1997

Progress Report

REGIONAL ALMOND VARIETY TRIALS

Planted in 1993

University of California

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REGIONAL ALMOND VARIETY TRIALS

Planted in 1993

Warren C. Micke, Joseph H. Connell, Paul Verdegaal, Mario Viveros, James T. Yeager, Mary Ann Thorpe and Thomas M. Gradziel[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 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 1997. 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. 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, is being grown 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.

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

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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.

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. 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 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 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 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.

1997 Data

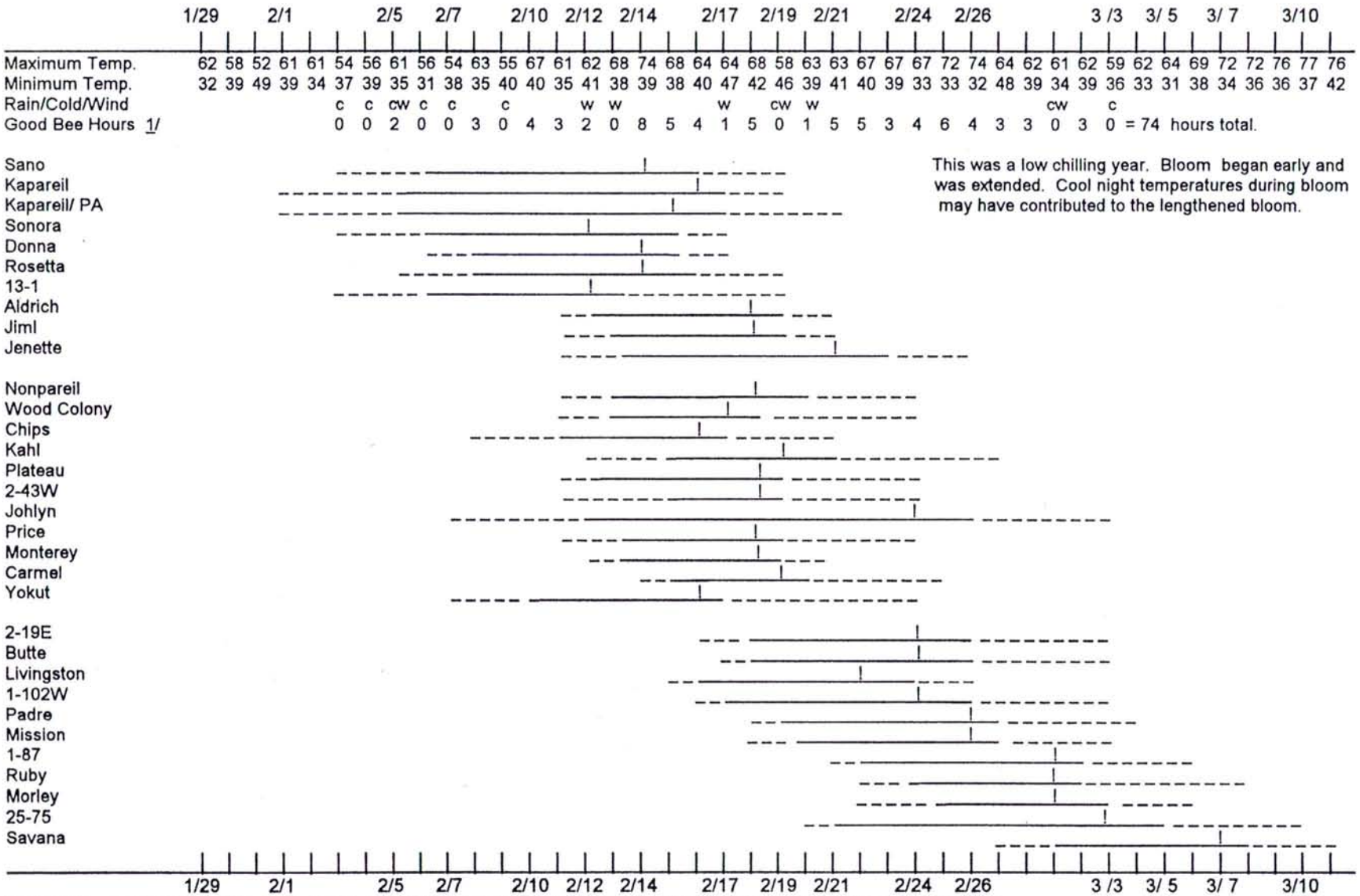
This 1997 report includes information, mostly in table or graph form, on bloom time, hull split/harvest time, yields, shelling percentage (percent kernel) and kernel defects. Some information on disease susceptibility is also included. With good bloom time weather in 1997, production from these trees in their **fifth growing season** was generally very good , with some varieties performing exceptionally well. This year a number of varieties produced a high percentage of double kernels in all of the RAVTs. However, with trees only in their fifth growing season, it is really too soon to draw conclusions on production and kernel defects. In the early bearing years tree spacing can have a significant impact on production per acre, and trees per acre vary in these RAVTs with 86 trees per acre in the Kern trial, 64 trees per acre in the CSU-Chico trial and 75 trees per acre in the Delta College trial.

