2002

Progress Report

REGIONAL ALMOND VARIETY TRIALS

Planted in 1993

University of California

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REGIONAL ALMOND VARIETY TRIALS

Planted in 1993

Bruce D. Lampinen, Joseph H. Connell, Paul Verdegaal, Mario Viveros, Samuel G. Metcalf, James T. Yeager, 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

Three new RAVTs were established in 1993, and this leaflet presents data collected from these trials in 2002. These RAVTs 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. Thus, any differences in varietal performance among various regions should become evident. The only differences in variety composition among these 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 planted on 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-almond hybrid rootstocks at all locations, but data isn't always included in this publication for the trees on peach-almond hybrid.

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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 is flood irrigated. Probably as a result of the coarse textured soil and flood irrigation, the trees in this latter 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 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 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 and 25-75.

Selection 1-102w and selection 2-43w were removed from the Butte trial in 2002 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. Kapareil on peach almond hybrid rootstock was removed from the Delta trial due to poor productivity and the row was replanted with Avalon in the spring of 2002.

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

2002 Data and Observations

This 2002 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.

Bloom time weather was generally good this spring. At the CSU-Chico trial, conditions during bloom were better than they have been in several years with 61 good bee

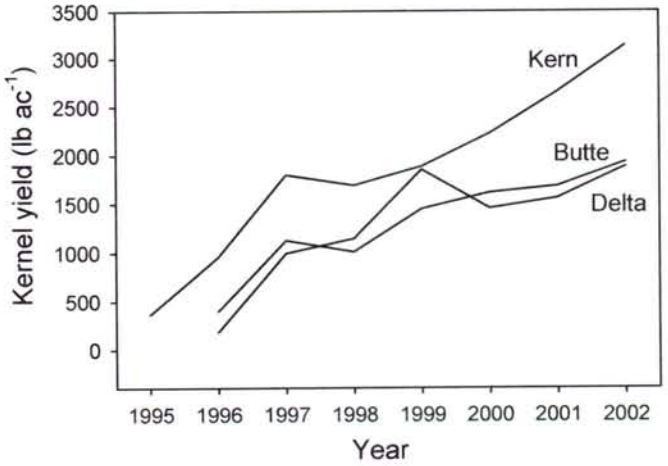


Fig. 1. Average annual yield for all varieties and selections combined at each trial.

hours in 2002 versus 42 in 2001 and 24 in 2000. At the Delta trial, although there was measurable rainfall on about 1/3 of the days during bloom, there were good conditions for bees on days spread throughout the bloom period. At the Kern trial conditions were excellent during bloom in 2002.

Overall average yield for all varieties was up 14% at the CSU-Chico trial, 21% at the Delta trial, and 18% at the Kern trial (Fig. 1).

In 2002, the CSU-Chico, Delta and Kern trials had 10, 15 and 8 varieties, respectively, with 6% or more kernel doubles. The Delta trial had 12 varieties while the CSU-Chico trial had only 3 varieties with 6% or more twin kernels. There were no varieties with 6% or more twin kernels at the Kern Trial. The CSU-Chico, Delta and Kern trials had 3, 10 and 1 varieties, respectively, with 6% or more blank kernels in 2002. The Kern trial had the most worm damage with 11 varieties having 6% or higher worm damage. The CSU-Chico trial had 6 and Delta only had 1 variety with 6% or higher worm damage in 2002.

Over the last seven years, Kahl, Sano and Plateau have had the most double kernels. Both Kahl and Donna have had eight percent or more blank kernels in at least one of the trials each year. Kapareil has had four 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. The exact cause of this splitting is uncertain, but it may be a result of the wide tree spacing and tree damage from a 1995 tornado at the CSU-Chico trial and the prevailing wind, heavy crops and lack of sufficient tree tying at the Delta College plot. Loss of scaffold limbs and trees have 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 noninfectious bud failure (BF) symptoms, and these symptoms might be due to a virus condition that mimics BF. However, in the spring of 2002, minor 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. To date, no bud failure has been observed on the Carmel trees at the Delta College trial.

Selection 13-1 was recently released with the name 'Winters'. It has shown good production (particularly at the CSU-Chico trial) and should be a good pollenizer for Nonpareil. However, the high susceptibility of Winters to diseases (especially *Alternaria* and *Anthracnose*) and worm damage will have to be watched.

