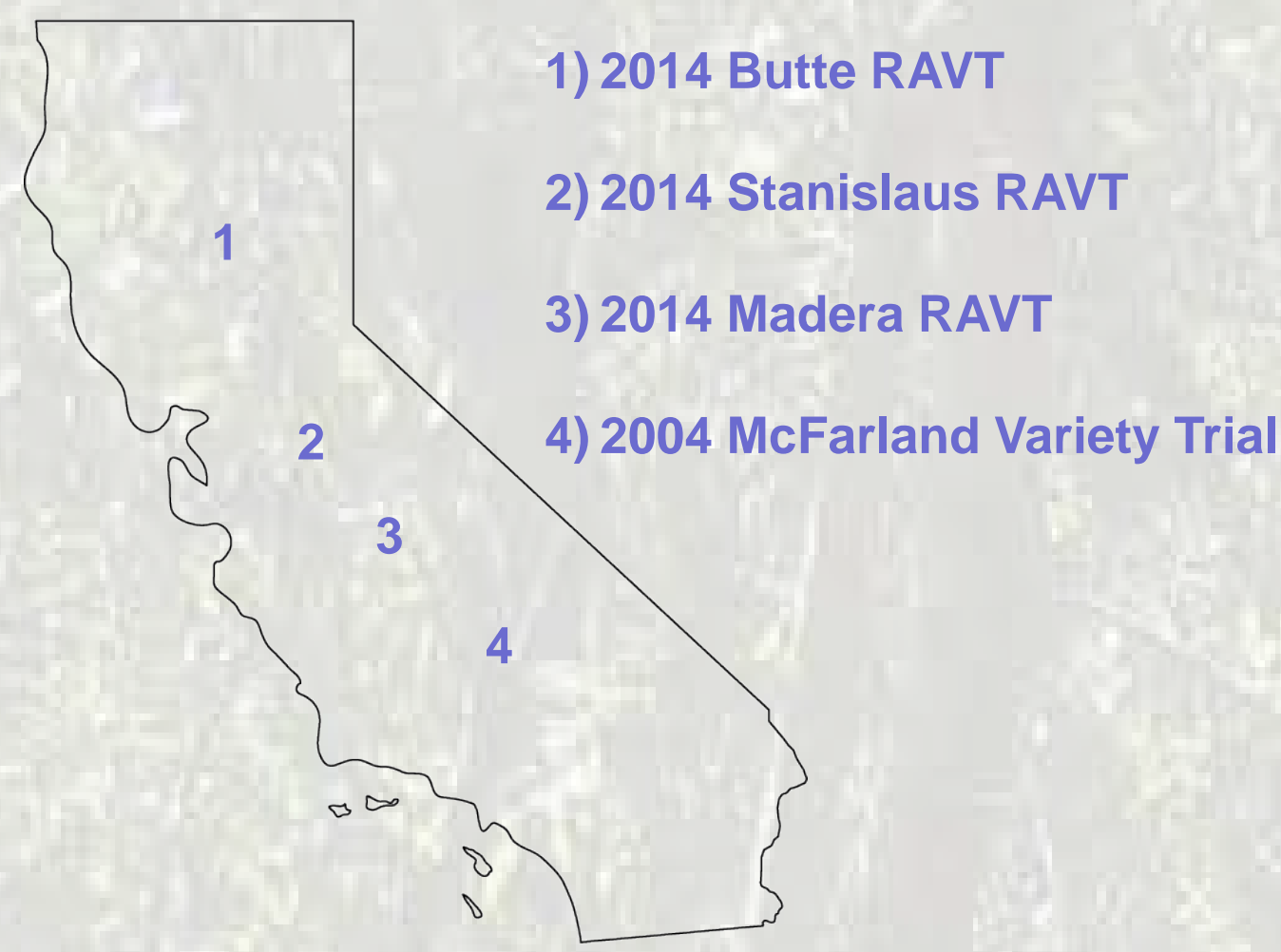


Regional Almond Variety Trials for Cultivar Evaluation in California

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Background

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

1993 Trials

To be comparable, the 1993 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.

