THE ALMOND CONFERENCE 2025

WELCOME!

CULTIVATING A HEALTHIER FUTURE

SELF-COMPATIBLE VARIETIES

Moderator

Sebastian Saa, ABC, Ag. Research

Speakers

Luke Milliron, UC ANR

Roger Duncan, UC ANR

Josette Lewis, Almond Board of California

Reid Robinson, Sierra Gold Nurseries

Tom Burchell, Burchell Nursery, Inc.

ALMOND CONFERENCE 2025

Regional Field Evaluation of New Almond Varieties & Selections – 3rd Generation

Luke Milliron, Phoebe Gordon, Roger Duncan

University of California Cooperative Extension (UCCE)

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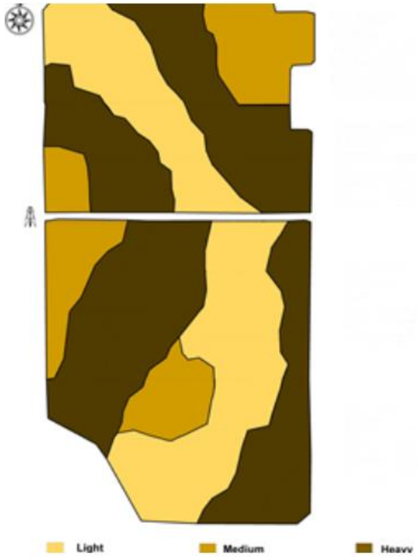
Aug 26

Mitigating Herbicide Damage in Young Almonds with Dani Lightle



Jul 15

Irrigation Part 10: Precision and Regulated Deficit Irrigation with Mae Culumber

Jun 3

Aspergillus Hull Rot in Almonds with Mohammad Yaghmour

May 20

Spider Mite Control in Almonds with David Haviland

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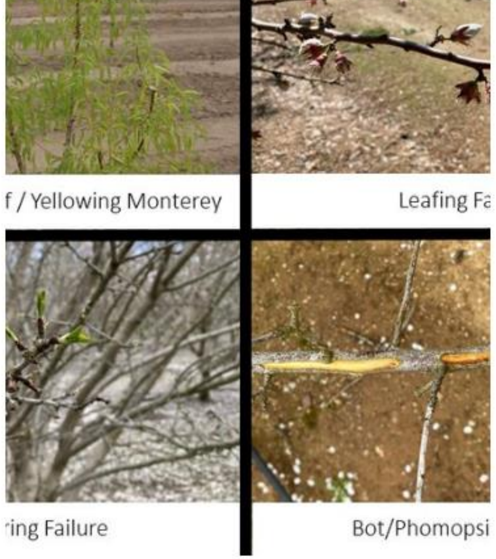
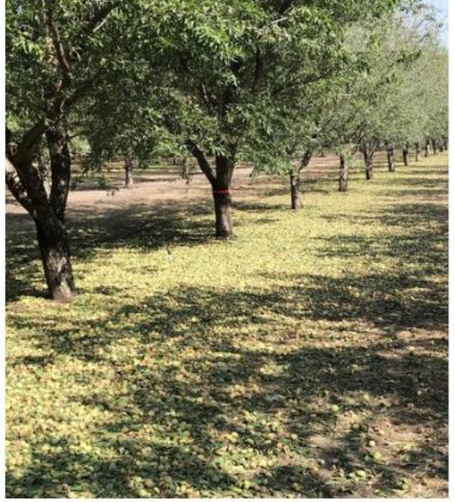


May 14

Monterey Almond Maladies



Mar 15

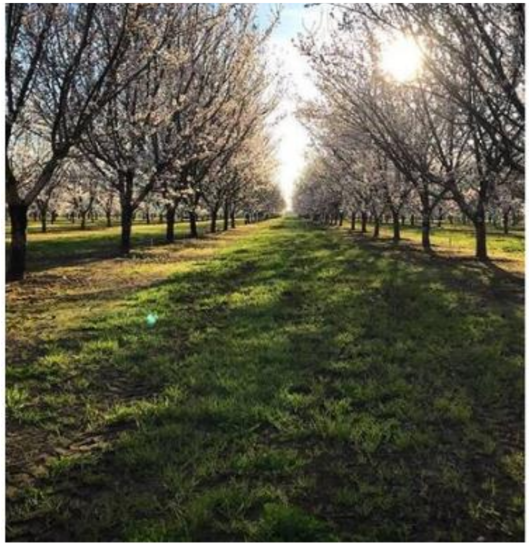
Rootstocks Part 3: Almond Rootstocks with Jarvis-Shean, Duncan, and Connell

Mar 15

Breeding Pt. 4: Craig Ledbetter on the USDA breeding program

Mar 15

Field Evaluation of Almond Varieties - Results Through 7th Leaf



Mar 19

Breeding Pt. 3: Almond with Tom Gradziel

Aug 19

Regional Almond Variety Trial - a discussion with Roger Duncan, Luke Milliron, and Phoebe Gordon

Oct 28

Almond Variety Trials 10 Years In

Almond Variety Trial Field Notes

457 views • 2 years ago

California Almonds

The key varieties of almonds grown in California hav

Considerations

Variety Selection

- Pollen compatibility
- Relative bloom periods

- Consistency
- Marketing classification
- Quality
- Price

- Insects
- Diseases
- Rootstock compatibility
- Genetic disorders

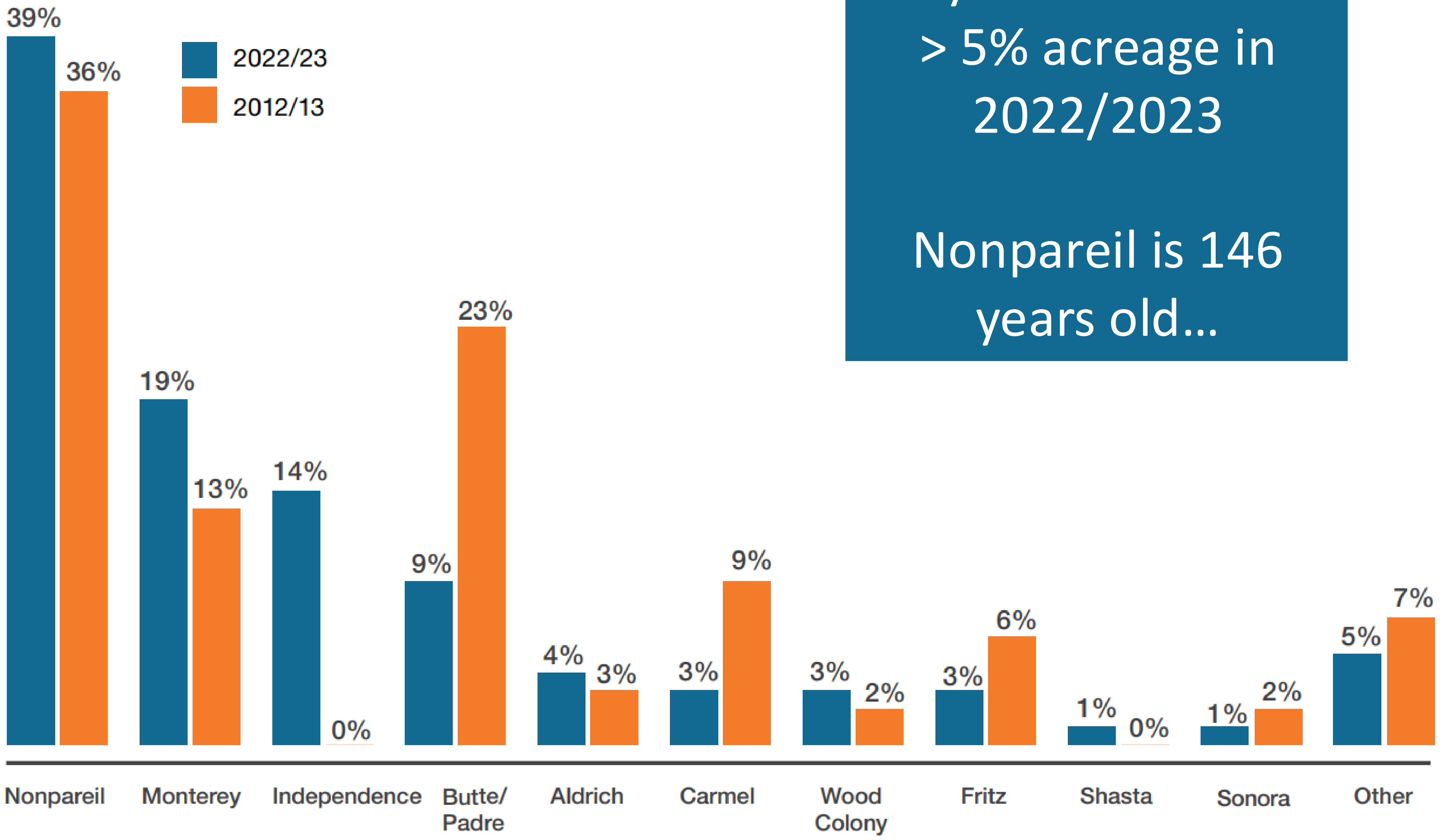
- Risk level
- Aesthetics

- Number of shakes
- Relative harvest timing
- Ease of removal

Kernel taste…


Top 10 Almond-Producing Varieties

crop years 2012/13 vs. 2022/23



Only 4 varieties with > 5% acreage in 2022/2023

Nonpareil is 146 years old…

Evaluation of Varieties by the University of California

- RVT#1 1974 – 1981
- RVT#2 1993 – 2006
- **RVT#3 2014 – 2025**
- RVT#4 2022 – Present

Current Regional Almond Variety Trials

Objective- evaluate new varieties and selections compared to standard varieties in three different almond production areas in the Central Valley.