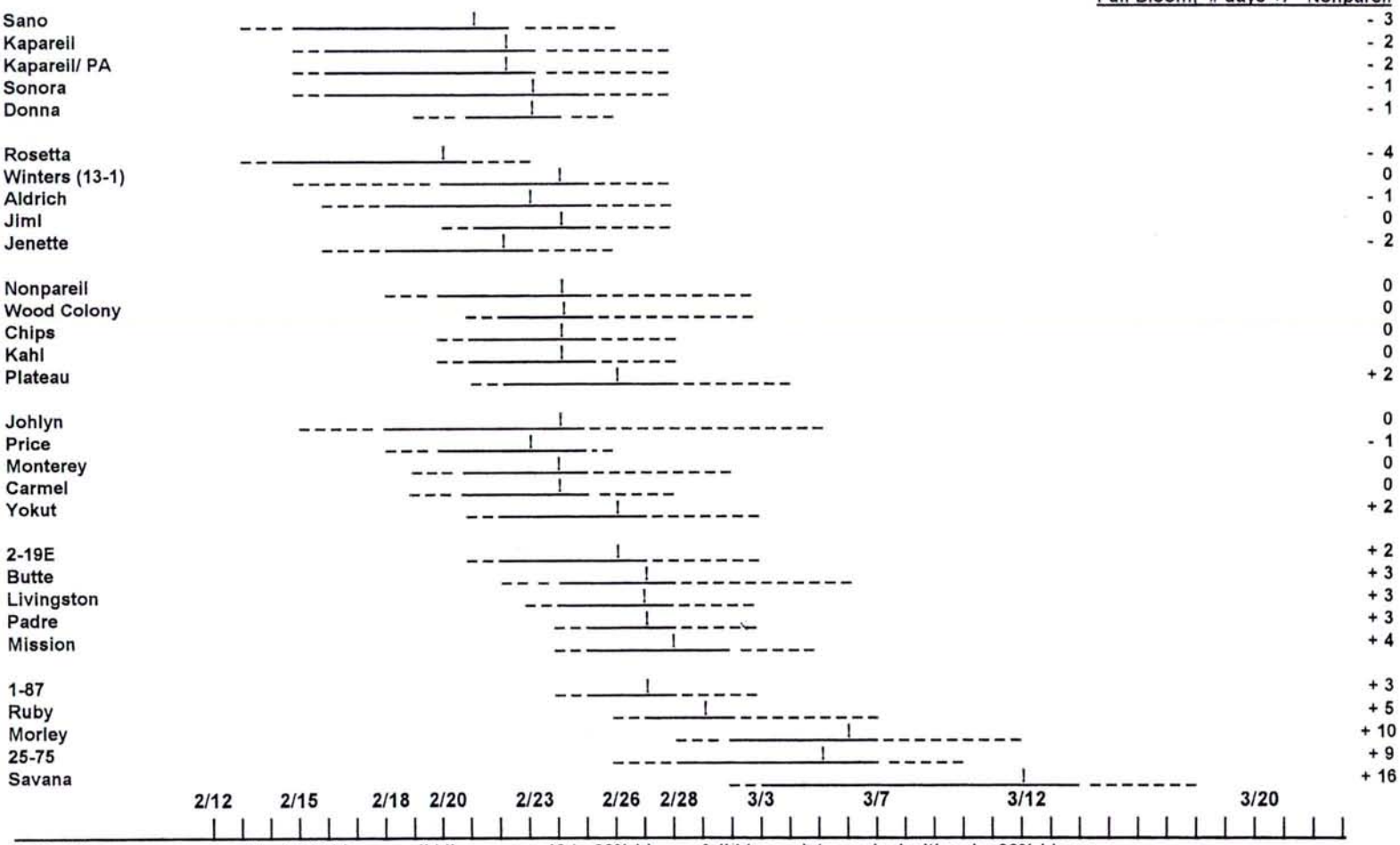
Acknowledgements

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 retired farm advisor Donald Rough, Cooperative Extension field assistants in Kern, Butte and San Joaquin Counties and field personnel of the University of California Pomology Department is gratefully acknowledged.

ALMOND REGIONAL VARIETY TRIAL - 2002 BLOOM

Planted in 1993 at the California State University Farm, Chico

	2/12			2/15			2/18	2/20			2/23			2/26	2/28			3/3			3/7						3/12						3/20			
Maximum Temp.	70	61	73	56	58	56	57	52	64	68	68	61	69	74	75	76	72	65	67	67	68	60	59	56	56	55	59	65	61	58	61	57	56	56	62	68	71
Minimum Temp.	39	48	45	45	43	39	45	47	52	45	45	48	42	41	39	47	36	40	37	36	36	42	50	41	30	33	47	43	45	33	37	31	34	35	34	32	41
Cold/Wind/Rain				c	c	c	c	cw				w				w	w	w				c															
Good Bee Hours 1/				(0	0	0	0	0	5	5	6	3	6	6	6	4	3	0	5	6	5	1)	= 61 Hours Total													



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 and Patrick Andersen, U.C. Farm Advisor and Intern, Butte County, June 18, 2002.

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

	# Days before or after Nonpareil Full Bloom 1/							
Variety	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**Average**
Sano	-12	-4	-4	-3	-7	-3	-3	-5.1
Kapareil	-11	-2	-5	-3	-7	-3	-2	-4.7
Kapareil/PA	-8	-3	-6	-4	-7	-3	-2	-4.7
Sonora	-8	-6	-9	-5	-7	-8	-1	-6.3
Donna	-6	-4	-2	-4	-4	-3	-1	-3.4
Rosetta	-4	-4	-5	-2	-7	-7	-4	-4.7
Winters (13-1)	-4	-6	-6	-2	-4	-3	0	-3.6
Aldrich	-3	0	0	1	-5	-2	-1	-1.4
Jiml	-2	0	1	3	-3	-1	0	-0.3
Jenette	-1	3	4	2	-5	-5	-2	-0.6
Nonpareil	0	0	0	0	0	0	0	0
Wood Colony	0	-1	7	2	2	0	0	1.4
Chips	0	-2	-1	-1	-2	-2	0	-1.1
Kahl	0	1	5	3	1	2	0	1.7
Plateau	0	0	8	4	4	1	2	2.7
2-43W	1	0	9	5	7	---	---	4.4
Johlyn	1	6	3	4	0	2	0	2.3
Price	2	0	3	1	-1	-1	-1	0.4
Monterey	2	0	6	4	0	2	0	2.0
Carmel	2	1	6	2	0	-1	0	1.4
Yokut	2	-2	4	2	0	0	2	1.1
2-19E	3	6	5	5	4	3	2	4.0
Butte	3	6	8	6	4	0	3	4.3
Livingston	4	4	7	10	7	4	3	5.6
1-102W	4	6	8	3	6	---	---	5.4
Padre	4	8	9	6	4	0	3	4.9
Mission	4	8	10	6	6	5	4	6.1
1-87	4	11	8	5	4	5	3	5.7
Ruby	6	11	17	10	10	6	5	9.3
Morley	6	11	19	18	16	12	10	13.1
25-75	11	13	10	12	15	9	9	11.3
Savana	11	17	20	18	17	12	16	15.9
Good Bee Hours 2/	77	74	43	37	24	42	61	

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.