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 and for 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 - 1997 BLOOM

Planted in 1993 at the California State University Farm, Chico



This was a low chilling year. Bloom began early and was extended. Cool night temperatures during bloom may have contributed to the lengthened bloom.

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

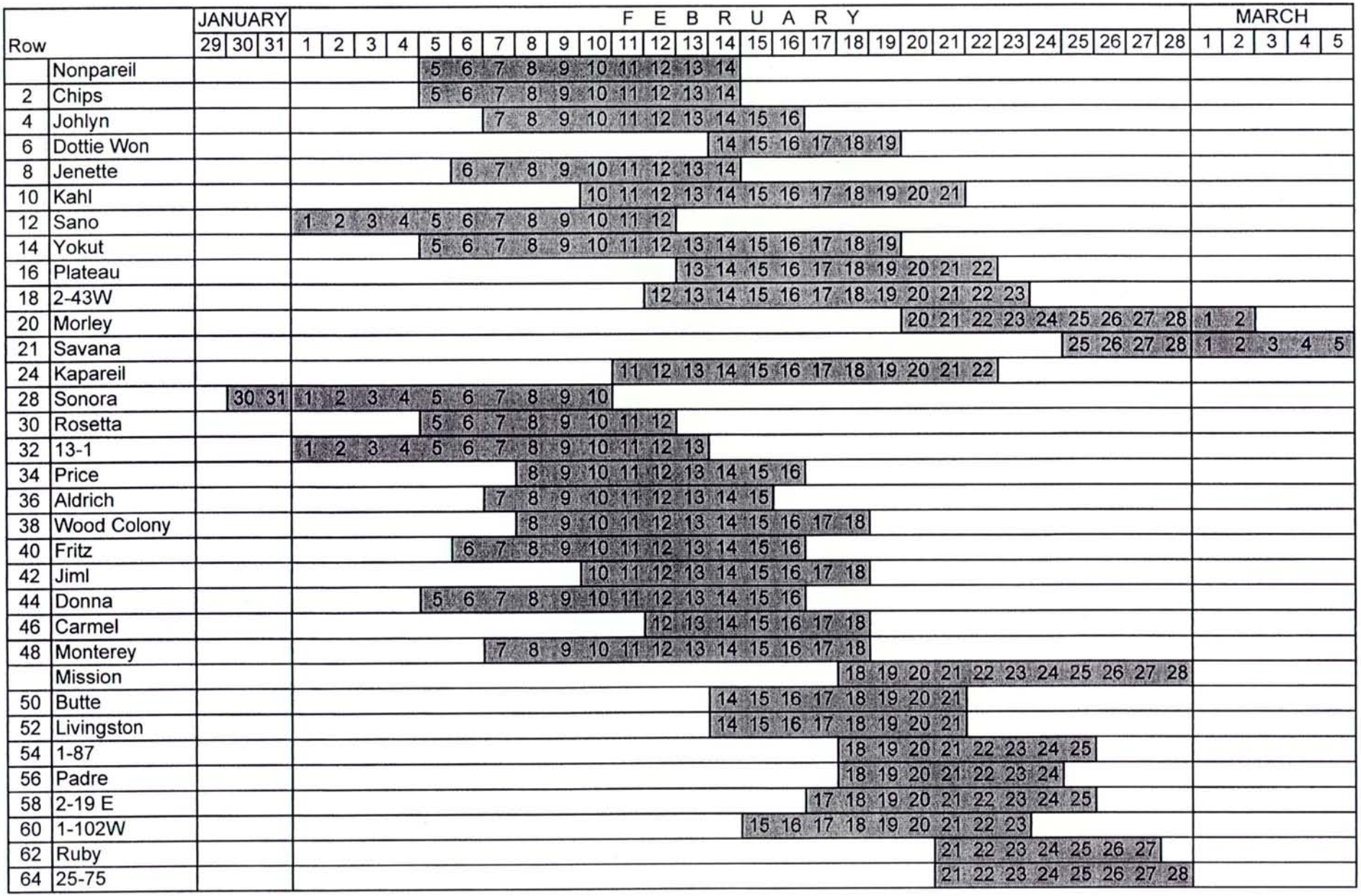
1/ Good Bee Hours = total daylight hours between 1% bloom on Sonora and 100% bloom on Mission when temperatures are ≥ 59 F, wind ≤ 10 mph, and no rain.