Site	Rootstock	Spacing	#trees/acre
Butte	Krymsk 86	18' x 22'	110
Stanislaus	Nemaguard	16' x 21'	130
Madera	Hansen 536	12' x 21'	173

Lots of Data collected…

- Bloom timing
- Hullsplit timing
- Midday canopy PAR interception
- Yield
- Nut quality
- Harvestability
- Disease incidence
- Tree loss

3rd Gen Regional Almond Variety Trials (RAVT #3)

Varieties Evaluated in Almond Regional Variety Trials: 2014 (31 varieties) 12 Self-fertile

Variety or Selection	Self-fertile	Source
Eddie		Bright's
Capitola		Burchell
Supareil		Burchell
Self-Fr P13.019	yes	Burchell
Self-Fr P16.013	yes	Burchell
Booth		Burchell
Sterling		Burchell
Bennett		Duarte
Nonpareil		Fowler
Durango		Fowler
Jenette		Fowler
Winters	partial	UCD
Sweetheart	partial	UCD
Kester		UCD

Also: Kester on Hansen & Wood Colony

Variety or Selection	Self-fertile	Source
UCD3-40		UCD
UCD18-20		UCD
UCD1-16		UCD
UCD8-160	yes	UCD
UCD8-27	yes	UCD
UCD1-271	yes	UCD
UCD1-232	yes	UCD
UCD7-159	yes	UCD
UCD8-201	yes	UCD
Y121-42-99	yes	USDA
Y117-86-03	yes	USDA
Y116-161-99	yes	USDA
Y117-91-03	yes	USDA
Folsom		Wilson
Aldrich		

FAIL EARLY
FAIL FAST
FAIL OFTEN.

Varieties Evaluated in Almond Regional Variety Trials: 2024 (13 varieties) only 3 self-fertile

Variety or Selection	Self-fertile	Source
Eddie		Bright's
Capitola		Burchell
~~Supareil~~	-	~~Burchell~~
~~Self-Fr P13.019~~	~~yes~~	~~Burchell~~
~~Self-Fr P16.013~~	~~yes~~	~~Burchell~~
Booth		Burchell
~~Sterling~~	-	~~Burchell~~
Bennett		Duarte
Nonpareil		Fowler
Durango		Fowler
Jenette		Fowler
~~Winters~~	~~partial~~	~~UCD~~
~~Sweetheart~~	~~partial~~	~~UCD~~
Kester		UCD

Also: ~~Kester on Hansen~~ & ~~Wood Colony~~

Variety or Selection	Self-fertile	Source
~~UCD3-40~~	-	~~UCD~~
UCD18-20		UCD
~~UCD1-16~~	-	~~UCD~~
~~UCD8-160~~	~~yes~~	~~UCD~~
~~UCD8-27~~	~~yes~~	~~UCD~~
~~UCD1-271~~	~~yes~~	~~UCD~~
~~UCD1-232~~	~~yes~~	~~UCD~~
~~UCD7-159~~	~~yes~~	~~UCD~~
~~UCD8-201~~	~~yes~~	~~UCD~~
~~Y121-42-99~~	~~yes~~	~~USDA~~
Y117-86-03	yes	USDA
Y116-161-99	yes	USDA
Y117-91-03	yes	USDA
~~Folsom~~	-	~~Wilson~~
Aldrich		

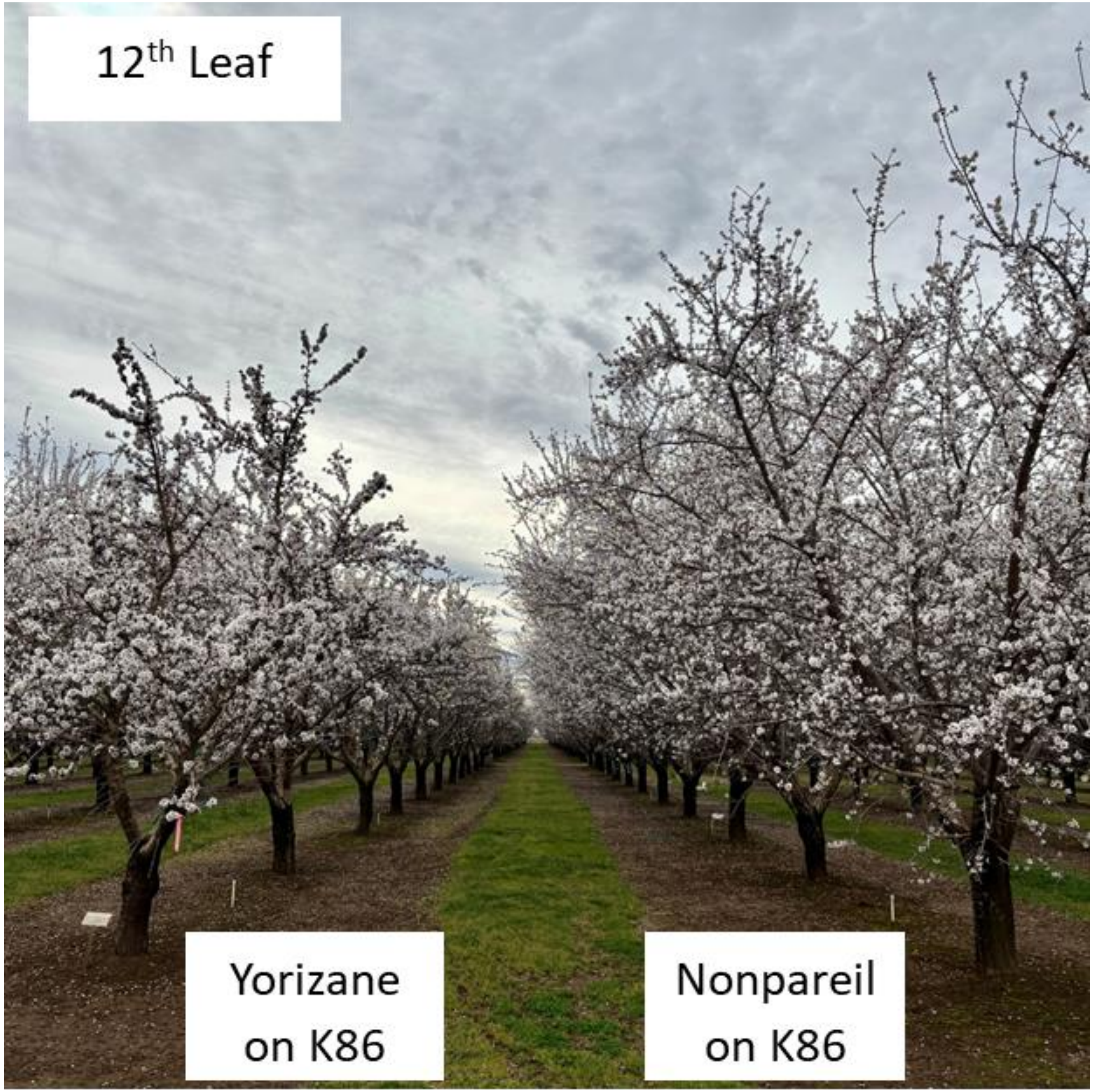
Why we dropped them…

- **Below average yield**

Additional reasons…

- Poor nut removal
- Lack of breeder interest
- Hull rot susceptibility
- Poor nut quality
  - Doubles, creases, stain

Cultivar	Average Yield/Yr
Nonpareil	2900
Aldrich	2700
UCD 18-20	2700
Booth	2600
Y117-91-03	2500
Durango	2400
Jenette	2400
Kester	2300
Capitola	2300
Y117-86-03	2300
Bennett-Hickman	2100
Eddie	2100
~~UCD 8-201~~	~~2100~~
Yorizane	2100
~~Kester/Hansen~~	~~2000~~
~~Winters~~	~~2000~~
~~Folsom~~	~~1900~~
~~Wood Colony~~	~~1900~~
~~Sweetheart~~	~~1900~~
~~UCD 8-160~~	~~1800~~
~~Supareil~~	~~1700~~
~~Sterling~~	~~1600~~


12th Leaf
Yorizane on K86
Nonpareil on K86

Yield: Cumulative 3rd – 11th leaf

Average of 2 SITES

[1]2024 yields were not collected in the Stanislaus trial; therefore cumulative yields are average of Butte and Madera only

Variety	Average cumulative yield (lbs ac-1)
Nonpareil	23,135
UCD18-20	22,237
Parpareil[1]	21,832
Booth	20,913
Yorizane[1]	20,703
Capitola	20,664
Aldrich	20,215
Kester	19,817
Y117-86-03	19,590
Eddie[1]	19,469
Durango	19,339
Bennett-Hickman	18,983
Jenette	18,572

Parpareil = Y117-91-03

2025 Butte Yields

	2025 Butte yields	kernel weight	crackout %
Nonpareil	**4291[a]**	**1.1**	**0.7**
Kester	3378[ab]	0.9	0.5
Durango	3358[ab]	1.1	0.5
UCD18-20	3089[b]	1.3	0.5
Eddie	3081[b]	1.3	0.7
Parpareil	3070[bc]	1.0	0.6
Y117-86-03	2974[bc]	1.1	0.6
Booth	2913[bc]	1.1	0.5
Capitola	2902[bc]	1.0	0.5
Aldrich	2777[bc]	0.8	0.5
Bennett-Hickman	2768[bc]	1.0	0.6
Jeanette	2562[bc]	1.1	0.6
Yorizane	2056[c]	1.2	0.5

Parpareil = Y117-91-03

2025 Butte Yields

Butte Cumulative Yield 3rd - 12th Leaf		avg / 10 harvests*
Nonpareil	31042	**3100**
UCD18-20	27083	2700
Aldrich	26975	**2700**
Booth	26354	**2600**
Parpareil	26277	**2600**
Durango	25350	2500
Jenette	24207	2400
Capitola	23920	2400
Kester	23784	2400
Y117-86-03	23602	2400
Eddie	22414	2200
Bennett-Hickman	21548	2200
Yorizane	20419	**2000**

Parpareil = Y117-91-03

*Rounded to nearest hundred lbs

Double kernels and **navel orangeworm** (NOW) damage by variety

Four years of nut quality data: 2016-2019 across three locations in Butte, Stanislaus, and Madera Counties.