Bloom Density -- CSU Chico, Regional Variety Trial

	Bloom Density*						
Variety	1996	1997	1998	1999	2000	2001	2002
Sano	4	4	3	4	4	4	4
Kapareil	5	5	5	5	5	5	5
Kapareil/PA	5	5	5	5	5	5	5
Sonora	4	2	5	4	4	3	5
Donna	3	3	3	4	3	3	4
Rosetta	3	4	2	3	4	4	3
Winters (13-1)	5	4	3	4	4	3	2
Aldrich	4	5	3	5	5	4	5
Jiml	2	3	2	2	3	3	4
Jenette	4	5	3	5	5	4	5
Nonpareil	4	4	3	4	3	3	3
Wood Colony	4	3	3	3	3	4	4
Chips	3	4	4	4	4	3	3
Kahl	2	3	2	3	2	4	3
Plateau	2	3	3	3	4	3	3
2-43W	4	3	2	3	4	---	---
Johlyn	4	4	1	4	3	3	3
Price	1	1	4	2	4	3	3
Monterey	4	4	2	3	3	2	4
Carmel	3	3	3	5	3	4	3
Yokut	1	3	1	2	1	4	2
2-19E	3	3	2	5	2	5	2
Butte	4	4	3	4	4	4	4
Livingston	3	4	3	4	4	4	4
1-102W	4	4	4	4	4	---	---
Padre	3	3	4	5	4	5	5
Mission	3	3	3	3	4	4	4
1-87	3	3	3	3	3	4	3
Ruby	3	3	3	3	4	3	4
Morley	3	3	3	3	4	4	4
25-75	2	3	3	3	4	3	3
Savana	4	3	3	3	2	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 Almond Regional Variety Trial

2002 Bloom Dates

Manteca

Row	FEBRUARY 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	MARCH 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Chips												23	24	25	26																
Nonpareil										21	22	23	24	25																	
Johlyn											22	23	24	25	26	27															
Dottie Won												23	24	25	26	27															
Jenette									20	21	22	23	24	25	26																
Kahl												23	24	25	26	27															
Sano							18	19	20	21	22																				
Yokut												23	24	25	26	27															
Plateau													24	25	26	27	28														
2-43W													24	25	26	27	28	1													
Morley																			2	3	4	5	6	7	8						
Savana																							6	7	8	9	10	11			
Kapareil												23	24	25	26																
Sonora							18	19	20	21	22	23	24																		
Rosetta							18	19	20	21	22	23																			
Winters (13-1)											22	23	24	25	26																
Mission															26	27	28	1	2	3											
Price										21	22	23	24	25	26																
Aldrich									20	21	22	23	24	25	26																
Wood Colony												23	24	25	26	27	28														
Fritz											22	23	24	25	26	27															
Jiml												23	24	25	26	27															
Donna										21	22	23	24	25	26	27	28														
Carmel												23	24	25	26	27	28														
Monterey												23	24	25	26	27	28														
Butte													24	25	26	27	28														
Livingston														25	26	27	28	1													
1-87															26	27	28	1													
Padre															26	27	28	1	2												
2-19E													24	25	26	27	28	1													
1-102W														25	26	27	28	1													
Ruby																	28	1	2	3	4										
25-75															26	27	28	1	2												

= 10 TO 90%

SAN JOAQUIN DELTA COLLEGE
REGIONAL ALMOND VARIETY TRIAL
2002 RAINFALL
MANTECA

		Air Temperature					Air Temperature		
February	Rain (inches)	Max	Min	Wind > 5 mph	**March**	Rain (inches)	Max	Min	Wind > 5 mph
1	0	55	29		1	0	65	38	7.4
2	0	58	30		2	0	68	31	
3	0	59	30		3	0	70	32	
4	0	63	27		4	0	70	34	
5	0	60	30		5	0	65	39	
6	0	61	31		6	0.39	62	50	5.5
7	0.24	65	45	6.7	7	0.16	61	41	9.0
8	0	60	37	5.9	8	0	56	30	
9	0	62	35		9	0	61	38	
10	0	67	32		10	0.24	62	48	
11	0	66	34		11	0	66	45	
12	0	67	36		12	0	65	47	6.0
13	0	57	42		13	0.08	58	42	8.3
14	0	67	40		14				
15	0	59	37		15				
16	0.16	62	39		16				
17	0.20	56	42		17				
18	0	60	40		18				
19	0.08	56	49	7.8	19				
20	0	68	50		20				
21	0	67	47		21				
22	0	70	47		22				
23	0	62	48	6.1	23				
24	0	68	43		24				
25	0	72	36		25				
26	0	72	38		26				
27	0	73	42		27				
28	0	72	37		28				
					29				
					30				
					31				

Rainfall subtotal for:

November	1.86
December	4.52
January	2.29
February	0.68
March	0.87
Total	10.22

Shaded dates = Bloom period

EFFECTIVE BLOOM PERIOD 2002

RAVT - Paramount Farming Company (Kern Co.)