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. 4/7/97.

SAN JOAQUIN DELTA COLLEGE
REGIONAL ALMOND VARIETY TRIAL
1997 BLOOM DATA
MANTECA

= 10 to 90%



SAN JOAQUIN DELTA COLLEGE
REGIONAL ALMOND VARIETY TRIAL
1997 RAINFALL
MANTECA

January	Rain (inches)	Wind ≥ 8mph	February	Rain (inches)	Wind ≥ 8mph	March	Rain (inches)	Wind ≥ 8mph
1	0.67		1	0		1	0	
2	0.79		2	0		2	0	
3	0		3	0.04		3	0	
4	0		4	0.08		4	0	
5	0.04		5	0		5	0	
6	0		6	0.04		6	0	
7	0		7	0		7	0	
8	0		8	0		8	0	
9	0		9	0		9	0	
10	0		10	0		10	0	
11	0		11	0		11	0	
12	0.16		12	0		12	0	
13	0		13	0		13	0	
14	0.04		14	0		14	0	
15	0.24		15	0		15	0	
16	0		16	0				
17	0		17	0.12				
18	0		18	0				
19	0		19	0				
20	0.24		20	0				
21	0.24	9	21	0				
22	1.14	12.4	22	0				
23	0.04		23	0				
24	0.39		24	0				
25	0.08	11.3	25	0				
26	0.39		26	0				
27	0		27	0.04	8.8			
28	0		28	0				
29	0							
30	0.04				9.6			
31	0							

Rainfall subtotal for:

January	4.49
February	0.32
March	0
Grand Total	**5.81**

Shaded dates = Bloom period

EFFECTIVE BLOOM PERIOD

Kern RAVT - Paramount Farming Company

Early Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Sano	1-18	2-06	2-13
Kapareil	1-21	2-04	2-17
Rosetta	1-26	2-09	2-21
Sonora	1-26	2-06	2-18
13-1	1-29	2-06	2-18

Mid-Season Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Nonpareil	2-07	2-15	2-25
Price	2-07	2-13	2-19
Jenette	2-05	2-13	2-25
Yokut	2-02	2-12	2-21
Johlyn	2-02	2-17	2-22
Plateau	2-08	2-15	2-26
Chips	2-02	2-15	2-25
Kahl	2-05	2-17	2-22
Fritz	2-07	2-13	2-21
Monterey	2-07	2-15	2-26
Aldrich	2-02	2-15	3-02
Wood Colony	2-08	2-21	2-27
1-102W	2-12	2-17	3-02
Jim1	2-04	2-17	2-24
Donna	2-05	2-17	2-20
Carmel	2-08	2-17	2-26
2-19E	2-09	2-23	3-06
2-43W	2-09	2-17	2-25

Late Season Blooming Varieties			
	Bloom Period		
	Beginning	Full	End
Butte	2-14	2-21	3-07
Livington	2-11	2-21	3-06
Padre	2-15	2-23	3-10
1-87	2-15	2-21	3-10
25-75	2-15	3-06	3-11
Mission	2-15	2-25	3-06
Ruby	2-15	3-04	3-11
Morley	2-15	2-25	3-13
Savana	2-23	3-06	3-14

Bloom Observations:

Good Blooming Varieties: Aldrich, Monterey, Plateau, Chips, Butte, Padre, 1-87, Livingston, Sonora, Ruby, Rosetta, 2-19E, and Kapareil-Nema.