Varieties were planted on peach rootstock; Lovell for those at CSU-Chico and Nemaguard for trees in the Delta College and Kern plots.

Yield data collection discontinued on most varieties at the Butte RAVT after the 2005 season due to extensive tree damage and loss in most varieties. The replacement varieties (Avalon, Durango, Kochi, and Carmel) which were planted in 2001 at a density of 128 trees per acre were also harvested in 2007. All trees were removed from the Butte trial in 2008.

After the 2006 season, yield data collection was discontinued for the Delta and Kern RAVTs as well.

2004 McFarland Trial

A replicated variety trial was planted in 2004 near McFarland in Kern County. This trial consists of eight almond varieties and eight Nonpareil clones planted at a spacing of 18' x 20' (121 trees/acre). Although Sonora was originally supposed to be included in the trial, the budwood for the Sonora variety was a mixture of several other varieties and hence will not be reported here.

McFarland Replicated Variety Trial

Planted in 2014
Seven varieties or selections and eight Nonpareil clones replicated 6 times

Kester (2-19e)	Nonpareil- 3-8-2-70
Chips	Nonpareil- 5
Kahl	Nonpareil- 6
Kochi	Nonpareil- 7
Marcona	Nonpareil- Driver
Sweetheart	Nonpareil- Jones
Winters	Nonpareil- Newell
	Nonpareil- Nico

20' x 18' planting distance
121 trees per acre
Irrigated with double line drip
Class 1 McFarland loam/Wasco sandy loam

Irrigation is with double line drip. The soil is Class 1 McFarland loam and Wasco sandy loam. Trees in this trial grew rapidly and continue to produce high yields with Nonpareil yields above 4000 kernel pounds per acre in 3 of the last 4 years (Table 1).

Yield for this trial continues to be well above that for any of the 1993 trial yields (Fig. 1)