Early Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Sano	02-13-02	02-25-02	03-01-02
Kapareil	02-15-02	02-25-02	03-04-02
Rosetta	02-15-02	02-24-02	03-04-02
Sonora	02-20-02	02-25-02	03-04-02
Winters (13-1)	02-20-02	02-27-02	03-01-02

Mid-Season Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Nonpareil	02-22-02	02-28-02	03-07-02
Price	02-22-02	02-28-02	03-04-02
Jenette	02-20-02	02-27-02	03-04-02
Yokut	02-22-02	03-01-02	03-04-02
Johlyn	02-20-02	02-27-02	03-08-02
Plateau	02-23-02	03-01-02	03-06-02
Chips	02-21-02	03-01-02	03-06-02
Kahl	02-22-02	03-01-02	03-02-02
Fritz	02-23-02	03-01-02	03-08-02
Monterey	02-25-02	03-01-02	03-10-02
Aldrich	02-22-02	03-01-02	03-11-02
Wood Colony	02-22-02	03-01-02	03-11-02
1-102W	02-25-02	03-01-02	03-11-02
Jim1	02-23-02	03-01-02	03-08-02
Donna	02-20-02	02-27-02	03-01-02
Carmel	02-25-02	03-01-02	03-09-02
2-19E	02-25-02	03-01-02	03-04-02
2-43W	02-23-02	03-04-02	03-11-02

EFFECTIVE BLOOM PERIOD 2002

RAVT - Paramount Farming Company (Kern Co.)

(Cont.)

Late Season Blooming Varieties			
	Bloom Period		
	Beginning	**Full**	**End**
Butte	02-25-02	03-04-02	03-11-02
Livingston	02-25-02	03-04-02	03-12-02
Padre	02-26-02	03-01-02	03-12-02
1-87	02-26-02	03-04-02	03-12-02
25-75	02-22-02	03-04-02	03-15-02
Mission	02-27-02	03-04-02	03-15-02
Ruby	02-27-02	03-06-02	03-13-02
Morley	03-01-02	03-11-02	03-15-02
Savana	03-02-02	03-13-02	03-18-02

Bloom Observations:

Good Blooming Varieties:
Rosetta, Yokut, 2-43W, Aldrich, Wood Colony, Butte, Mission, 1-87, Padre, 102W

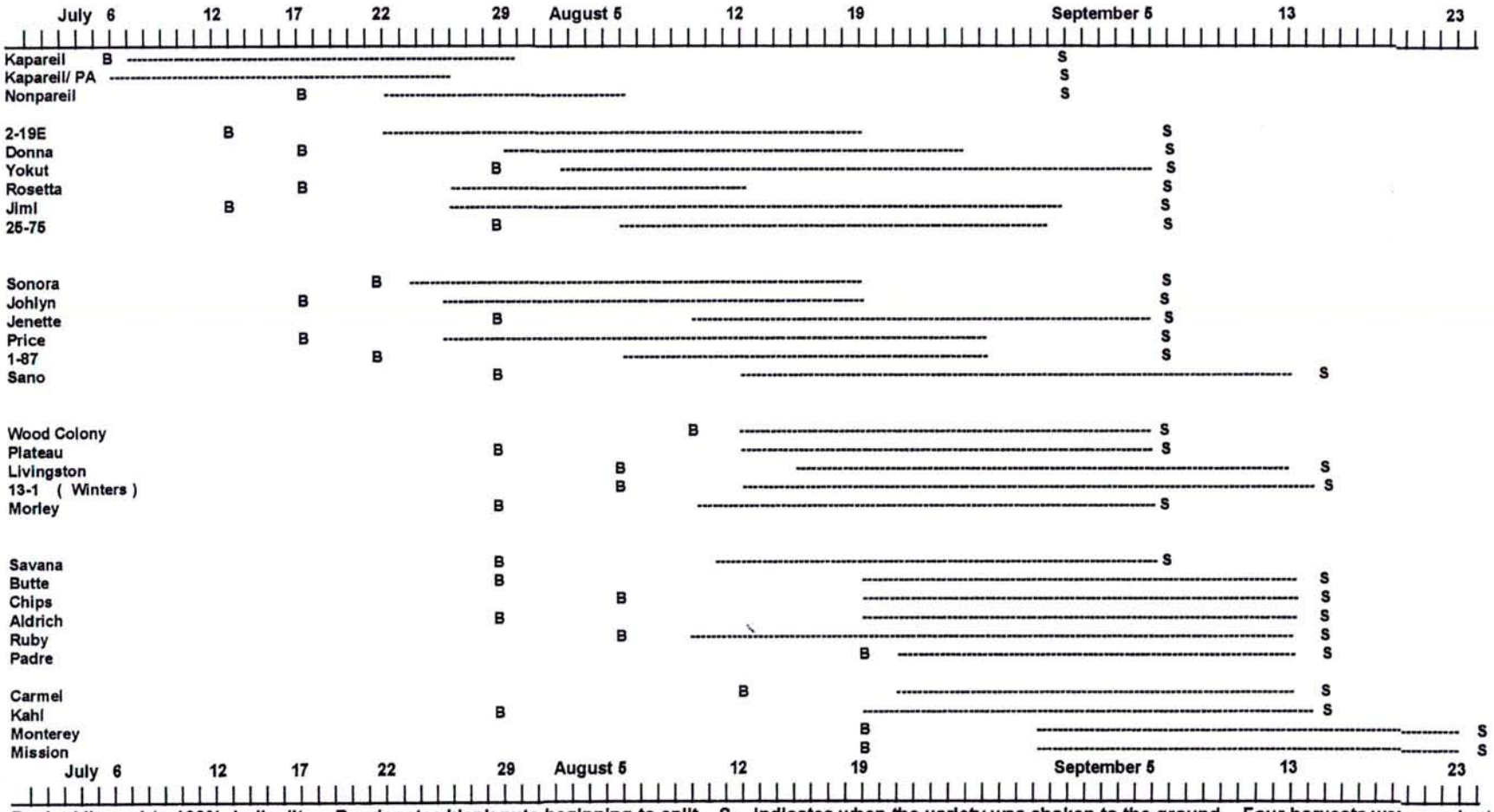
Average Blooming Varieties:
Sonora, Jiml, Fritz, Johlyn, Kahl, Ruby, 13-1, Price, Carmel, Monterey