Average Blooming Varieties: 1-102W, Savana, Kapareil-P.A., Donna, Fritz and Kahl.

Poor Blooming Varieties: Sano, Carmel, Yokut, Price, 13-1, Jiml, and Wood Colony.

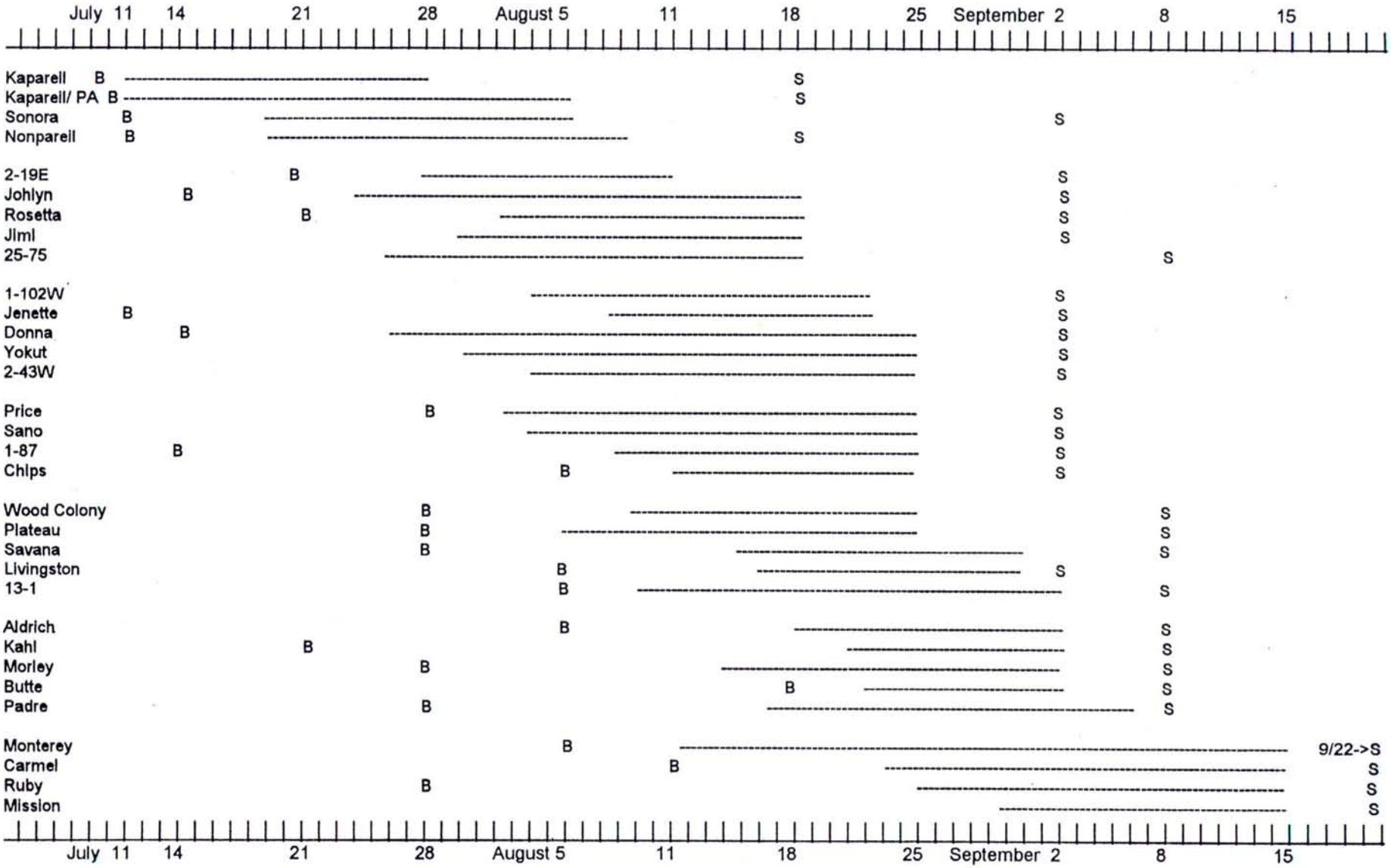
Varieties Blooming with Nonpareil: Monterey, Donna, Jiml, Fritz, Yokut, Price and Aldrich.