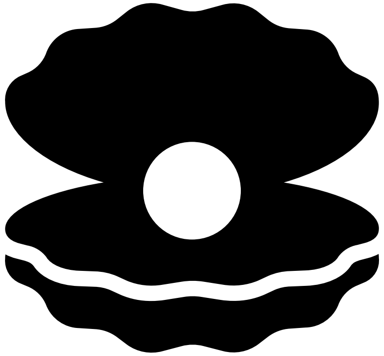
Variety	% Doubles	% NOW
UCD 18-20	**28.9**	1.6
Booth	19.7	2.4
Wood Colony	10.5	1.2
Durango	6.0	2.6
Kester	2.8	0.3
Parpareil	3.2	0.8
Aldrich	6.6	1.7
Winters	3.6	2.1
Capitola	5.8	2.1
Jenette	5.6	1.5
Bennett-Hickman	2.8	3.7
Supareil	1.7	1.8
Nonpareil	**4.6**	**1.5**
Folsom	4.4	1.7
Y117-86-03	7.2	1.1
Sweetheart	0.6	1.1
Yorizane	2.0	2.1
Eddie	1.0	3.0

Parpareil = Y117-91-03


Parpareil
Nonpareil
Yorizane
Booth

Implications

- The second-generation planting test…



- Variety trials are best at revealing the worst
- Dropped varieties tended to be later harvesting
- Self-sterile: Does Booth have a place?
- Self-fertile: Yorizane and Parpareil released

(Left) Parpareil and (Right) NP

Almond Variety: Parpareil

Parpareil is a self-compatible tree with similar bloom-interval as Nonpareil, but an earlier harvest date (-7 days). This new cultivar has consistently performed as one of the highest producing varieties in UC trials, with a high crackout rate (66%) and low doubles, twins, creases, and NOW damage.

Parpareil has a light and smooth kernel with moderate veining and sweet flavor. Hulls fully open like a butterfly and Hull Rot susceptibility has been rated to be low. No particular susceptibility to other diseases has been observed so far.

Key Points

- Self-Compatible
- Very Early Harvest
- Low NOW Damage and Hull Rot Susceptibility

Parpareil

Nonpareil

Pomological Traits

Growth Habit: Somewhat upright
Tree Vigor: Vigorous
Flowering Time: Nonpareil time +2
S Compatibility Genotype: $S_f S_8$
Pollination: Self-fertile
Foliage Density: Average
Length of Flowering: Average (21 days approx.)
Harvest Season: Very early (-7 approx. than Nonpareil)
Duration of hullsplit: Very short (15 days approx.)

Variety Development

Commercial Traits

Kernel Size: Smaller than Nonpareil (0.9 – 1.0 gram; 27 – 30 per oz)
Kernel Appearance: Light, smooth, with moderate veining
Crackout Percentage: High - 66%
Shell Seal: Average
Shell Type: Semi-hard
Double Kernels: Very low
Twin Kernels: Very low

USDA Agricultural Research Service

california almonds Almond Board of California

UC CE University of California Agriculture and Natural Resources Cooperative Extension

Thank you!

Almond Board of California

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Podcast: GrowingTheValleyPodcast.com

Website: SacValleyOrchards.com

Bloom

Days before (-) or after (+) full bloom relative to Nonpareil

2016-2022
*2016-2021

	Trial location		
	Butte	Stanislaus	Madera*
Aldrich	0	0	-2
Booth	0	1	-1
Nonpareil	0	0	0
Yorizane	-1	2	1
Y 117-91-03	2	2	3

Hullsplit

Cultivar	Butte Average start	Butte Average length*	Stanislaus Average start	Stanislaus Average length	Madera Average start	Madera Average length
Y117-91-03	7/12	14	7/11	15	7/13	15
Yorizane	7/16	20	7/12	19	7/10	24
Nonpareil	7/17	13	7/11	21	7/12	31
Booth	7/22	15	7/23	20	7/26	33
Aldrich	8/1	17	8/2	18	7/31	28

Regional Field Evaluation of New Almond Varieties & Selections – 4th Generation

- *Roger Duncan, UCCE Stanislaus County, Emeritus*
- *Luke Milliron, UCCD Butte County,*
- *Mohammad Yaghmour, UCCE Kern County*

University of California
Agriculture and Natural Resources

Blind Variety Evaluation for 4th Gen Regional Variety Trials

47 selections obtained from CA, Spain, Australia, & Israel

Varieties and Experimental Selections

4th Generation Regional Variety Trials.

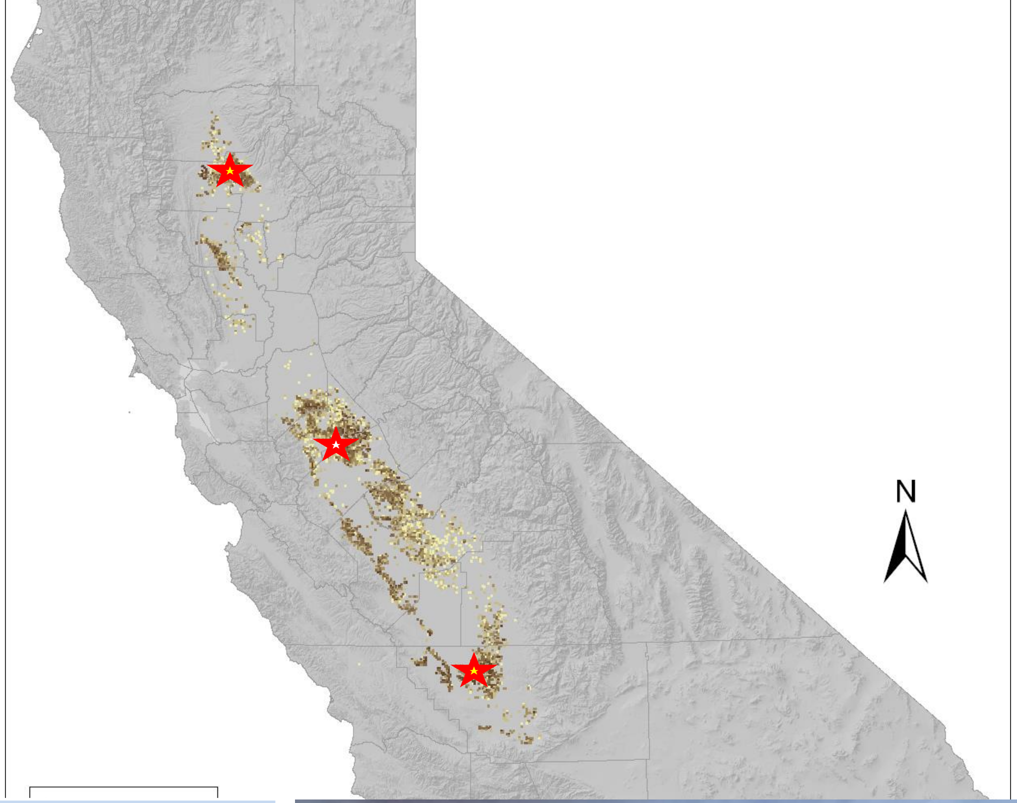
Variety	Source	Self-Compatible?
UCD-B2	UC Davis	Yes
UCD-B3	UC Davis	No
UCD-B4	UC Davis	Yes
UCD-B6	UC Davis	Yes
UCD-B8	UC Davis	Yes
UCD-B9	UC Davis	Yes
UCD-B12	UC Davis	Yes
UCD-B14	UC Davis	Yes
UCD-B15	UC Davis	Yes
Y117-106-03	USDA Agricultural Research Service	Yes
Y119-12-11	USDA Agricultural Research Service	Yes
Parpareil (Y117-91-03)	USDA Agricultural Research Service	Yes
Yorizane	USDA Agricultural Research Service	Yes
Carina	University of Adelaide	Yes
Mira	University of Adelaide	Yes
Vela	University of Adelaide	Yes
Penta	CEBAS – Spain	Yes
Florida	CEBAS – Spain	Yes
Constanti	IRTA – Spain	Yes
Lassen	Burchell Nursery	Yes
Conway	Burchell Nursery	No
P10.023	Burchell Nursery	Yes
Shasta	Burchell Nursery	yes
Pyrenees	Burchell Nursery	Yes
Bennettt-Hickman	Duarte Nursery	No
Standards		
Aldrich		No
Butte		No
Independence		Yes
Monterey		No
Nonpareil		No

- 25 “experimental” varieties
  - all but two are self-fertile
- 5 standard varieties

4th Generation Regional Almond Variety Trials

Planted Fall 2022 / Spring 2023

2025 is 3rd leaf



County	Location	Rootstock	Tree Spacing	Trees / Acre	Pruning Style
Butte	CSU Chico	Krymsk 86	14’ x 21’	148	Conventional
Stanislaus	Grower	Hansen 536	10’ x 20’	218	Minimal
Kern	Grower	Hansen 536	16’ x 22’	124	Conventional

RAVT4 Stanislaus County – Bloom 2025

Parameters Measured Annually in Each Location

- Bloom time / duration / density
- Hull split begin, duration, & end (harvest date)
- Yield / yield efficiency
- Kernel quality / defects, insect damage, etc.
- Ease of harvest (mummies)
- Bloom, foliar and fruit disease incidence
- Canopy size
- Compatibility with Krymsk 86 rootstock in Butte County trial

Third-Leaf Trees on Krymsk 86.
Butte County

Nonpareil Pyrenees Lassen Nonpareil

Relative Bloom Timing
(Full bloom date + or - Nonpareil)
2025 / 3rd leaf.