Poor Blooming Varieties:
Nonpareil, Morley, Jenette, 2-19E, Sano, Savana, Plateau, Kapareil, 25-75 and Donna

Chilling Hours: 636

ALMOND REGIONAL VARIETY TRIAL - 2002 HARVEST MATURITY

Planted in 1993 at the California State University Farm, Chico



Dashed line = 1 to 100% hullsplit. B -- denotes blank nuts beginning to split. S -- indicates when the variety was shaken to the ground. Four harvests were conducted this year to complete harvest operations. This is a cooperative project between the Almond Board of California, California State University Chico, & University of California Cooperative Extension. Prepared by: Joseph H. Connell, U.C. Farm Advisor & Patrick Andersen, Butte County CE Intern. 11/1/02.

Almond Regional Variety Trial
2002 Hull Split Dates
Delta College

Variety	10%	90%	Average Progression 1997-2002
Kapareil	16-Jul	25-Jul	1
Nonpareil	16-Jul	25-Jul	2
Johlyn	30-Jul	12-Aug	3
Jiml	16-Jul	30-Jul	4
Sonora	30-Jul	12-Aug	5
2-43W	5-Aug	15-Aug	6
Price	30-Jul	15-Aug	7
Yokut	12-Aug	4-Sep	8
Donna	31-Jul	13-Aug	9
25-75	25-Jul	5-Aug	10
Chips	16-Aug	30-Aug	11
Jenette	6-Aug	13-Aug	12
Winters (13-1)	18-Aug	4-Sep	13
Dottie Won	6-Aug	30-Aug	14
Morley	5-Aug	12-Aug	15
Plateau	13-Aug	26-Aug	16
Rosetta	24-Jul	2-Aug	17
2-19E	30-Jul	12-Aug	18
Savana	30-Jul	26-Aug	19
Aldrich	15-Aug	30-Aug	20
Wood Colony	18-Aug	26-Aug	21
Sano	5-Aug	16-Aug	22
1-87	12-Aug	26-Aug	23
1-102W	31-Jul	14-Aug	24
Carmel	18-Aug	3-Sep	25
Monterey	1-Sep	12-Sep	26
Livingston	15-Aug	27-Aug	27
Butte	22-Aug	30-Aug	28
Kahl	13-Aug	7-Sep	29
Mission	23-Aug	9-Sep	30
Padre	14-Aug	3-Sep	31
Ruby	20-Aug	3-Sep	32
Fritz	3-Sep	14-Sep	33

HULLSPLIT PERIOD

RAVT - Paramount Farming Company (Kern Co.)

EARLY - SEASON		
	Hullsplit Period	
	Beginning*	End**
Kapareil	07-05-02	07-31-02
Nonpareil	07-10-02	08-22-02
2-19E	07-26-02	08-30-02
Sonora	07-26-02	08-30-02
Rosetta	07-26-02	08-20-02
2-43W	08-09-02	09-12-02
1-102W	08-02-02	09-06-02
Donna	07-26-02	08-20-02
Aldrich	08-10-02	09-04-02
Jiml	07-26-02	09-02-02
Jenette	08-02-02	09-01-02
Johlyn	07-31-02	09-04-02

MID - SEASON		
	Hullsplit Period	
	Beginning*	End**
25-75	08-09-02	08-30-02
Winters (13-1)	08-14-02	09-16-02
1-87	08-10-02	09-02-02
Price	08-02-02	09-02-02
Plateau	07-31-02	08-30-02
Chips	08-05-02	09-03-02
Savana	08-09-02	09-12-02
Morley	08-08-02	09-12-02
Wood Colony	08-09-02	09-06-02

MID to LATE SEASON		
	Hullsplit Period	
	Beginning*	End**
Sano	07-31-02	08-30-02
Yokut	07-31-02	08-30-02
Padre	08-16-02	09-07-02
Butte	08-25-02	09-18-02
Livingston	08-16-02	09-14-02
Kahl	08-20-02	09-15-02
Carmel	08-20-02	09-22-02
Ruby	08-20-02	09-18-02

LATE - SEASON		
	Hullsplit Period	
	Beginning*	End**
Mission	08-30-02	09-25-02
Monterey	08-22-02	09-18-02
Fritz	08-30-02	10-02-02

*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 crop.