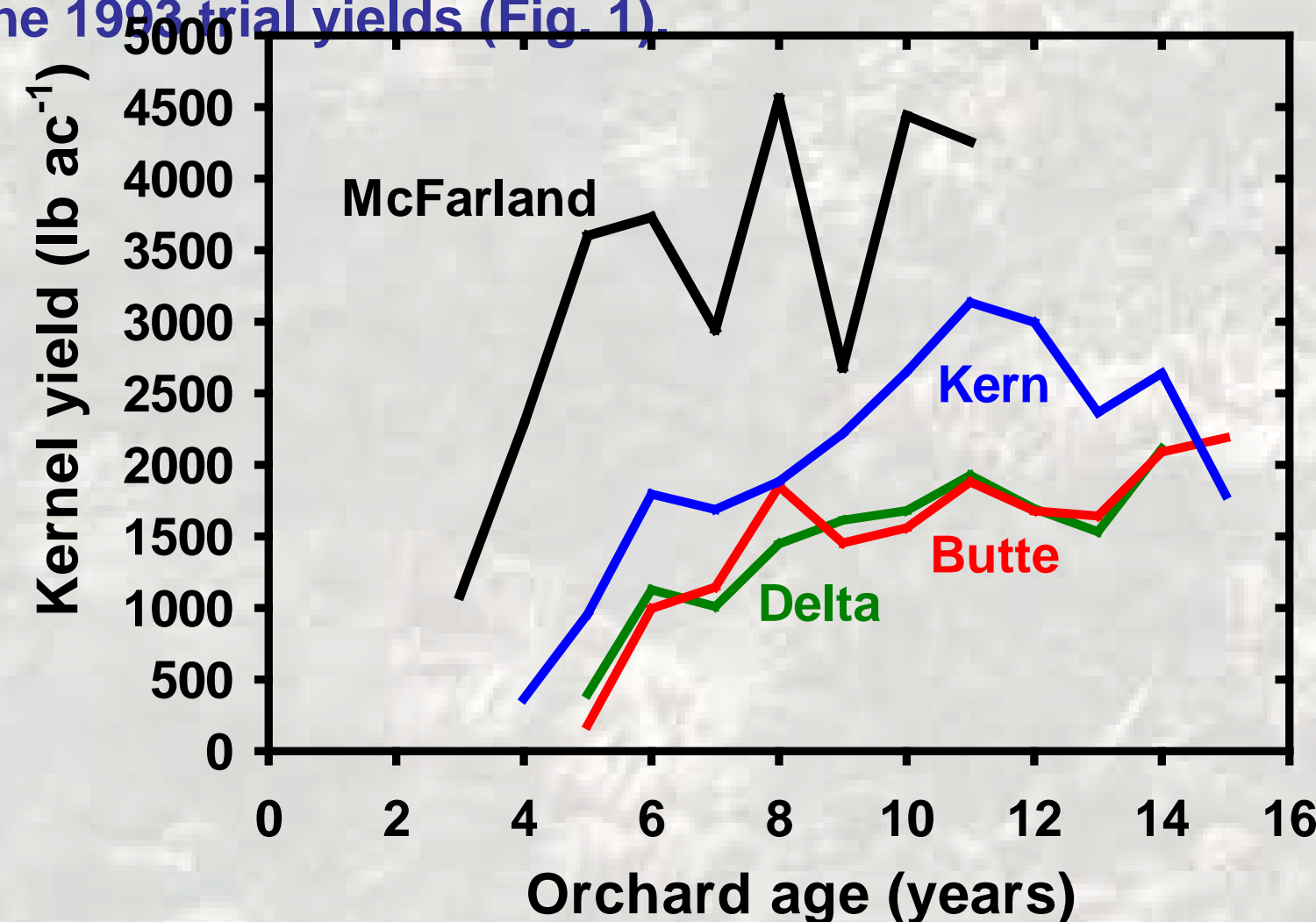


Fig. 1. Average annual yield for all varieties and selections combined at each trial by orchard age.

Table 1. Yield, shelling percentages, and yield per unit PAR intercepted by year and variety for 2010-2014 seasons.

2010	Variety	No. of nuts/tree	Average kernel wt (g)	Shelling percentage	unit PAR int.	Kernel pounds per		Cumulative kernel yield (lbs/acre)
						Tree	Acre	
	Nonpareil-Nico	8921 abc	1.24 abcd	72.5 ab	49.7 a	25.9 a	3141 a	14538 a
	Nonpareil-Newell	9420 abc	1.31 abc	73.6 a	45.2 abc	24.2 a	2931 a	14922 abc
	Nonpareil-3-8-2-70	8823 bcd	1.28 abcd	72.3 ab	47.1 ab	24.9 a	3011 a	13916 ab
	Nonpareil-Driver	8368 cde	1.28 abcd	71.0 ab	46.2 abc	23.6 a	2849 a	13911 ab
	Nonpareil-7	10611 ab	1.16 bcdef	69.8 ab	49.4 a	27.1 a	3282 a	15010 abc
	Nonpareil-6	9449 abc	1.21 abcd	72.3 ab	49.3 a	25.9 a	3130 a	13938 abc
	Nonpareil-5	9488 abc	1.21 abcd	71.8 ab	48.7 ab	25.5 a	3081 a	13220 bc
	Kester (2-19e)	6832 efg	1.10 bcdef	66.1 e	33.7 def	16.7 bc	2020 bc	13100 bc
	Nonpareil-Jones	8315 cde	1.23 abcd	70.9 ab	43.8 abc	22.2 a	2727 a	12991 c
	Winters	8691 efg	1.11 bcdef	69.7 abc	38.8 abc	19.0 bc	1945 bc	11203 d
	Chips	9089 abc	1.15 bcdef	65.9 abc	48.4 a	23.0 a	2789 a	10933 d
	Sweetheart	10915 a	0.80 f	71.8 ab	42.2 abcd	23.4 a	2839 a	10803 d
	Kahl	7597 cde	1.06 f	66.2 e	43.4 abcd	18.9 b	2048 c	10661 d
	Marcona	8072 efg	1.28 abc	66.2 e	36.7 cdef	14.4 bc	1745 bc	9308 e
	Kochi	3902 f	1.40 a	64.4 bcd	23.5 cde	12.1 bc	1466 bc	8421 e

Results and Summary

Average bloom progression for 2006-2014 is shown in Fig. 2. Marcona, Winters and Sweetheart all bloomed before Nonpareil (but also had good overlap) which has been shown to be ideal for providing good pollination to Nonpareil.