	Stanislaus County	Kern County	Average
UCD B6	-3	-3	-3
UCD B2	-3		-3
UCD B12	-4	0	-2
Yorizane	-2	-2	-2
Y117-106-03	-1	-3	-2
Florida	-1	-3	-2
Vela	0	-3	-1
Aldrich*	-3	0	-1
UCD B4	-1		-1
Shasta	-1	0	-1
Carina	-1	0	0
Independence	-1	0	0
Lassen	0	0	0
UCD B9	0	0	0
Bennett-H*	0		0
UCD B3*	0		0
Pyrenees	+2	0	+1
Parpareil	+2	0	+1
Monterey*	+2	0	+1
UCD B14	+2	0	+1
UCD B15	+3	0	+2
Conway*	+4	+2	+3
Y119-12-11	+5	0	+3
Mira	+4	+4	+4
UCD B8	+5		+5
Constanti	+5	+4	+5
P10.023	+4	+7	+6
Butte*	+4	+7	+6
Penta	+24	+23	+24

Penta (left) vs Shasta (right) March 21, 2025

	Start	End	Harvest Date +/- Np	Duration (days)
Y119-12-11	9-Jul	17-Jul	-25	8
P10.023	20-Jul	3-Aug	-8	14
Parpareil	24-Jul	3-Aug	-8	10
Florida	23-Jul	6-Aug	-5	14
Yorizane	20-Jul	7-Aug	-4	18
Shasta	20-Jul	8-Aug	-3	19
Independence	21-Jul	9-Aug	-2	15
Nonpareil	24-Jul	11-Aug	-	18
UCD B15	23-Jul	11-Aug	0	19
UCD B9	24-Jul	12-Aug	+1	19
UCD B2	21-Jul	18-Aug	+7	26
UCD B12	24-Jul	19-Aug	+8	26
Mira	3-Aug	20-Aug	+9	17
Carina	29-Jul	22-Aug	+11	24
Conway	6-Aug	25-Aug	+14	19
Y117-106-03	6-Aug	25-Aug	+14	19
UCD B4	5-Aug	2-Sep	+22	27
UCD B14	1-Aug	2-Sep	+22	31
Lassen	11-Aug	2-Sep	+22	21
Penta	3-Aug	4-Sep	+24	31
Pyrenees	15-Aug	4-Sep	+24	19
UCD B8	1-Aug	5-Sep	+25	35
Aldrich	20-Aug	6-Sep	+26	16
Bennett	25-Aug	8-Sep	+28	13
Butte	2-Sep	10-Sep	+30	8
UCD B6	1-Sep	12-Sep	+32	11
Monterey	31-Aug	12-Sep	+32	12
Vela	23-Aug	15-Sep	+35	23
Constanti	2-Sep	17-Sep	+37	15
UCD B3	7-Sep	after 9-20	> 40	?

Hullsplit / Harvest Timing (days + or - Nonpareil) Stanislaus 2025. 3rd leaf.

“Butterfly” hullsplit Parpareil

Determining Yield:
Conveyer Cart with Scale Sensors in Axels & Tongue

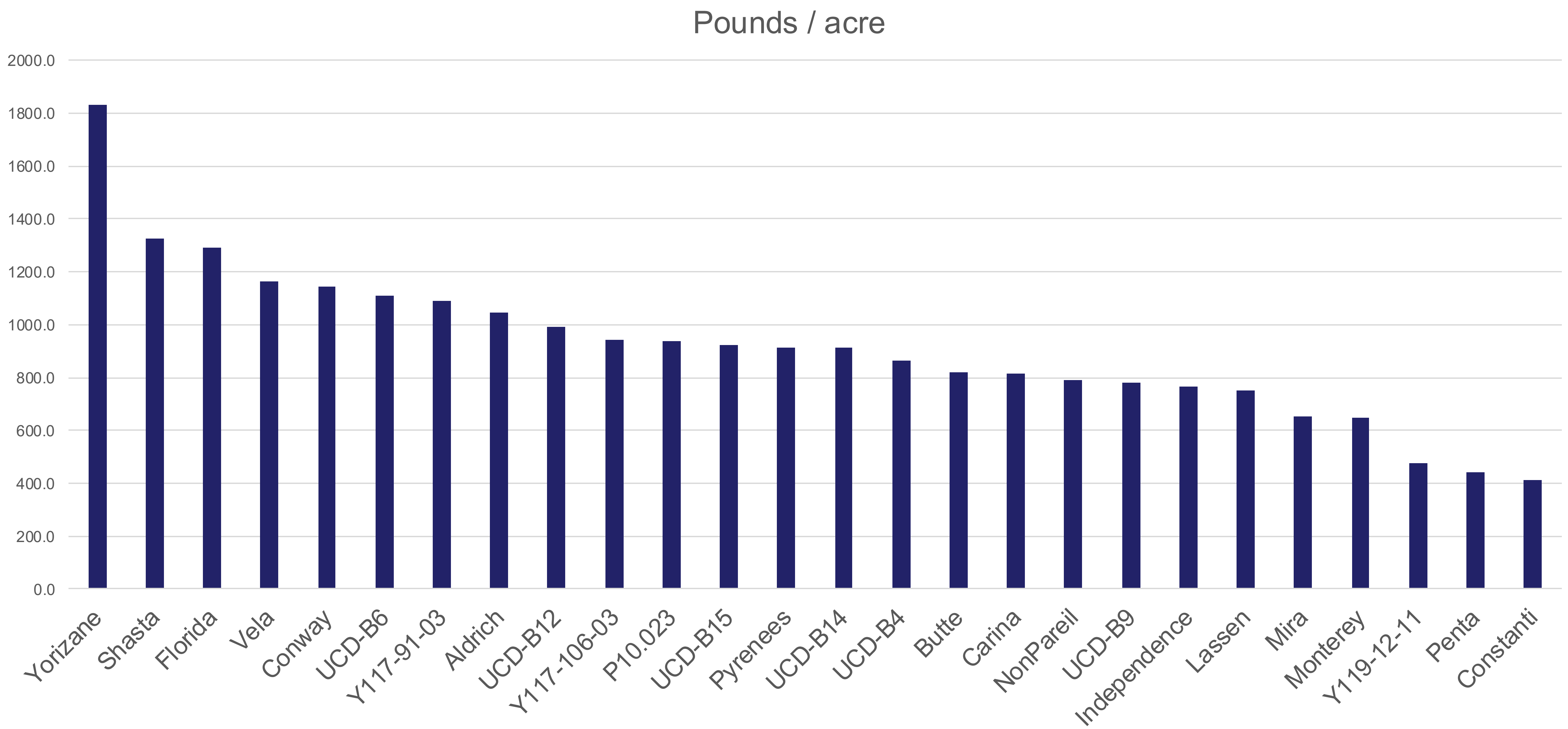
Samples Cracked Out by Hand

Varieties / Selections[4]	Yield (lb / acre) 2025 (3rd)	Statistical Significance P<0.05
Yorizane	1832	A
Shasta	1326	B
Florida	1291	B
Vela	1164	BC
Conway	1142	BC
UCD B6	1111	BCD
Parpareil	1091	BCDE
Aldrich	1045	BCDE
UCD B12	990	BCDE
Y117-106-03	941	BCDE
P10.023	936	BCDE
UCD B15	923	BCDEF
Pyrenees	914	BCDEF
UCD B14	912	BCDEF
UCD B4	865	BCDEFG
Butte	822	CDEFG
Carina	816	CDEFG
Nonpareil	788	CDEFG
UCD B9	779	CDEFG
Independence	764	CDEFG
Lassen	749	CDEFG
Mira	651	DEFG
Monterey	645	EFG
Y119-12-11	474	FG
Penta	439	G
Constanti	414	G

Yield of 3rd Leaf Trees.

Kern County, 2025

3rd Leaf Yield – Kern County 2025



Varieties / Selections			Yield (lb / acre) 2024 (2^{nd})	
Yorizane			1013 a	
Parpareil			494 efgh	
Pyrenees			713 bc	
Monterey*			487 efgh	
UCD B12			453 efghi	
Constanti			640 bcd	
Mira			382 hijk	
Penta			463 efghi	
UCD B6			333 ijkl	
Carina			668 bcd	
Vela			584 cde	
UCD B14			241 lmno	
Shasta			745 b	
Independence			524 defgh	
UCD B8			58 p	
Aldrich*			256 klmn	
Butte*			406 ghij	
Conway*			182 mnop	
Y117-106-03			441 fghi	
P10.023			65 p	
Nonpareil*			282 jklm	
Lassen			428 fghi	
UCD B9			352 ijkl	
Florida			562 def	
Y119-12-11			107 op	
Bennett-H			-	
UCD B15			183 mnop	
UCD B3*			128 nop	

Yield & Percent Crackout of 2^{nd} and 3rd Leaf Trees.