2002 Yield Summary for the Regional Almond Variety Trial at California State University at Chico Farm, Butte County. Planted in 1993					
				Kernel Pounds Per	
Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling Percentage	Tree	Acre[1]
Chip's	16495	1.37	69.7	49.9	3195
Aldrich	23382	0.89	54.8	45.6	2920
Nonpareil	**16266**	**1.13**	**65.7**	**40.4**	**2587**
Winters (13-1)	19982	0.88	45.2	38.7	2479
Jiml	14805	1.14	59.4	37.0	2371
Plateau	14195	1.18	46.9	36.9	2361
Livingston	15875	1.05	57.9	36.7	2350
Carmel	15557	1.06	50.7	36.3	2320
Wood Colony	14895	1.10	54.3	36.2	2318
Mission	**16208**	**1.01**	**45.7**	**36.0**	**2304**
Johlyn	13061	1.11	68.7	31.8	2036
Monterey	11534	1.25	46.5	31.8	2032
Butte	15233	0.93	47.5	31.3	2001
Jenette	12128	1.13	68.1	30.3	1939
Padre	16212	0.84	49.8	30.1	1929
Sano	10529	1.29	53.8	30.0	1918
Ruby	12439	1.06	50.9	29.0	1859
25-75	16564	0.79	52.9	28.7	1835
1-87x	15035	0.85	58.0	28.2	1802
Morley	12788	0.97	48.3	27.2	1741
Yokut	9743	1.18	50.3	25.3	1621
Sonora	8172	1.30	69.1	23.4	1498
Rosetta	7783	1.32	46.6	22.7	1451
Donna	9745	0.94	52.0	20.2	1294
Kahl	8802	1.03	36.4	20.0	1280
Price	9366	0.94	49.9	19.4	1244
Savana	7541	1.10	51.8	18.3	1169
Kapareil	8872	0.87	70.0	17.1	1093
2-19E	6910	0.99	43.7	15.1	964
2-43W	Selection was removed from the Butte RAVT				
1-102W	Selection was removed from the Butte RAVT				

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

2002 Yield Summary for the Regional Almond Variety Trial at San Joaquin Delta College Farm, Manteca, San Joaquin County. Planted in 1993.					
				Kernel Pounds Per	
Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling Percentage	Tree	Acre[1]
Padre	16945	1.07	59.1	39.9	2995
Livingston	15772	1.10	62.2	38.1	2856
Carmel	13763	1.19	62.3	36.0	2697
Fritz	15076	1.06	60.4	35.3	2645
Plateau	12192	1.30	59.8	35.0	2626
Monterey	11559	1.32	61.0	33.5	2513
Butte	15375	0.97	56.3	32.8	2459
Ruby	12067	1.22	60.6	32.4	2432
Jiml	11093	1.26	58.1	30.8	2313
Dottie Won	14221	0.98	52.9	30.7	2302
Chips	11795	1.18	60.6	30.7	2299
Mission	**12072**	**1.11**	**50.9**	**29.4**	**2203**
Nonpareil	**9630**	**1.32**	**69.4**	**27.9**	**2093**
Winters (13-1)	10137	1.15	59.9	25.6	1922
Johlyn	9159	1.20	71.3	24.3	1822
Yokut	8531	1.29	58.3	24.2	1812
1-87	11660	0.93	60.9	23.8	1787
25-75	10365	1.04	65.9	23.8	1784
Jenette	8458	1.28	68.2	23.8	1783
Kahl	9986	1.08	50.2	23.7	1778
Aldrich	9539	1.09	61.5	23.0	1724
Morley	9511	1.06	51.4	22.3	1672
Sano	6677	1.44	57.0	21.2	1590
Wood Colony	6888	1.39	66.3	21.1	1579
Donna	8447	1.09	53.0	20.2	1515
Sonora	6470	1.42	76.9	20.2	1514
Price	8611	1.00	66.1	19.0	1422
2-43W	6349	1.27	53.8	17.8	1334
2-19E	6519	1.16	54.8	16.6	1245
1-102W	4742	1.54	67.1	16.1	1209
Rosetta	4508	1.45	50.8	14.4	1083
Kapareil	4838	0.98	61.2	10.4	783
Savana	1061	1.40	70.6	3.3	245

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

2002 Yield Summary for the Regional Almond Variety Trial at Paramount Farming Company, Shafter, Kern County. Planted in 1993					
				Kernel Pounds Per	
Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling Percentage	Tree	Acre[1]
Aldrich	28551	0.85	63.6	53.2	4576
Padre	29495	0.82	56.5	53.0	4559
Jiml	21429	1.06	61.8	49.8	4287
Ruby	19423	1.12	58.0	47.8	4113
Butte	25837	0.84	56.9	47.7	4101
2-43W	22326	0.94	64.7	46.1	3967
1-102W	16480	1.27	68.2	46.0	3958
Sonora	19638	1.06	71.4	45.7	3928
1-87	25394	0.78	62.9	43.6	3752
Morley	22337	0.88	50.2	43.1	3706
Price	23543	0.83	63.1	42.8	3684
Livingston	18157	1.06	61.0	42.6	3660
Nonpareil	**17311**	**1.07**	**70.5**	**40.7**	**3504**
Rosetta	15724	1.17	48.6	40.4	3473
Johlyn	15795	1.15	69.3	40.1	3453
Fritz	20471	0.89	56.4	40.1	3451
Carmel	17451	1.03	59.8	39.5	3398
Monterey	14933	1.16	55.0	38.3	3293
Wood Colony	16038	1.07	66.9	37.7	3245
Mission	**18203**	**0.83**	**47.2**	**36.8**	**3161**
Yokut	14538	1.14	57.1	36.6	3150
Chip's	15842	0.97	66.3	33.8	2905
Kahl	15231	1.00	51.5	33.4	2874
Jenette	13966	1.08	60.2	33.3	2862
Plateau	12953	1.15	51.2	32.9	2827
Winters (13-1)	16538	0.89	63.6	32.4	2788
2-19E	12746	1.01	56.6	28.3	2434
25-75	12043	0.90	62.7	23.8	2044
Kapareil	13927	0.76	72.6	23.4	2010
Donna	7819	1.04	64.4	17.9	1540
Savana	7056	1.08	61.9	16.8	1449
Sano	3364	1.55	58.4	11.5	990

