. Planted in 1993.

Variety	Yield (kernel pounds/acre ¹)											
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Accum.
Carmel	114	2111	1893	2695	2538	2206	2697	1861	1993	3153	2627	23886
Butte	328	1631	2075	2641	2243	2311	2459	2865	1596	3643	1866	23657
Plateau	²	1198	2301	2511	1968	2201	2626	2106	2749	3251	2653	23564
Livingston	73	683	1572	2779	1736	2133	2856	2214	1941	4290	2683	22959
Monterey	153	1315	1660	2006	1718	1570	2513	2558	1594	3294	3220	21601
Padre	221	579	1502	1340	2784	2123	2995	2374	2337	3243	2078	21576
Fritz	134	1692	1539	2086	2024	1648	2645	1819	1519	2876	2781	20763
Dottie Won	100	1287	1757	1667	2133	2019	2302	2291	1686	2963	2202	20408
Ruby	419	1274	1890	1985	2518	1505	2432	2494	2109	2247	1304	20177
Chips	420	920	1798	2134	1828	1464	2299	2243	1613	1829	2573	19122
Jenette	226	1313	1530	2579	1667	1927	1783	1713	2228	2052	2058	19076
Yokut	251	1288	1882	1956	2060	1674	1812	1318	2135	1272	2923	18572
Mission	219	813	1332	1780	2001	1754	2203	1887	1746	1767	1663	17165
Nonpareil	115	1165	918	2252	1333	1794	2093	2028	1403	1354	2686	17142
WoodColony	211	1131	1168	2176	1543	1677	1579	1908	1158	2006	1827	16384
Sano	²	1213	995	2299	2205	1762	1590	1506	1506	1679	1351	16106
Winters	²	1591	192	2223	392	2671	1922	1446	1274	1001	2908	15619
Kahl	²	757	1320	1836	1605	1246	1778	1462	2058	1264	2212	15540
1-87	79	486	1207	1601	1296	1238	1787	1582	1427	2064	1628	14395
Sonora	123	²	965	2407	1194	1651	1514	1234	1377	1607	2119	14191
Aldrich	34	937	636	2169	902	1307	1724	1329	1116	1512	2249	13914
Jiml	²	534	744	2509	1098	1179	2313	927	1264	539	2700	13807
Morley	²	559	576	1401	842	1702	1672	1721	1740	1736	1854	13803
Donna	169	1000	990	1394	1153	1137	1515	1539	1261	1767	1763	13689
Johlyn	²	634	997	1510	1246	1188	1822	1356	1297	1332	1800	13181
Price	²	947	573	1731	932	1075	1422	1327	1354	1794	1919	13074
Rosetta	²	1323	600	1745	1487	1611	1083	1105	1699	906	1468	13026
Kapareil	²	361	183	1200	485	1346	783	851	831	³	³	6040

2002 planting

Avalon	.	.	.	.	.	.	.	.	.	94	784	878
Kochi	.	.	.	.	.	.	.	.	.	.	222	222

¹ Based on a spacing that gives 75 trees per acre.

² Because of poor production in 1996 and poor production and a harvesting error in 1997, some varieties were not harvested in these years. Thus, cumulative yields for these varieties should be somewhat higher than what is shown in the table.

³ Selections were not harvested due to non-uniform tree stand remaining.

Annual Yield Summary (1995-2006) and Accumulative Yield (1995-2006) for the Regional Variety Trial at Paramount Farming Company, Shafter, Kern County. Planted in 1993.

Variety	Yield (kernel pounds/acre ¹)												
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Accum.
Padre	802	1624	1624	1883	2416	2841	4068	4559	4079	4434	3446	2666	34443
Ruby	664	1406	2413	2180	2550	3164	3482	4113	3964	3018	3836	1659	32449
Butte	377	1364	2400	2353	1670	1178	3401	4101	4443	2872	3363	3333	30855
Janette	294	952	3085	1574	2692	2810	4177	2862	3638	2765	3068	2141	30059
Aldrich	422	459	2230	1295	2936	1410	3230	4576	2491	3173	3252	3369	28843
Plateau	282	1340	2525	2419	2239	3197	3653	2827	2977	2262	3770	1229	28720
Nonpareil	259	782	2428	1963	2560	2216	3022	3504	2523	2890	2714	3746	28607
2-19E	341	963	2347	1944	2496	2646	3479	2434	4890	1490	3082	2451	28563
Livingston	323	760	1972	1749	3054	1608	2233	3660	4396	2179	3817	2254	28004
Monterey	591	1141	2184	1914	2194	2429	3342	3293	2886	2383	3350	1398	27104
Fritz	²	1261	1706	2234	1700	2805	3199	3451	3000	2822	3614	1181	26973
Mission	545	1353	1949	1816	1716	2285	2296	3161	3516	2832	3142	1705	26316
Morley	176	372	1091	1871	1516	1742	3531	3706	3787	2863	2725	1879	25261
Yokut	382	1316	1519	1835	2023	3184	2059	3150	3118	2396	2679	1445	25106
Kahl	383	1319	1852	1683	1926	2696	2634	2874	3115	2385	2785	1289	24940
Rosetta	93	481	2164	1123	2308	1808	2308	3473	3216	3234	2435	2025	24667
Johlyn	291	1221	2195	1936	1287	2084	2313	3453	2900	3037	2032	1910	24658
1-87	228	607	1598	1594	2171	1008	2260	3752	3543	2302	2588	2670	24320
Chip's	401	882	1417	2004	1709	3106	2419	2905	2798	1935	3120	1488	24183
Carmel	634	1260	1944	1427	1359	2534	3819	3398	2651	2778	1855	375	24034
Sano	291	1209	1345	1754	2446	3702	3033	990	3983	1797	2695	530	23774
Price	297	746	1118	1772	1235	2997	2819	3684	2282	2660	2621	1429	23660
1-102W	304	464	2143	1742	1755	661	1685	3958	3785	2641	2087	2202	23428
Sonora	337	843	1315	1120	2218	3181	1822	3928	2056	1099	2187	2432	22539
2-43W	477	1028	2056	1794	1516	1254	1526	3967	2683	2016	1700	2520	22535
Wood Colony	559	1136	1545	1024	760	1923	2193	3245	3068	2328	2794	1858	22434
Winters (13-1)	599	1224	2076	2152	1643	2073	2475	2788	1927	2328	1852	1232	22369
Jiml	107	626	1565	1887	1631	2039	1391	4287	2137	2403	1821	1696	21590
25-75	167	808	1184	1138	1298	2072	2150	2044	1833	2088	1796	1148	17725
Donna	324	935	766	955	1069	2281	1549	1540	2218	1336	2488	581	16042
Savana	418	697	1008	1271	656	1480	1771	1449	1961	1173	1866	756	14506
Kapareil	41	110	733	670	1576	618	1486	2010	1520	1097	1303	1085	12249