Varieties Blooming Ahead of Nonpareil: Sano, Kapareil, Sonora, Rosetta, Kahl, 13-1, Johlyn, Chips, and Jenette.

Chilling Hours: 453 hours of temperatures below 45°F.

ALMOND REGIONAL VARIETY TRIAL - 1997 HARVEST MATURITY

Planted in 1993 at the California State University Farm, Chico



Dashed line encompasses 1 to 100% hullsplit. B -- denotes blanks beginning to split (No B -- indicates that significant blanks were not present or else nuts were hardshells).
S -- indicates that the variety was shaken to the ground at the time of the observation. Four harvests were conducted this year to complete harvest in the entire block.
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. 11/10/97.

SAN JOAQUIN DELTA COLLEGE
REGIONAL ALMOND VARIETY TRIAL
1997 HULL SPLIT DATES
MANTECA

Variety	10%	90%
Kapareil	7/5	7/16
Nonpareil	**7/10**	**7/22**
Sonora	7/15	7/26
Johlyn	7/22	7/31
Yokut	7/24	8/8
Jiml	7/25	8/8
Jenette	7/27	8/8
Plateau	7/28	8/7
2-19 E	7/30	8/12
2-43 W	7/30	8/10
Chips	7/30	8/14
Morley	7/30	8/9
Price	7/30	8/9
25-75	7/31	8/12
Donna	7/31	8/13
Dottie Won	7/31	8/12
Savana	7/31	8/12
Wood Colony	8/3	8/13
1-87	8/6	8/16
1-102 W	8/6	8/13
Sano	8/6	8/16
Aldrich	8/7	8/13
Monterey	8/7	8/16
Livingston	8/8	8/17
13-1	8/12	**
Carmel	8/13	8/21
Mission	**8/13**	**9/2**
Padre	8/13	8/29
Butte	8/14	8/28
Rosetta	8/20	**
Ruby	8/20	9/2
Fritz	8/30	**
Kapareil/PA	**	7/21
Kahl	NA	

NA = Not Available
** = Date Missing

HULLSPLIT PERIOD

Kern RAVT - Paramount Farming Company

EARLY - SEASON		
	Hullsplit Period	
	Beginning*	End**
Kapareil	6/30	7/15
Nonpareil	7/03	8/04
2-19E	7/15	8/15
Sonora	7/11	8/09
Rosetta	7/22	8/16
2-43W	7/25	8/28
1-102W	7/28	8/26
Donna	7/15	8/19
Aldrich	7/20	8/26
Jiml	7/15	8/28
Jenette	7/22	8/26
Johlyn	7/15	8/26

MID-SEASON		
	HULLSPLIT PERIOD	
	Beginning*	End**
25-75	7/25	8/29
13-1	7/22	8/26
1-87	8/02	8/29
Price	7/11	8/12
Plateau	7/25	9/01
Chips	7/28	8/26
Savana	7/28	8/29
Morley	7/28	8/29
Wood Colony	7/22	8/21

MID to LATE SEASON		
	Hullsplit Period	
	Beginning*	End**
Sano	7/22	8/21
Yokut	7/22	8/21
Padre	8/04	9/01
Butte	7/30	8/29
Livingston	7/30	9/01
Kahl	8/04	9/14
Carmel	8/12	9/08
Ruby	8/09	9/11

LATE-SEASON		
	Hullsplit Period	
	Beginning*	End**
Mission	8/21	9/14
Monterey	8/12	9/19
Fritz	8/12	9/19

*Beginning means one to five percent of hullsplit.