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

Annual Yield Summary for 1996 through 2002 and Accumulative Yield for This Period 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	Accum.
Winters (13-1)	425	2076	784	2736	2446	2677	2479	13623
Plateau	360	1215	2367	2007	1943	2160	2361	12414
Carmel	741	1240	1260	1700	1934	2070	2320	11265
Nonpareil	**494**	**1427**	**1127**	**1952**	**1762**	**1846**	**2587**	**11195**
Livingston	425	1449	1275	1765	1607	2283	2350	11153
Monterey	749	1535	1531	1410	2279	1541	2032	11078
Aldrich	275	1813	1005	1388	1494	1663	2920	10559
Ruby	448	1208	1315	1823	1828	1676	1859	10156
Wood Colony	724	978	951	1464	1695	1781	2318	9911
Butte	443	1169	1549	1404	1509	1705	2001	9780
Johlyn	537	1047	1046	1870	1595	1457	2036	9588
Sano	372	1036	1020	1558	2128	1552	1918	9584
Morley	219	1102	1189	1364	1846	2053	1741	9515
Chip's	344	817	1188	1030	1434	1490	3195	9498
Jiml	262	873	738	1633	1948	1484	2371	9309
1-87	190	1295	1074	1340	1454	1711	1802	8866
Padre	541	1013	832	1258	1402	1833	1929	8808
Rosetta	248	1039	840	1422	1727	2041	1451	8768
Mission	**383**	**941**	**890**	**1018**	**1616**	**1483**	**2304**	**8635**
Jenette	279	868	672	1407	1932	1290	1939	8387
25-75	308	668	815	1103	1910	1433	1835	8072
Yokut	359	765	896	1204	1126	1964	1621	7934
Sonora	732	494	1152	1262	1510	1165	1498	7812
Price	538	931	990	1230	1066	1469	1244	7467
2-19E	276	1299	454	1345	906	1828	964	7072
Kahl	208	672	1070	1301	1034	1491	1280	7057
Donna	582	913	712	1003	1255	1118	1294	6877
Savana	451	1079	815	992	958	1106	1169	6570
Kapareil	68	1129	280	941	1029	1364	1093	5904

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

Annual Yield Summary for 1996 through 2002 and Accumulative Yield for This Period 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	Accum.
Carmel	114	2111	1893	2695	2538	2206	2697	14253
Butte	328	1631	2075	2641	2243	2311	2459	13687
Plateau	[2]	1198	2301	2511	1968	2201	2626	12805
Ruby	419	1274	1890	1985	2518	1505	2432	12023
Livingston	73	683	1572	2779	1736	2133	2856	11831
Fritz	134	1692	1539	2086	2024	1648	2645	11768
Padre	221	579	1502	1340	2784	2123	2995	11544
Dottie Won	100	1287	1757	1667	2133	2019	2302	11266
Jenette	226	1313	1530	2579	1667	1927	1783	11024
Monterey	153	1315	1660	2006	1718	1570	2513	10935
Yokut	251	1288	1882	1956	2060	1674	1812	10924
Chips	420	920	1798	2134	1828	1464	2299	10863
Mission	**219**	**813**	**1332**	**1780**	**2001**	**1754**	**2203**	**10103**
Sano	[2]	1213	995	2299	2205	1762	1590	10064
Nonpareil	**115**	**1165**	**918**	**2252**	**1333**	**1794**	**2093**	**9671**
Wood Colony	211	1131	1168	2176	1543	1677	1579	9485
Winters (13-1)	[2]	1591	192	2223	392	2671	1922	8991
Kahl	[2]	757	1320	1836	1605	1246	1778	8543
Jiml	[2]	534	744	2509	1098	1179	2313	8377
Sonora	123	[2]	965	2407	1194	1651	1514	7854
Rosetta	[2]	1323	600	1745	1487	1611	1083	7849
Aldrich	34	937	636	2169	902	1307	1724	7709
1-87	79	486	1207	1601	1296	1238	1787	7694
Johlyn	[2]	634	997	1510	1246	1188	1822	7396
Donna	169	1000	990	1394	1153	1137	1515	7358
Morley	[2]	559	576	1401	842	1702	1672	6752
Price	[2]	947	573	1731	932	1075	1422	6681
1-102W	217	457	892	939	519	1379	1209	5613
2-19E	[2]	503	507	1010	903	1008	1245	5176
25-75	75	192	660	542	912	683	1784	4848
2-43W	[2]	[2]	776	1198	632	767	1334	4707
Kapareil	[2]	361	183	1200	485	1346	783	4359
Savana	[2]	[2]	184	750	109	536	245	1824

[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 on the table.