¹Based on a spacing that gives 86 trees per acre.

²Yield data for Fritz was lost in 1995 due to a harvesting error. Thus the accumulative yield should be somewhat higher than what is shown in this table.

KERNEL DEFECTS OBSERVED IN 2006

Significant defects noted in the 2006 harvest nut samples of the three RAVTs are outlined below. The trees from the original planting were in their fourteen growing season. Avalon, Carmel (young), Durango and Kochi at Chico were in their fifth growing season and Avalon and Kochi at Delta in their fourth. Defects listed may only become important if they continue to show in the same varieties over several years as the trees mature.

Varieties with defect	Trial		
	CSU-Chico*	Delta College	Kern
6% or more double kernels:	Avalon (38%) Carmel (20%) Nonpareil (20%) Kochi (6%)	Donna (68%) Kahl (64%) Plateau (60%) Monterey (56%) Sano (50%) Aldrich (38%) Dottie Won (30%) Jiml (26%) Price (22%) Wood Colony (18%) Butte (16%) Morley (14%) Ruby (14%) Carmel (12%) Mission (10%) Avalon(8%) Fritz (8%) Padre (8%) Rosetta (8%) Chips (6%) Winters (6%)	Plateau (52%) Sano (34%) Wood Colony (26%) Donna (16%) Kahl (16%) 2-19E (14%) 25-75 (12%) Jiml (12%) Monterey (10%) Price (10%) Livingston (8%) Morley (8%) Mission (7%) Carmel (6%)
6% or more twin kernels (two kernels within the same pellicle):	Durango (6%)	Sonora (38%) 1-87 (30%) Avalon (20%) Nonpareil (17%) Johlyn (14%) Price (12%) Jiml (8%) Winters (6%)	1-87 (10%) Price (10%) Sonora (10%) Nonpareil (6%)

* only 6 varieties were harvested at the CSU Chico trial in 2006

Varieties with defect	CSU-Chico *	Delta College	Kern
6% or more blank kernels:	Avalon (8%) Carmel (6%)	Sano (34%) Kahl (32%) Aldrich (30%) Donna (30%) Dottie Won (22%) Jenette (22%) Price (22%) Plateau (16%) Monterey (12%) Avalon (10%) Jiml (10%) Morley (10%) Rosetta (8%) Ruby (8%) Wood Colony (8%) Nonpareil (7%) Butte (6%) Johlyn (6%)	Kahl (12%) Price (12%) Sano (10%) Donna (8%) Morley (6%)
6% or more kernels with gum:	(none)	(none)	Fritz (32%) Sonora (18%) Livingston (8%)
6% or more worm damage:	(none)	(none)	Livingston (32%) Plateau (32%) Kapareil (26%) Kapareil/PA (26%) 25-75 (16%) Winters (14%) 1-102W (12%) Price (12%) Sonora (12%) Carmel (10%) Jiml (10%) Johlyn (10%) Nonpareil (9%) Ruby (8%) 2-19E (6%) Kahl (6%) Monterey (6%) Rosetta (6%) Sano (6%)

*only 6 varieties were harvested at the CSU Chico trial in 2006

ALTERNARIA LEAFSPOT 2006
RAVT - Paramount Farming Company (Kern Co.)

Variety	Infestation in 100 Leaf Samples
Donna	25
Morley	19
Monterey	14
Livingston	12
Johlyn	12
Ruby	11
Price	10
Carmel	10
2-19E	10
Aldrich	9
Nonpareil	8
Butte	7
1-102W	6
Rosetta	4
1-87	4
Mission	3
Padre	3
Winters (13-1)	0
Sonora	0
Wood Colony	0
Kahl	0
Savana	0
Yokut	0
Kapareil	0
Jiml	0
Plateau	0
Sano	0
Jenette	0
25-75	0
Chips	0
Fritz	0
2-43W	No data collected

HULL ROT 2006

RAVT - Paramount Farming Company (Kern Co.)

Variety	No. Strikes / Tree*
Nonpareil	295
Kapareil	294
2-19E	234
1-102W	193
Johlyn	174
Padre	159
Sonora	157
Winters (13-1)	156
Donna	104
Yokut	103
Jenette	98
Wood Colony	97
Sano	93
Chips	75
Morley	74
Fritz	66
Kahl	56
Livingston	52
Aldrich	43
Plateau	42
Jiml	41
Savana	33
Carmel	33
2-43W	32
Butte	21
1-87	15
Price	13
Mission	8
Rosetta	7
Ruby	7
Monterey	4
25-75	0