Stanislaus County, 2025

- First generation orchard
- Hansen Rootstock
- Spacing: 10’ x 20’ (218 trees / acre)
- No training & no pruning
- ½ hive per acre

Varieties / Selections		Yield (lb / acre) 2025 (3rd)	Yield (lb / acre) 2024 (2nd)	
Yorizane		2936 ab	1013 a	
Parpareil		2961 a	494 efgh	
Pyrenees		2699 abcd	713 bc	
Monterey*		2923 ab	487 efgh	
UCD B12		2885 abc	453 efghi	
Constanti		2567 abcdef	640 bcd	
Mira		2822 abc	382 hijk	
Penta		2677 abcde	463 efghi	
UCD B6		2790 abc	333 ijkl	
Carina		2453 cdefgh	668 bcd	
Vela		2493 bcdefg	584 cde	
UCD B14		2741 abcd	241 lmno	
Shasta		2217 efghi	745 b	
Independence		2292 defghi	524 defgh	
UCD B8		2718 abcd	58 p	
Aldrich*		2493 bcdefg	256 klmn	
Butte*		2308 defghi	406 ghij	
Conway*		2525 abcdef	182 mnop	
Y117-106-03		2168 fghij	441 fghi	
P10.023		2425 cdefgh	65 p	
Nonpareil*		2172 fghij	282 jklm	
Lassen		1994 hijk	428 fghi	
UCD B9		2051 ghijk	352 ijkl	
Florida		1743 jkl	562 def	
Y119-12-11		1865 ijk	107 op	
Bennett-H		1620 kl	0	
UCD B15		1388 lm	183 mnop	
UCD B3*		980 m	128 nop	

Yield & Percent Crackout of 2nd and 3rd Leaf Trees.

Stanislaus County, 2025

- First generation orchard
- Hansen Rootstock
- Spacing: 10’ x 20’ (218 trees / acre)
- No training & no pruning
- ½ hive per acre

Varieties / Selections	Cumulative (lb / acre) 2nd-3rd leaf	Yield (lb / acre) 2025 (3rd)	Yield (lb / acre) 2024 (2nd)	
Yorizane	3949	2936 ab	1013 a	
Parpareil	3455	2961 a	494 efgh	
Pyrenees	3412	2699 abcd	713 bc	
Monterey*	3410	2923 ab	487 efgh	
UCD B12	3338	2885 abc	453 efghi	
Constanti	3207	2567 abcdef	640 bcd	
Mira	3204	2822 abc	382 hijk	
Penta	3140	2677 abcde	463 efghi	
UCD B6	3123	2790 abc	333 ijkl	
Carina	3121	2453 cdefgh	668 bcd	
Vela	3077	2493 bcdefg	584 cde	
UCD B14	2982	2741 abcd	241 lmno	
Shasta	2962	2217 efghi	745 b	
Independence	2816	2292 defghi	524 defgh	
UCD B8	2776	2718 abcd	58 p	
Aldrich*	2749	2493 bcdefg	256 klmn	
Butte*	2714	2308 defghi	406 ghij	
Conway*	2707	2525 abcdef	182 mnop	
Y117-106-03	2609	2168 fghij	441 fghi	
P10.023	2490	2425 cdefgh	65 p	
Nonpareil*	2454	2172 fghij	282 jklm	
Lassen	2422	1994 hijk	428 fghi	
UCD B9	2403	2051 ghijk	352 ijkl	
Florida	2305	1743 jkl	562 def	
Y119-12-11	1972	1865 ijk	107 op	
Bennett-H	1620	1620 kl	0	
UCD B15	1571	1388 lm	183 mnop	
UCD B3*	1108	980 m	128 nop	

Yield & Percent Crackout of 2nd and 3rd Leaf Trees.

Stanislaus County, 2025

- First generation orchard
- Hansen Rootstock
- Spacing: 10’ x 20’ (218 trees / acre)
- No training & no pruning
- ½ hive per acre

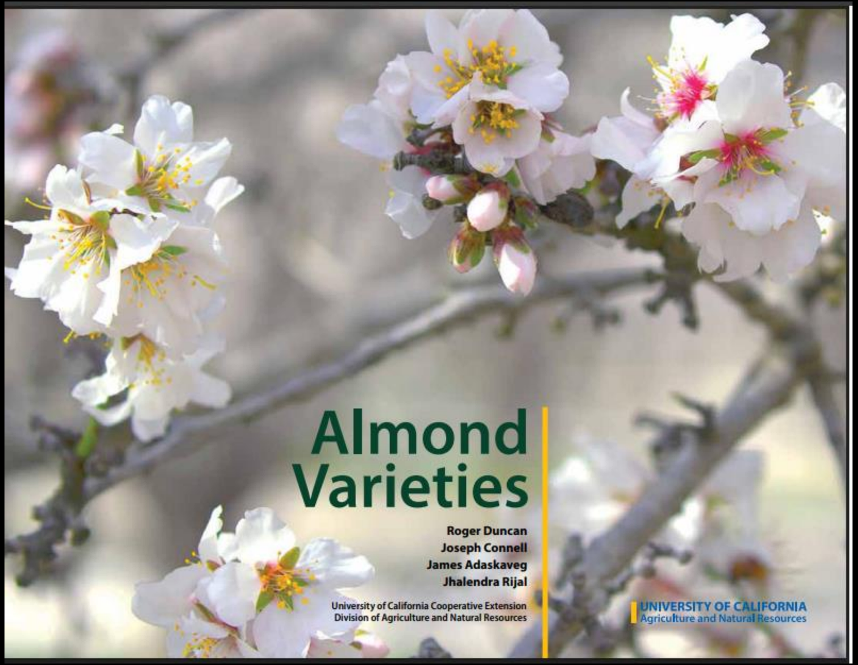
Varieties / Selections	Cumulative	Yield (lb / acre) 2025 (3rd)	Yield (lb / acre) 2024 (2nd)	Crackout (%)
Yorizane	3949	2936 ab	1013 a	68
Parpareil	3455	2961 a	494 efgh	70
Pyrenees	3412	2699 abcd	713 bc	58
Monterey*	3410	2923 ab	487 efgh	53
UCD B12	3338	2885 abc	453 efghi	58
Constanti	3207	2567 abcdef	640 bcd	46
Mira	3204	2822 abc	382 hijk	54
Penta	3140	2677 abcde	463 efghi	43
UCD B6	3123	2790 abc	333 ijkl	48
Carina	3121	2453 cdefgh	668 bcd	41
Vela	3077	2493 bcdefg	584 cde	53
UCD B14	2982	2741 abcd	241 lmno	62
Shasta	2962	2217 efghi	745 b	60
Independence	2816	2292 defghi	524 defgh	69
UCD B8	2776	2718 abcd	58 p	54
Aldrich*	2749	2493 bcdefg	256 klmn	59
Butte*	2714	2308 defghi	406 ghij	54
Conway*	2707	2525 abcdef	182 mnop	57
Y117-106-03	2609	2168 fghij	441 fghi	66
P10.023	2490	2425 cdefgh	65 p	56
Nonpareil*	2454	2172 fghij	282 jklm	67
Lassen	2422	1994 hijk	428 fghi	59
UCD B9	2403	2051 ghijk	352 ijkl	61
Florida	2305	1743 jkl	562 def	54
Y119-12-11	1972	1865 ijk	107 op	62
Bennett-H	1620	1620 kl	0	65
UCD B15	1571	1388 lm	183 mnop	57
UCD B3*	1108	980 m	128 nop	51

Yield & Percent Crackout of 2nd and 3rd Leaf Trees.