Annual Yield Summary for 1995 through 2002 and Accumulative Yield for This Period for the Regional Almond 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	Accum.
Ruby	664	1406	2413	2180	2550	3164	3482	4113	19973
Padre	802	1624	1624	1883	2416	2841	4068	4559	19817
Plateau	282	1340	2525	2419	2239	3197	3653	2827	18481
Jenette	294	952	3085	1574	2692	2810	4177	2862	18446
Monterey	591	1141	2184	1914	2194	2429	3342	3293	17088
Butte	377	1364	2400	2353	1670	1178	3401	4101	16845
Nonpareil	**259**	**782**	**2428**	**1963**	**2560**	**2216**	**3022**	**3504**	**16734**
2-19E	341	963	2347	1944	2496	2646	3479	2434	16650
Aldrich	422	459	2230	1295	2936	1410	3230	4576	16557
Carmel	634	1260	1944	1427	1359	2534	3819	3398	16375
Fritz	[2]	1261	1706	2234	1700	2805	3199	3451	16356
Yokut	382	1316	1519	1835	2023	3184	2059	3150	15468
Kahl	383	1319	1852	1683	1926	2696	2634	2874	15367
Livingston	323	760	1972	1749	3054	1608	2233	3660	15358
Mission	**545**	**1353**	**1949**	**1816**	**1716**	**2285**	**2296**	**3161**	**15121**
Winters (13-1)	599	1224	2076	2152	1643	2073	2475	2788	15030
Chip's	401	882	1417	2004	1709	3106	2419	2905	14843
Johlyn	291	1221	2195	1936	1287	2084	2313	3453	14779
Sano	291	1209	1345	1754	2446	3702	3033	990	14770
Sonora	337	843	1315	1120	2218	3181	1822	3928	14764
Price	297	746	1118	1772	1235	2997	2819	3684	14668
Morley	176	372	1091	1871	1516	1742	3531	3706	14006
Rosetta	93	481	2164	1123	2308	1808	2308	3473	13758
2-43W	477	1028	2056	1794	1516	1254	1526	3967	13617
Jiml	107	626	1565	1887	1631	2039	1391	4287	13533
1-87	228	607	1598	1594	2171	1008	2260	3752	13218
1-102W	304	464	2143	1742	1755	661	1685	3958	12712
Wood Colony	559	1136	1545	1024	760	1923	2193	3245	12385
25-75	167	808	1184	1138	1298	2072	2150	2044	10861
Donna	324	935	766	955	1069	2281	1549	1540	9419
Savana	418	697	1008	1271	656	1480	1771	1449	8750
Kapareil	41	110	733	670	1576	618	1486	2010	7244

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

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

KERNEL DEFECTS OBSERVED IN 2002

Significant defects noted in the 2002 harvest nut samples of the three RAVTs are outlined below. The trees were in their tenth growing season. Defects listed may only become important if they continue to show in the same varieties over several years as the trees mature.

	Trial		
Varieties with defect	CSU-Chico	Delta College	Kern
6% or more double kernels:	Plateau (38%) Kahl (36%) Price (32%) Wood Colony (20%) Butte (17%) Sano (12%) 2-19e (10%) Livingston (8%) Donna (6%) Aldrich (6%)	Donna (32%) Kahl (24%) Price (24%) Wood Colony (20%) Dottie Won (14%) Monterey (14%) Aldrich (12%) Jiml (12%) Butte (10%) Sano (8%) 2-19e (8%) Savana (6%) 25-75 (6%) Plateau (6%) Livingston (6%)	Plateau (32%) Sano (12%) 25-75 (10%) Jiml (10%) Kahl (10%) Price (6%) Wood Colony (6%) Johlyn (6%)
6% or more twin kernels (two kernels within the same pellicle):	Price (8%) 2-19e (8%) 25-75 (6%)	Price (28%) Sonora (24%) Carmel (22%) Jenette (20%) 1-87 (18%) Jiml (14%) Nonpareil (9%) 2-19e (8%) 25-75 (8%) Livingston (8%) Wood Colony (6%) Mission (6%)	(none)

Varieties with defect	CSU-Chico	Delta College	Kern
6% or more blank kernels:	Morley (12%) Price (8%) Sonora (6%)	Kahl (16%) Donna (14%) Monterey (12%) Price (10%) Savana (10%) 2-43w (10%) Aldrich (8%) Butte (8%) Jiml (6%) Morley (6%)	Morley (6%)
6% or more kernels with gum:	Kahl (6%) Rosetta (6%)	1-102w (20%) Savana (16%) Winters (6%)	(none)
6% or more worm damage	Winters (8%)	(none)	Kapareil (12%) Johlyn (8%) Sano (6%) 1-87 (6%) 25-75 (6%) 1-102w (6%) Livingston (6%) 2-19e (6%) Sonora (6%) Donna (6%) 2-43w (6%)

ALTERNARIA LEAFSPOT 2002

RAVT - Paramount Farming Company (Kern Co.)

Variety	Infestation in 100 Leaf Samples (07-26-02)	Infestation of Leaves Per 30 Sec. Counts (08-30-02)	Percent of Defoliation (09-03-02)
Winters (13-1)	39	150	45
Carmel	4	132	50
Donna	20	132	10
Sonora	30	130	40
Monterey	23	126	40
Butte	4	125	15
Wood Colony	36	123	45
Price	29	121	30
Livingston	18	112	20
2-19E	0	105	2
Kahl	6	104	1
Jenette	4	102	5
Fritz	16	101	10
Ruby	0	94	10
Savana	3	87	35
1-102W	30	85	10
Mission	**6**	**84**	**20**
2-43W	24	84	40
Aldrich	28	84	1
Morley	21	80	20
Yokut	10	77	5
Johlyn	0	76	2
1-87	0	57	15
Plateau	7	46	15
Rosetta	0	27	0
Nonpareil	**12**	**26**	**7**
Sano	20	20	5
Kapareil	7	19	0
Padre	5	16	0
Chips	0	15	1
Jiml	0	14	20
25-75	4	5	0

HULL ROT 2002

RAVT - Paramount Farming Company (Kern Co.)

Variety	No. Strikes / Tree
Kapareil	974
Johlyn	505
Nonpareil	**411**
1-102W	300
Sonora	176
Jiml	120
Winters (13-1)	107
Chips	82
Padre	70
25-75	66
2-43W	66
Donna	49
2-19E	44
Sano	30
Savana	29
Price	28
Aldrich	28
Butte	14
Yokut	14
Ruby	12
Jenette	11
Rosetta	11
1-87	11
Plateau	9
Morley	7
Livingston	5
Wood Colony	4
Mission	**3**
Kahl	0
Fritz	0
Carmel	0
Monterey	0