**End means 100% hullsplit.

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

1997 Yield Summary for the Regional Almond Variety Trial at California State University—Chico Farm, Butte County. Planted in 1993					
Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling %	Kernel Pounds Per Tree	Kernel Pounds Per Acre[1]
13-1	14301	1.03	53.5	32.4	2076
Aldrich	12586	1.02	55.2	28.3	1813
2-43W	10625	1.08	60.3	25.2	1615
Monterey	7858	1.39	44.7	24.0	1535
Livingston	8250	1.25	68.4	22.6	1449
Nonpareil	8505	1.19	64.3	22.3	1427
2-19E	9163	1.01	51.2	20.3	1299
1-87	10707	0.86	55.3	20.2	1295
1-102W	6480	1.39	61.5	19.8	1266
Carmel	6632	1.33	56.3	19.4	1240
Plateau	6155	1.40	49.8	19.0	1215
Ruby	6645	1.29	54.4	18.9	1208
Butte	8369	0.99	54.4	18.3	1169
Kapareil	8433	0.95	71.1	17.6	1129
Morley	7250	1.08	56.8	17.2	1102
Savana	6554	1.17	68.8	16.9	1079
Johlyn	6750	1.10	68.2	16.4	1047
Rosetta	5582	1.32	51.4	16.2	1039
Sano	5429	1.35	54.2	16.2	1036
Padre	6473	1.11	54.0	15.8	1013
Wood Colony	5707	1.22	58.6	15.3	978
Mission	5713	1.17	44.5	14.7	941
Price	5654	1.17	61.9	14.5	931
Donna	5920	1.09	52.6	14.3	913
Jiml	4601	1.35	60.8	13.6	873
Jenette	5024	1.23	67.1	13.6	868
Chips	5395	1.07	54.1	12.8	817
Yokut	4074	1.33	54.0	12.0	765
Kahl	4582	1.04	37.8	10.5	672
25-75	5097	0.93	58.0	10.4	668
Sonora	2222	1.58	69.6	7.7	494

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

1997 Yield Summary for the Regional Almond Variety Trial at San Joaquin Delta College Farm, Manteca. Planted in 1993.					
Variety	No. of Nuts/Tree	Average Kernel Weight (g)	Shelling %	Kernel Pounds Per Tree	Kernel Pounds Per Acre[1]
Carmel	10997	1.16	60.4	28.1	2111
Fritz	9946	1.03	56.8	22.6	1692
Butte	11095	0.89	56.8	21.8	1631
13-1	10303	0.96	57.1	21.3	1591
Rosetta	7035	1.14	47.0	17.6	1323
Monterey	7068	1.13	56.2	17.5	1315
Jenette	7930	1.00	68.8	17.5	1313
Yokut	6529	1.19	59.1	17.2	1288
Dottie Won	8951	0.87	51.2	17.2	1287
Ruby	6511	1.18	54.6	17.0	1274
Sano	5959	1.23	52.7	16.2	1213
Plateau	5858	1.24	50.7	16.0	1198
Nonpareil	6680	1.06	69.7	15.5	1165
Wood Colony	5802	1.18	66.5	15.1	1131
Donna	6724	0.90	55.8	13.3	1000
Price	6324	0.91	64.8	12.6	947
Aldrich	6300	0.90	55.6	12.5	937
Chips	5890	0.95	55.9	12.3	920
Mission	4390	1.13	48.6	10.8	813
Kahl	4742	0.97	45.6	10.1	757
Livingston	3264	1.27	70.7	9.1	683
Johlyn	3403	1.13	78.1	8.5	634
Padre	3262	1.07	57.1	7.7	579
Morley	3198	1.06	53.7	7.5	559
Jiml	2865	1.13	75.0	7.1	534
2-19E	3138	0.97	55.7	6.7	503
1-87	3367	0.87	61.5	6.5	486
1-102W	2120	1.31	62.0	6.1	457
Kapareil	2528	0.86	65.8	4.8	361
25-75	1293	0.90	59.7	2.6	192