Stanislaus County, 2025

Constanti

New Almond Variety Guide



Appearance	Variety[1]	Bloom Time Days +/- Relative To Nonpareil	100% Hull Split Days +/- Relative To Nonpareil	Ease of Nut Removal at Harvest[2]	Tree Architecture	Nut Characteristics Shell Seal	In-shell	Kernel Description	Nut Quality Nut Size	Doubles	Salt Sensitivity	Pollen Compatibility Group	Plum or Plum Hybrid Rootstock Compatibility
	SELF-STERILE												
	NONPAREIL	0	0	easy	large size, upright to spreading	poor	soft shell	Attractive, smooth, uniform, flat, elongated, light-colored kernel with a mild, sweet flavor	medium-large	< 6 %	low	Nonpareil	variable
	MONTEREY	+2	+42	average	medium size, spreading	good	soft shell	Large, long and narrow, with a dark, deeply wrinkled surface. High percent double kernels. High oil content	large	> 10 %	high	Monterey	variable
	BUTTE	+4	+24	easy	large size, vigorous, upright to spreading	excellent	semi-hard shell	Small, round, and plump with a dark, distinctively wrinkled surface and more robust flavor than Nonpareil	small	> 10 %	moderate	Monterey	variable
	CARMEL	+2	+32	easy	medium size, upright with slight spread	excellent	soft shell	Long, narrow, lightly colored, slightly wrinkled. Prone to doubles.	medium	6-10 %	high	Carmel	compatible
	PADRE	+5	+26	difficult	large size, vigorous, very upright	excellent	hard shell	Small, round, and plump with a dark, distinctively wrinkled surface similar to 'Butte'	small	< 6 %	high	Padre	compatible
	FRITZ	-1	+50	average	small-medium size, vigorous, spreading	good	semi-hard shell	Medium-small, ovate kernel, with a medium to dark brown, wrinkled texture	small	6-10 %	high	Fritz	compatible
	ALDRICH	-1	+24	easy	large size, vigorous, very upright	fair	soft shell	Medium-small, ovate, slightly wrinkled. Strong amaretto flavor	medium	6-10 %	high	Aldrich	compatible
	WOOD COLONY	+1	+22	average	small size, upright with slight spread	fair	soft shell	Long, narrow, flat, slightly wrinkled. Kernels prone to creases.	medium	> 10 %	moderate	Wood Colony	compatible
	SONORA	-6	+7	average	medium size, upright to spreading	fair	soft shell	Attractive, long, smooth, narrow, light color, with a sweet flavor	large	< 3 %	unknown	Solano	compatible
	SUPAREIL	0	+27	easy	medium-large size, vigorous, upright to spreading	good	semi-soft shell	Large, flat, smooth, attractive, blonde kernel with obvious, dark veins.	medium-large	< 3 %	low	unknown	compatible
	SELF-FERTILE[5]												
	INDEPENDENCE	-1	+2	difficult	small size, upright to slight spread	poor	soft shell	Flat, light color, slightly wrinkled	medium-large	6-10 %	high	universal	generally incompatible
	SHASTA	-1	-2	easy	medium size, vigorous, willowy, spreading	good	soft shell	Long, smooth, very slight wrinkles	large	< 3 %	unknown	universal	variable
	YORIZANE[6] (Y116-161-99)	+2	-2	average	small-medium size, slightly upright-spreading	fair	soft shell	Oblong, broad, light color, slightly wrinkled	medium	< 3 %	unknown	universal	appears compatible
	PARPAREIL[6] (FF17-91-66)	+2	-7	average	large, vigorous, upright to spreading	fair	semi-soft shell	Narrow, light color, smooth, moderate veins	small-medium	< 6 %	unknown	universal	appears compatible

Variety[1]	Alternaria Leaf Spot	Anthracnose	Brown Rot Blossom Blight	Hull Rot	Jacket Rot/ Green Fruit Rot	Scab	Shot Hole	Rust	NOW[3] Potential Damage	Plant Bug Damage Susceptibility[4]	Other Characteristics of Note	Other Diseases of Note
SELF-STERILE												
NONPAREIL	+++	++	+	++++	+	+	+	++	high	low	Historic standard California premium variety. Highly versatile. Soft shell easily cracked by hand. Premium for in-shell market.	
MONTEREY	++++	++++	++	+++	+++	+++	++	++	moderate	high	Historically high yielding Nonpareil pollenizer. Late harvest is a concern in high rainfall areas. Prone to poorly understood "failure to leaf" malady	
BUTTE	++++	++	+++	+	+++	++	++	++	moderate	low	Often roasted and used in confectioneries. Often planted and harvested with 'Padre' pollenizer. Hard shell resists insect damage	Susceptible to Phomopsis fruit rot. With high rainfall, aerial Phytophthora can be a problem.
CARMEL	++++	+++	+++	+	+++	+++	+++	+++	low	low	Prized for seasoned almond snacks. Prone to Noninfectious Bud Failure.	With high rainfall, aerial Phytophthora can be a problem.
PADRE	++	+++	++	+	+	+	+	+	low	moderate	Train trees to reduce scaffold failure. Often planted and harvested together with 'Butte'	Susceptible to silver leaf disease.
FRITZ	++	++	++	+	++	++	++	+	low	high	Very late harvest. Uses are similar to Butte & Padre	Very susceptible to bacterial spot. In high rainfall, aerial Phytophthora can be a problem.
ALDRICH	+	++	++	+	++	+	++	+	moderate	high	Very dense, prolonged bloom overlaps well with Nonpareil. Train to avoid very upright scaffolds prone to breakage	Prone to bacterial blast.
WOOD COLONY	+++	+++	++++	++	++++	++	++	++	moderate	low	Small tree stature benefits from high vigor rootstock and close spacing.	Susceptible to bacterial blast, band canker, and Phomopsis fruit rot.
SONORA	++++	+++	+++	+	+++	++	++	++	high	high	Premium variety highly sought for in-shell market. Yields suffer due to lack of appropriate early pollenizer.	Prone to almond leaf scorch and Phomopsis fruit rot can be problems.
SUPAREIL	+?	+?	+?	+++	+?	+?	+++	+?	moderate	moderate	High quality kernel but yield efficiency has been low in UC trials.	
SELF-FERTILE[5]												
INDEPENDENCE	+++	+++	+	+	+	+	+	++	high	high	The first commercial self-fertile almond variety. History of good production.	Prone to bacterial blast, bacterial spot, almond leaf scorch, and silver leaf.
SHASTA	++?	+?	++++	+?	++	+?	+?	+++	high	moderate	Prone to scaffold failure; requires more intensive training when young.	
YORIZANE[6] (Y116-161-99)	++?	+?	++++	+?	++	+?	+?	+	moderate	high	Easy to grow tree prone to high early yields which may level off over time.	
PARPAREIL[6] (FF17-91-66)	++?	+?	+?	+?	+?	+?	++++	++	low	high	Very early harvest. Kernel is similar to Nonpareil but smaller.	Prone to bacterial blast.

1: Self-sterile and self-fertile varieties, respectively, are listed in order of current bearing acreage

2: Nut removal for Independence and Padre can be improved by shaking while hulls are still somewhat green

3: NOW = navel orange worm. Susceptibility is due to a combination of shell integrity and harvest timing

4: Ranking refers primarily to leaf-footed plant bug damage causing early nut drop. Stink bug feeding injury occurs later in the season resulting in brown spots on the kernel

5: Self-fertile varieties need no pollenizer and are assumed to universally pollinate all other varieties.

6: Experience is limited for the new varieties Yorizane and Parpareil. This information may change as we gain more experience.

UNIVERSITY OF CALIFORNIA Agriculture and Natural Resources

UC CE UC Cooperative Extension University of California Agriculture & Natural Resources

california almonds Almond Board of California

Thank you!

Growers:

- CSU Chico Student Farm
- John & Isaac Duarte
- Pacific Ag Management

- Burchell Nursery for growing 5400 experimental trees

- Almond Board for funding several decades of rootstock and variety research

Roger Duncan
raduncan@ucdavis.edu

GENE EDITED ALMOND VARIETIES

REGULATION OF GENE EDITING VARIES BY MARKET

Gene Edited ≠ GMO

- Canada
- China
- India
- Japan
- UK
- US

Gene Edited = GMO

- EU
- South Korea

Undetermined

- Hong Kong
- Mexico
- Morocco
- Turkey
- UAE
- Vietnam

GENE EDITED TOMATOES SOLD IN JAPAN

2019

- Japan clarifies regulatory approaches for gene-edited products
- SDN-1 gene edits are not subject to regulation (biodiversity and food safety)

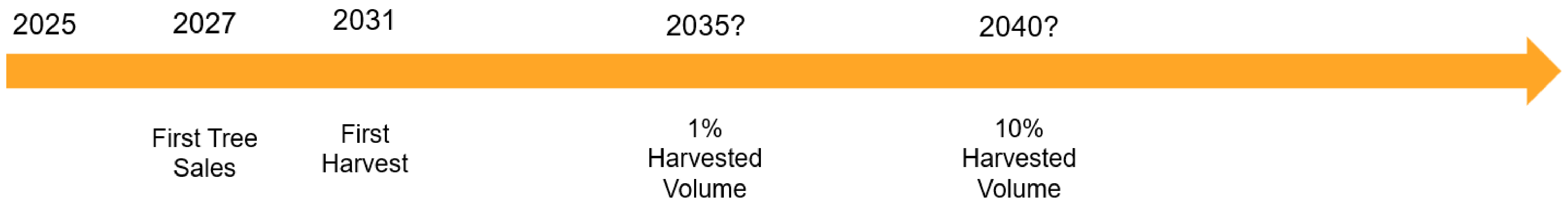
Dec 2020

- Sanatech Seed Co filed submitted information to government regulators

2021

- Gave tomato seedlings to gardeners at no charge (May)
- Selling of tomato fruits online (September)
- Selling of tomato seedlings to gardeners (October)

TIMELINE



POTENTIAL ABC ROLES

- Continue monitoring export market regulations
- Include gene edited varieties into Regional Varietal Trials
- Provide information to growers
- Examine options for segregation to keep kernels in US market
- Assist in regulatory approval in leading export markets

FruitionOne™


A tree that is genetically identical to nonpareil,
except for one single feature.
These trees produce self-fertile flowers.

What do we know? (Product)

Scientific Background

Extremely well understood mechanism ✓

Genomic Confirmation:
Very high level of quality control and precision ✓

Multiple, layered approaches to achieve goals ✓

Laboratory observations and experiments confirm that plants should be self fertile. ✓

Observational Process

Initial growth habit and appearance match Nonpareil ✓

Established in multiple locations with layered approaches ✓

Evidence of flower setting in a pollinator exclusion zone – Starting spring 2026

We are setting up our own proving grounds up and down the state....

Whole house exclusion

Pollinator nets

Trial Blocks




Exporting GE Almond Kernels (Take this seriously!)