Average hull split progression for 2006-2014 is shown in Fig. 3. Hullsplit was completed in early August for Nonpareil, Kochi and selection 2-19e. Hullsplit was completed in late August for Sweetheart and Chips and in early September for Winters, Kahl and Marcona.

There have been severe problems with *Alternaria* and hull rot in the orchard (especially in 2009 when there were 122 strikes per tree in Kochi). In 2014, disease pressure was relatively low. There was no scab and hull rot was most severe in Kochi with lesser amounts in the Nonpareil clones (Table 4). *Alternaria* pressure was low with the most in Winters followed by Kahl and Sweetheart.

Yields at the McFarland Trial showed some sign of alternate bearing for the last 6 years (Fig. 1). In the early years, the orchard tended to go through fairly severe stress cycles with midday stem water potentials reaching the -15 to -18 bar range (data not shown). It appears that water penetration problems may have contributed to these problems. Since 2010, every other row middle has been ripped each year and water penetration and water relations have been significantly improved.

Table 2. Disease rating for McFarland Trial by variety for 2014 season.

Variety	Scab Rating	Nonpareil-J	Alternaria rating	Kahl	Hull Rot Strikes										
						Nonpareil-5	Nonpareil-3-8-2-70	Nonpareil-7	Nonpareil-3-8-2-70	Winters	Nonpareil-Nico	Nonpareil-DR	Nonpareil-6	Nonpareil-DR	Chips
Winters	2.17	b	0.0	a	0	0									
Kochi	0.17	a	0.0	a	0	0									
Kester (2-19E)	0	a	0.0	a	1	1									
Nonpareil-7	0	a	0.0	a	2	2									
Nonpareil-Newell	0	a	0.0	a	2	2									
Nonpareil-J	0	a	0.0	a	2	2									
Nonpareil-5	0	a	0.2	a b	3	3									
Nonpareil-3-8-2-70	0	a	0.3	a b	3	3									
Nonpareil-DR	0	a	0.5	b c	4	4									
Nonpareil-6	0	a	0.5	b c	5	5									
Marcona	0	a	0.5	b c	5	5									
Sweetheart	0	a	0.8	c d	6	6									
Nonpareil-Nico	0	a	1.0	d e	6	6									
Kahl	0	a	1.3	e	11	11									
Chips	0	a	3.0	f	25	25									

Yield per unit light (PAR) intercepted has averaged above 50 over the last 6 years in this trial for Winters, the Nonpareil clones, Kahl and Kester (selection 2-19e). See poster 64 for more detailed analysis of yield trends from this trial.

2014 Regional Almond Variety Trials

The next generation almond variety trials were planted in the winter of 2014 in Butte (Chico State University), Stanislaus (Salida School District Site), and Madera (Chowchilla grower site) counties. The varieties and selections planted are listed in Table 4. The first 30 items are common to all 3 sites and a few different items added at individual sites are listed at the bottom of Table 4. Trees at the Butte, Stanislaus and Madera trial were planted on Krymsk 86, Nemaguard and Hansen 536 rootstocks respectively (with the exceptions listed at the bottom of Table 4). Trees were planted at a spacing of 18' x 22' at the Butte site (110 trees/acre), 16' x 21' at the Stanislaus site (130 trees/acre) and 12' x 21' at the Madera site (173 trees/acre). These densities are significantly higher than the previous generation RAVTs where planting densities for the Butte, San Joaquin and Kern trials were 64, 75 and 86 trees per acre respectively.

Figure 2. Average bloom progression for McFarland Trial by variety from 2006-2014.