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

1997 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 %	Kernel Pounds Per	
				Tree	Acre[1]
Jenette	14413	1.13	68.7	35.9	3085
Plateau	11452	1.16	56.5	29.4	2525
Nonpareil	11541	1.11	66.6	28.2	2428
Ruby	11540	1.10	51.6	28.1	2413
Butte	14080	0.90	54.5	27.9	2400
2-19E	12746	0.97	52.7	27.3	2347
Aldrich	12739	0.92	60.2	25.9	2230
Johlyn	10109	1.15	66.5	25.5	2195
Monterey	9254	1.25	49.6	25.4	2184
Rosetta	10130	1.13	52.4	25.2	2164
1-102W	8235	1.37	64.8	24.9	2143
13-1	10640	1.03	53.5	24.1	2076
2-43W	10241	1.06	59.4	23.9	2056
Livingston	9517	1.09	61.4	22.9	1972
Mission	9650	1.07	44.6	22.7	1949
Carmel	8209	1.25	60.8	22.6	1944
Kahl	9260	1.06	47.1	21.5	1852
Fritz	8262	1.09	52.2	19.8	1706
Padre	7864	1.09	60.1	18.9	1624
1-87	11131	0.76	55.2	18.6	1598
Jiml	6325	1.31	63.5	18.2	1565
Wood Colony	7495	1.09	57.9	18.0	1545
Yokut	6189	1.30	55.0	17.7	1519
Chips	7794	0.96	54.7	16.5	1417
Sano	4564	1.56	55.3	15.6	1345
Sonora	5628	1.23	72.2	15.3	1315
25-75	6836	0.91	61.3	13.8	1184
Price	5143	1.15	61.7	13.0	1118
Morley	5009	1.15	50.1	12.7	1091
Savana	4943	1.08	62.1	11.7	1008
Donna	3791	1.07	52.6	8.9	766
Kapareil	4206	0.92	66.3	8.5	733

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

KERNEL DEFECTS OBSERVED IN 1997

Significant defects noted in the 1997 harvest nut samples of the three RAVTs are outlined below. The trees were only in their fifth growing season. 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 Plateau Monterey Donna Sano Price Carmel	Sano Plateau Kahl	Donna Sano Monterey Kahl Carmel 2-43W Wood Colony
10-19% double kernels	Wood Colony Aldrich Jiml 25-75 Mission Ruby	Wood Colony Fritz Aldrich Donna 25-75 Monterey Price Dottie Win	Mission Butte Fritz Price Livingston Plateau Aldrich Jiml 2-19E Ruby 25-75
Varieties with 10% or more twin kernels (two kernels within the same pellicle)	Price	Price Carmel 1-87 25-75	Price
Varieties with more than 5% worm damage (including ant damage)[2]	Price (A)[2] Jenette (A)	Chips (N)[3] Kapareil (N) Fritz (A) Jiml (N) Johlyn (N) Plateau (N) 2-19E (N)	Monterey (N) Price (P) Chips (A) Sano (A)
Varieties with 10% or more blank kernels	Donna	Johlyn Morley Fritz	Donna Sano Kahl Price

[1]Also at Delta College, Livingston and Johlyn had 10 and 8% gummy kernels, respectively.
[2]Majority of this damage caused by N (navel orangeworm), P (peach twig borer), A (ants)
[3]Most of the worm damage at the Delta College Trial was caused by Navel orangeworm and may be the result of later than desirable harvest for some of these varieties.

ALMOND ALTERNARIA LEAFSPOT

Percent of Almond Leaves Showing Alternaria Leafspots
Kern RAVT

VARIETY	% LEAF INFECTED
Morley	69
Kahl	63
25-75	56
Savana	54
Monterey	53
Ruby	52
Mission	51
13-1	51
Aldrich	50
Butte	49
Donna	49
Wood Colony	48
Carmel	48
2-43W	47
Yokut	44
Sonora	44
Livington	38
Plateau	37
Kapareil	35
2-19E	34
Johlyn	32
Jenette	31
1-87	31
Fritz	30

ALMOND ALTERNARIA LEAFSPOT (CONT'D)

VARIETY	% LEAF INFECTED
Sano	30
Chips	28
Nonpareil	26
1-102W	24
Price	21
Rosetta	17
Padre	15

VARIETIES SHOWING SYMPTOMS OF SCAB AND HULL ROT

Kern RAVT

HULL ROT	SCAB
Nonpareil	Yokut
Kapareil	Carmel
13-1	Monterey
1-102W	Sonora
Jiml	