Ohalo's regulatory team is already working through this process, specifically for FruitionOne™

- **Every major almond destination** (EU, India, China, Japan, Middle East, Mexico) **already imports massive volumes** of GMO corn, soy, canola oil, and processed ingredients.
- **GE almond kernels are treated as food**, not planting material — **no environmental rules, no orchard risk.**
- **Simple gene edits (SDN-1)** are *not classified as GMO* in many key markets (Japan, Australia, Brazil, Argentina).
- **Even strict markets** (EU, China) have **well-defined, routine food-import pathways** for GMO products.

Within 10 years, FruitionOne™ could be contributing **$75M–$150M per year** in incremental industry profit.

True Self-Fertility Resets the Cost Structure

- Higher more consistent yields through all bloom conditions.
- Reduces bee rental needs by **40–70%** at scale.
- Lower labor and management complexity for the life of the orchard.

Profitability Improves Across the Entire Value Chain

- Higher yields + lower cost/acre = **higher net returns** for growers.
- Improved uniformity + kernel quality = **higher efficiency and margin** for processors.
- Supply-chain reliability = **pricing stability** for handlers.

Processing Lines Get Faster, Cleaner, More Profitable

Processors benefit from:

- Tighter, higher quality kernel size distribution
- Lower reject rates
- More predictability

The finish line.

Why would you plant a non-self-fertile Nonpareil again?

TO LEARN MORE: Contact your field representative below or visit sgtrees.com.


Sierra Gold Nurseries
Save the date
GROWER DAY
MAY 15, 2026
10 a.m. - 2 p.m.
Yuba City
Learn about our varieties and rootstocks
Orchard, nursery and lab tours
FruitionOne™ tour

The Burchell Nursery Inc.

Burchell Breeding Inc

Verinomics

BURCHELL NURSERY, INC.

- Commercial grower of fruit and nut trees for farmers
- Established in 1942
- Four generations
- Over 2 million trees grown annually
- Bare root and potted trees
- Locations in Oakdale and Fresno, California

THE ALMOND CONFERENCE 2025

BURCHELL BREEDING, INC.

- Innovators of New Varieties
  - 5 of the top 10 almond varieties grown in California were introduced by Burchell Nursery (Monterey, Wood Colony, Shasta, Carmel, Fritz)
  - Over 100 patented stone fruit varieties including O'Henry, Elegant Lady and Autumn Flame peaches

BURCHELL BREEDING INC

CHALLENGES → TRAITS TO IMPROVE ALMOND PRODUCTION

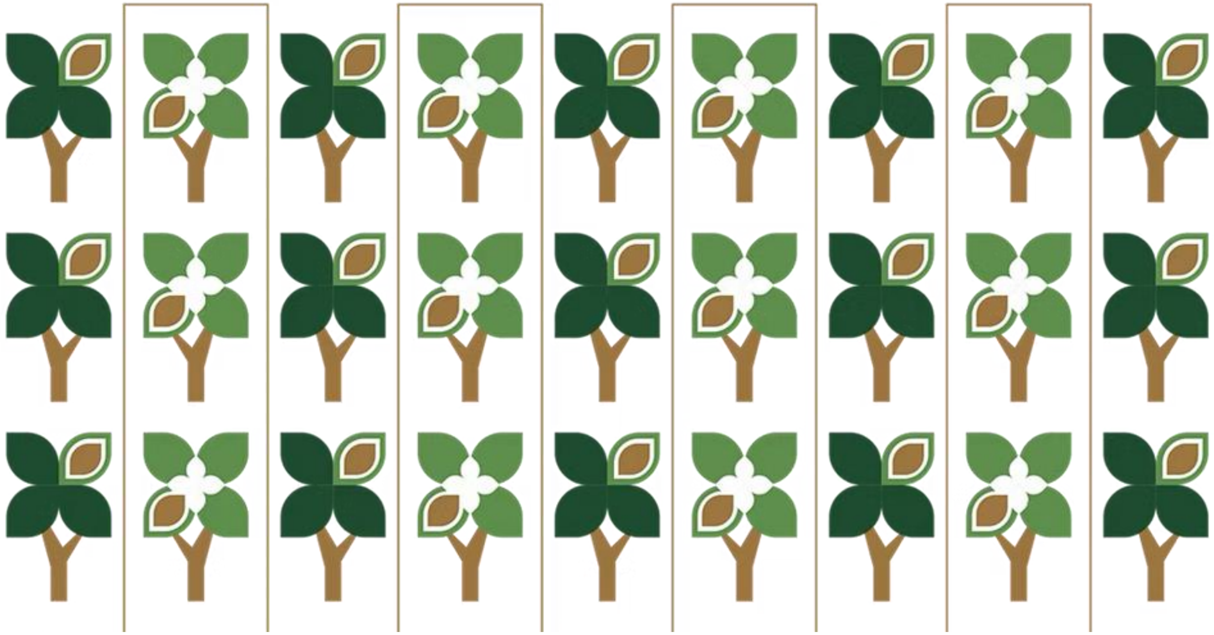
- **Economic challenges** – one harvest, one pruning, spraying, management efficiency
- **Water efficiency** – drought-tolerance, cuticle modifications
- **Plant architecture** – height, branch angel, nut set
- **Environmental challenges** – cold-tolerance, flowering time, harvest time, dust mitigation, honeybee decline
- **Consumer traits** – shelf-life, flavors, colors, fortification
- **Emerging disease pandemics** – Red leaf blotch, bud failure, hull rot, bacterial canker, phytophthora

COMMERCIAL GENE EDITING

SELF-INCOMPATIBILITY IN NONPAREIL

Nonpareil represents ~60% of the US almond market

Varietal flower time must coincide



- Self-incompatible (interplanting)
- Cross-incompatible with some varieties
- Pollinator (bees) required
- Multiple harvests

POSSIBLE SOLUTIONS?

Conventional Breeding	GMOs	Precision Gene Editing
• Limited genetic diversity • Decades-long varietal development • Loss of variety fidelity	• Regulatory hurdles • Great expense • Consumer antipathy • Limited markets • Introduce foreign DNA	• Non-GMO • Path to deregulation • Consumer acceptance • Expanding markets • Make use of parent DNA

Unlike conventional or GMO technologies gene editing provides a rapid, non-GMO pipeline of agricultural products to expanding international markets with increasing consumer acceptance.

DIFFERENT BREEDING APPROACHES

Shasta = Almond X SF Almond (Conventional Breeding)

Yorizane = Almond X SF Almond (Conventional Breeding)

Independence = (Almond X Peach) X (Almond)

Nonpareil+ = Almond (Gene Editing Natural Mutation)

RAPID RESPONSE TIME

Gene editing allows specific traits to be incorporated into existing germplasm in a fraction of the time.

Breeding = 15 years or more

- Crosses needed
- Each generation = 3-5 years
- **Loss of varietal identity**

Editing = 1-2 years

- No crosses needed
- Transgene free plants
- **Varietal identity maintained**

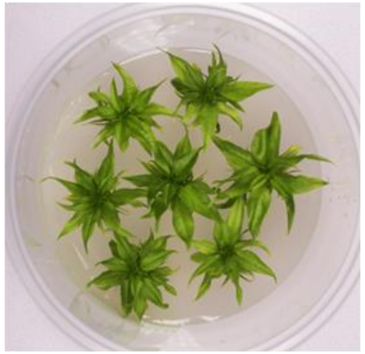
New Varietal Release

COMMERCIAL GENE EDITING

ALMOND GENE EDITING

Editing for self-compatibility, disease-resistance and drought-tolerance

Varietal TC Establishment → Transformation & Regeneration → Vectors & Constructs → Guide Design & Editing → Regenerated Edited Plants → Regenerated TF-edited Variety → Burchell Nursery



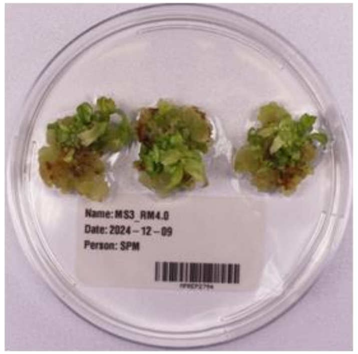
Establish almond varieties

↓

Nonpareil

Shasta

Butte



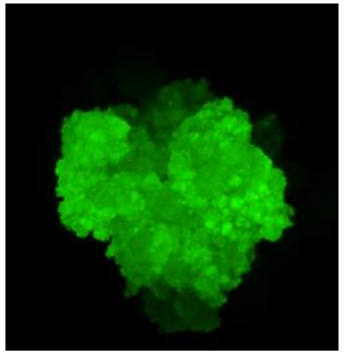
Regeneration

↓

Nonpareil

Shasta

Butte



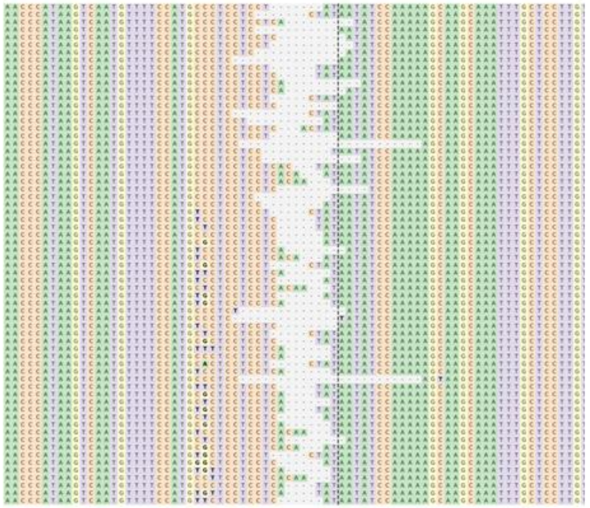
Transformation

↓

Nonpareil

Shasta

Butte



SC & SC+ Gene Editing

THE FUTURE IS NOW WITH NONPAREIL+

In collaboration with Burchell Breeding, Verinomics is revolutionizing the almond industry with the self-compatible Nonpareil variety, driving increased yields and maximized grower profitability.