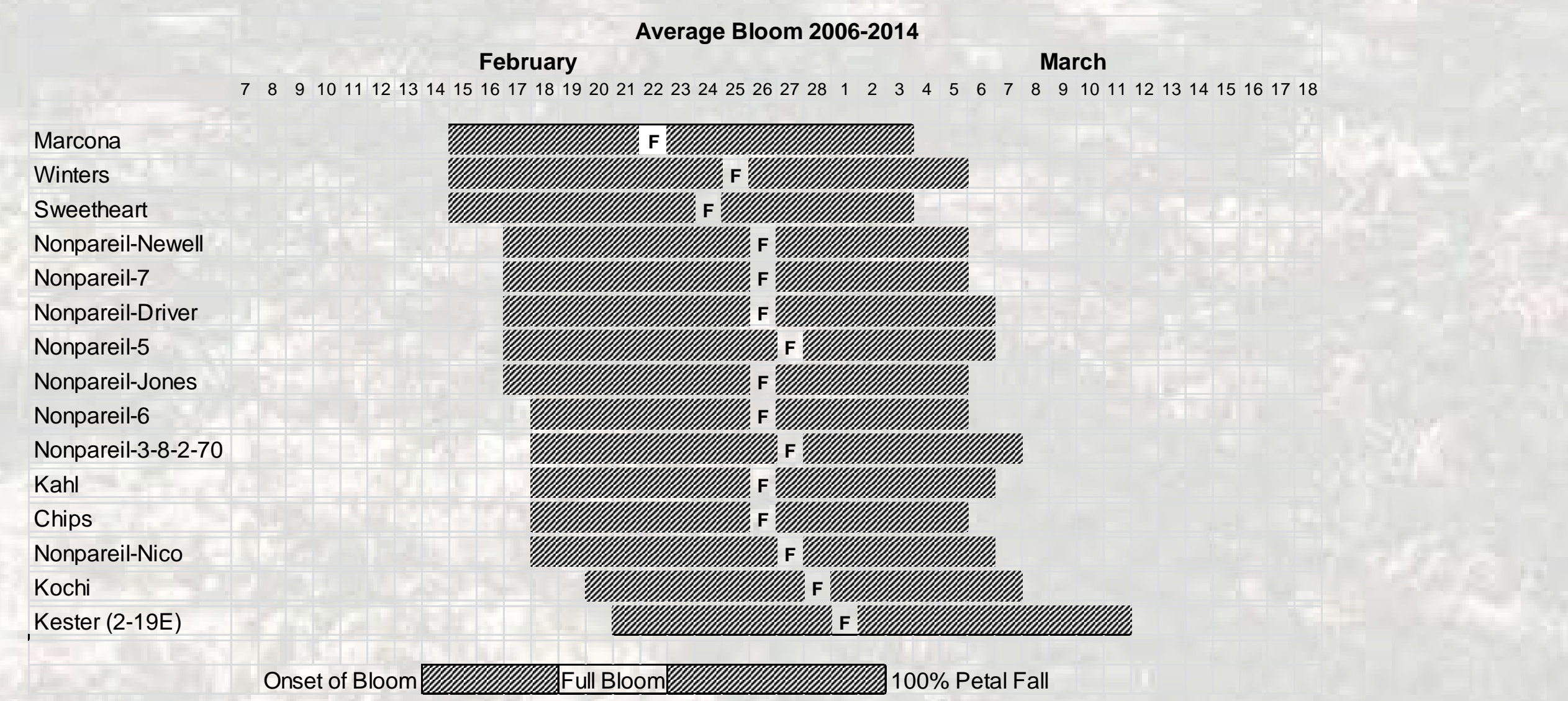


Figure 3. Average hull-split progression for McFarland Trial by variety from 2006-2014.