Verinomics

Verinomics

Verinomics

Burchell Breeding Inc

Burchell Breeding Inc

2027

First shipments of **Nonpareil+**

Burchell Breeding Inc

60% of almond trees are either Nonpareil or pollinators of Nonpareil.
All can be replaced with Nonpareil+

Benefits of Nonpareil+

One variety to harvest

Less dust

Less dependence on bees

One variety to manage

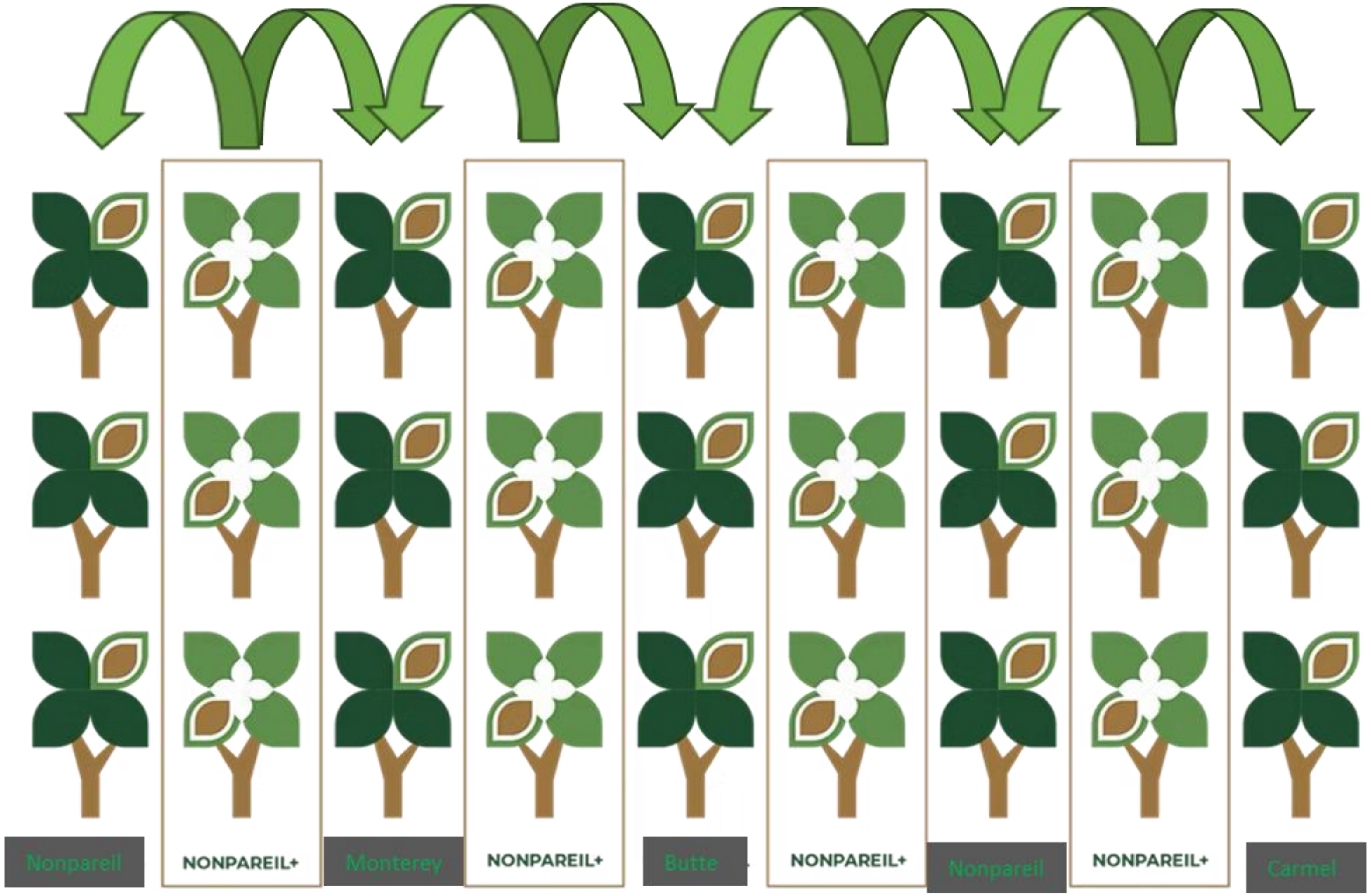
Self compatibility means more nuts set (higher production)

Ability to pollinate any other variety

We sequenced the entire genome of Nonpareil and nothing changed except its ability to pollinate itself and others.

The Nonpareil you know and love is still the same, but better!

100% POLLINATION WITH NONPAREIL+



THE ALMOND CONFERENCE 2025

NONPAREIL AND NONPAREIL+ NUTS ARE THE SAME

- About 1% of the nuts on a Nonpareil tree are self-pollinated.
- Majority of nuts on a Nonpareil tree are pollinated by another variety.
- Since the nut is all maternal (female) tissue it has the same nut traits as Nonpareil even if it was pollinated by another variety.
- Handlers currently do not separate the self-pollinated Nonpareil from the pollinated Nonpareil.

THE ALMOND CONFERENCE 2025

SUCCESS OF PRODUCT TO DATE

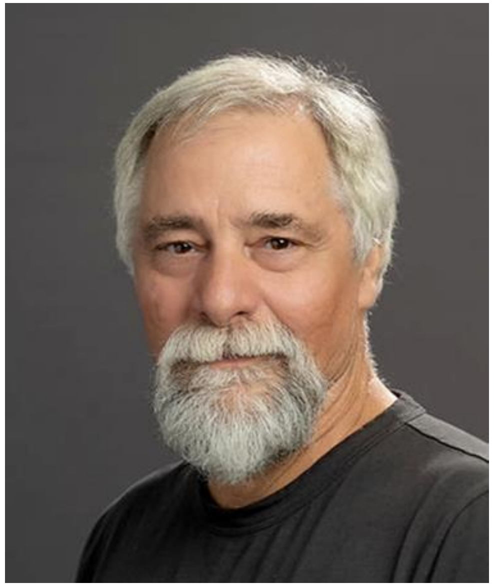
- Nonpareil+® (self-compatible) are being propagated in our greenhouse.
- Test orchard planted on our property in Fowler.
- Hundreds of test trees will go out spring 2026 into grower field trials.
- Orders are being written for commercialization in 2027.

THE ALMOND CONFERENCE 2025

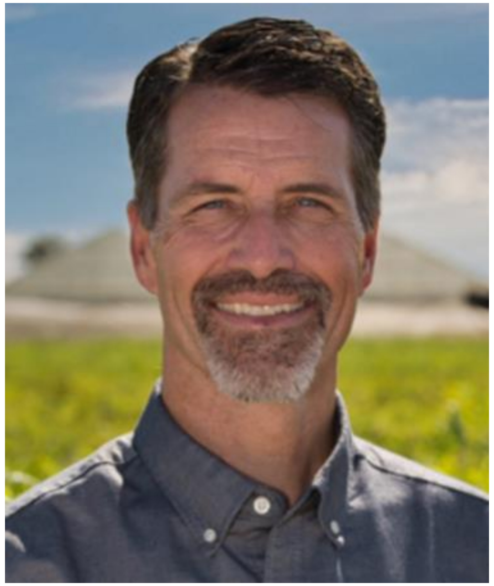
MORE TO COME!

- Butte+ Self-compatible Butte released in 2027 for testing.

OUR TEAM



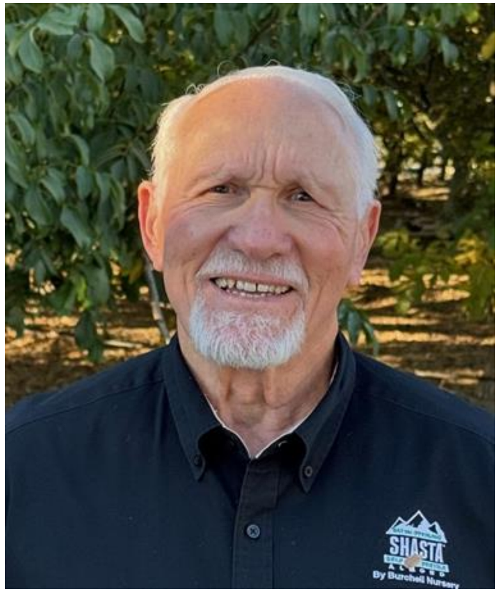
Prof. Steve Dellaporta Founder of Verinomics, Inc.



Tom Burchell, President/CEO Burchell Nursery, Inc.

Gio Scalzo, COO Verinomics, Inc.

Dr. Chris Fragoso, Computational Biologist, Verinomics, Inc.



Richard Werner, IP & Licensing, Burchell Breeding, Inc.

Dr. Anahid Powell, Director of Gene Editing, Verinomics, Inc.

THE ALMOND CONFERENCE 2025


THANK YOU!
2025
THE ALMOND CONFERENCE
CULTIVATING A HEALTHIER
FUTURE