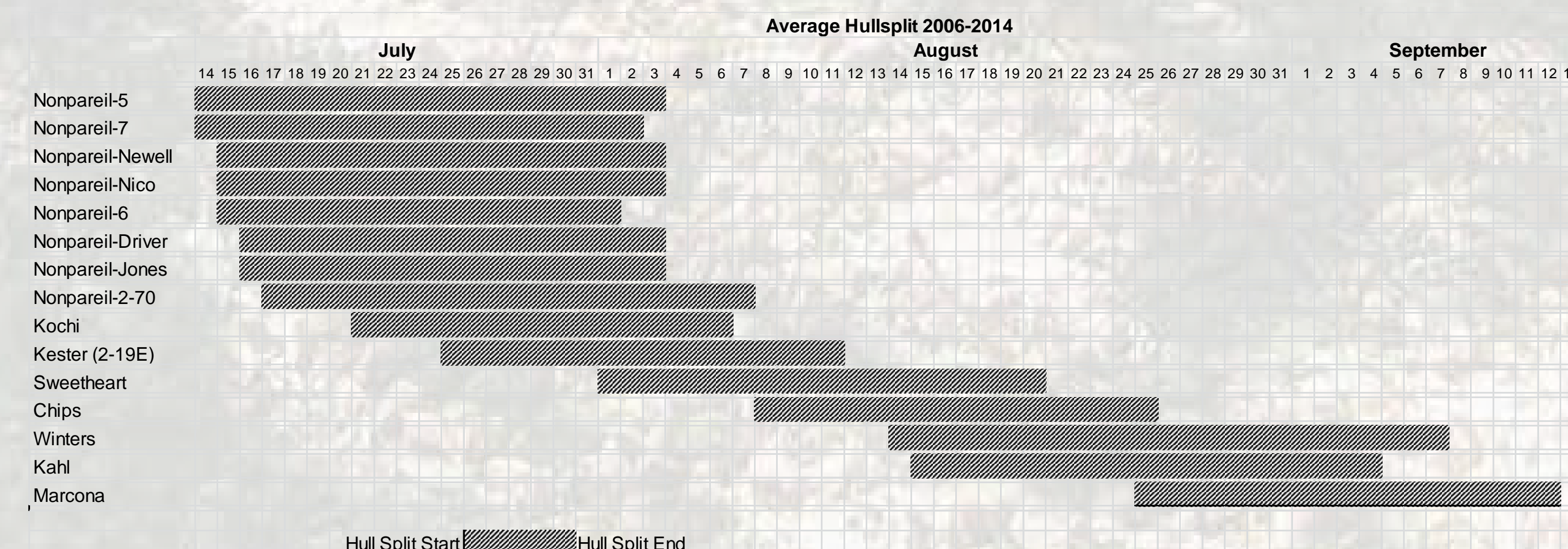


Table 3 Varieties and selections planted at the next generation regional almond variety trials. Items 1-30 are planted at all 3 sites while additional material planted at individual sites is listed at the end. Trees at the Butte, Stanislaus and Madera sites were planted on Krymsk 86, Nemaguard and Hansen 536 rootstock respectively (exceptions are noted at bottom of table).

Variety	Source
1 Eddie	Bright's
2 Capitola	Burchell
3 Supareil	Burchell
4 self-fruital P16.013	Burchell
5 self-fruital P13.019	Burchell
6 Booth	Burchell
7 Sterling	Burchell
8 Bennett	Duarte
9 Nonpareil	Fowler
10 Durango	Fowler
11 Jenette	Fowler
12 Aldrich	Fowler
13 Marcona	Spain
14 Winters	UCD
15 Sweetheart	UCD
16 Kester (2-19e)*	UCD
17 UCDS-40	UCD
18 UCDS-40	UCD
19 UCDS-16	UCD
20 UCDS-160	UCD
21 UCDS-27	UCD
22 UCDS-271	UCD
23 UCDS-232	UCD
24 UCDS-159	UCD
25 UCDS-201	UCD
26 Y121-42-99	USDA
27 Y117-86-03	USDA
28 Y116-151-99*	USDA
29 Y117-91-03	USDA
30 Folsom	Wilson
31 Wood Colony on Krymsk 86 (Butte only)	
32 Lone Star on Hansen 536 (Chowchilla only)	

*Kester (2-19e) was planted at all three sites on the usual rootstock f in addition at the Butte and Stanislaus sites it was also planted in a replicated trial on Hansen 536 rootstock
** Y116-151-99 planted only in two rows outside of main trial at Butte



Acknowledgements
Thanks to the Almond Board of California and the Billings Ranches for supporting this work in 2014