

# Regional Field Evaluation of New Almond Varieties & Selections – 4<sup>th</sup> generation

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### Abstract

In 2021, an open request was distributed to all public and private California breeders and nurseries and several international breeding programs to obtain promising new almond varieties and experimental selections for comparative testing under commercial California growing conditions. Candidate varieties and experimental selections were received from California, Australia, Spain, and Israel. A committee of UC farm advisors, commercial almond handlers, and consultants participated in a blind evaluation of 50 shelled and in-shell almond samples provided by participating breeders and nurseries. From these, we identified 24 top-tier contenders for field testing. All but two are purportedly self-fertile. Replicated field trials were established in the North (Butte County), Central (Stanislaus County), and South (Kern County) regions of the California Central Valley to document the performance of the experimental varieties and compared against six industry standards. Important horticultural characteristics, kernel quality, and yield will be monitored for several years. The Stanislaus County trial was harvested after the second growing season due to an unusually heavy crop in the vigorous, minimally pruned orchard. Yorizane had the highest yield (1013 lb / acre) of all varieties (P≤0.05). Shasta (745 lb/a), Pyrenees (713 lb/a), Carina (668 lb/a), and Constanti (640 lb / a) also had outstanding 2<sup>nd</sup> leaf yields.



Fifty candidate varieties were blindly evaluated for inclusion in the regional field tests



### Objectives:

- ❑ Establish identical field trials farmed under commercial conditions in three regions of the Central Valley: Butte County, Stanislaus County, and Kern County.
- ❑ Monitor and record key horticultural information valuable for grower decision making, including bloom period, hull split period, harvest timing, disease and insect susceptibility, kernel quality, and yield.
- ❑ Extend results to growers and allied industry via field days and industry-relevant publications.

### Introduction

Although Nonpareil has been the dominant variety in the California almond industry for nearly 150 years, there is still a need to identify better, grower-friendly pollinizer varieties with good bloom overlap with Nonpareil, high yields of good quality kernels, and low insect and disease susceptibility. In addition to finding good Nonpareil pollinizers, the industry will benefit from the development of new, self-compatible (self-fertile) varieties. Self-compatibility offers several advantages over conventional, self-sterile almond varieties, including increased farming efficiencies, reduced costs, and more consistent yields, especially in years with poor bloom weather. Thus, while self-compatible varieties could bring multiple competitive advantages to our CA growers, they need to be regionally evaluated to explore their potential novelties through regional field trials.

### Methodology:

In-shell samples of 50 candidate almond varieties and experimental selections were obtained from private and public breeding programs and commercial nurseries in California, Australia, Spain, and Israel. After a blind selection process, 24 contenders were selected for regional field testing based on desirable kernel attributes and other factors. Budwood was obtained from the breeders/nurseries, and 180 trees of each variety/selection were grown by a commercial nursery (Burchell Nursery, Oakdale, CA) for evaluating by UC farm advisors. In September 2022, potted trees on Hansen rootstock were planted in the Stanislaus and Kern County trials and bareroot trees on Krymsk 86 were planted in May 2023 in the Butte County trial. At least five standard varieties were included for comparison in each location. In each regional trial, trees were planted in replicated, experimental designs with four replications and 13-16 trees of each variety per replication. Beginning in 2025 (third leaf) researchers will monitor several important parameters annually, including yield, yield efficiency, kernel quality, tree canopy size, bloom quality and timing, hullsplit time and duration, and susceptibility to insects and diseases. Because the Stanislaus trial was planted on Hansen rootstock at a high density (218 trees per acre) and minimally pruned, yields were collected in the second leaf (2024).

Table 1. Varieties and Selections Planted in Regional Variety Trials Located in Kern, Stanislaus, and Butte Counties		
Varieties	Source	Self-Fertile?
Y117-106-03	USDA ARS	Yes
Y119-12-11	USDA ARS	Yes
Y117-91-03	USDA ARS	Yes
Yorizane	USDA ARS	Yes
Carina	University of Adelaide, Australia	Yes
Mira	University of Adelaide, Australia	Yes
Vela	University of Adelaide, Australia	Yes
Constanti	Institute of Agrifood Research & Technology – Lleida, Spain	Yes
Florida	CEBAS - Murcia, Spain	Yes
Penta	CEBAS – Murcia, Spain	Yes
Conway	Burchell Nursery	No
Lassen	Burchell Nursery	Yes
P10.023	Burchell Nursery	Yes
Pyrenees	Burchell Nursery	Yes
Shasta	Burchell Nursery	yes
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
Standards		
Aldrich		No
Bennett – Hickman (Modesto only)		No
Butte		No
Fritz (Kern only)		No
Independence		Yes
Monterey		No
Nonpareil		No



Bloom of second-leaf trees in Kern County trial. Feb 2024. Trees on Hansen rootstock were planted into a 2<sup>nd</sup>-generation field after whole orchard recycling and conventionally pruned.

Table 3. Bloom and Hull Split Time of 2 <sup>nd</sup> Leaf Trees						
	Bloom Time (Days Before (-) or After (+) Nonpareil)				Hull Split	
	Stanislaus County		Kern County		Stanislaus County	
	Begin Bloom	Full Bloom	Begin Bloom	Full Bloom	Begin Hull split	End Hullsplit / Harvest Date
Y117-106-03	-5	-4	-4	+2	+17	+18
Lassen	-3	-1	-7	-5	+17	+25
UCD B12	-3	-1	-4	-2	+5	+13
UCD B9	-3	-1	-4	+2	+3	-4
UCD B4	-3	-1	0	0	+9	+25
Carina	-3	+1	0	+2	0	-4
UCD B2	-3	+3	-4	+2	a	a
Vela	-1	-1	0	0	+35	+25
Florida	-1	0	-4	-2	0	-4
Yorizane	-1	+1	-4	0	-5	-8
Nonpareil	Feb. 15	Feb. 20	Feb. 16	Feb. 21	July 23	Aug 9
UCD B6	0	-1	0	+2	+37	+32
Aldrich	0	0	-4	0	+26	+25
Shasta	0	+1	-4	0	0	0
Monterey	0	+1	0	+2	+37	+33
UCD B14	0	+1	+3	+5	+15	+25
UCD B15	0	+1	+3	0	+3	+10
Pyrenees	+1	+1	-3	0	+17	+25
Independence	+1	+1	0	-2	+6	+11
Conway	+2	+1	0	+2	+9	+10
Y117-91-03	+2	+2	0	0	0	-7
UCD B3	+2	+2	0	+5	+42	B
UCD B8	+2	+2	+3	+2	+6	+18
P10.023	+3	+2	+3	+2	0	-4
Y119-12-11	+3	+4	0	+2	-18	-21
Mira	+3	+4	+3	+5	+6	+10
Butte	+4	+5	+3	+3	+36	+32
Constanti	+6	+5	0	+2	+35	+32
Penta	+18	+21	+7	+21	+11	+18

Table 2. Rootstock, Tree Spacing, and Pruning Style for Trials in Butte, Stanislaus, and Kern Counties			
	Rootstock	Tree Spacing	Pruning Style
Butte	Krymsk 86	14’ x 21’	Conventional
Stanislaus	Hansen 536	10’ x 20’	Minimal
Kern	Hansen 536	16’ x 22’	Conventional



Experimental trees ready to be planted at the Stanislaus County site near Modesto. September 2022.



Second-leaf, minimally pruned Yorizane trees blooming in the Stanislaus trial. Feb. 20, 2024



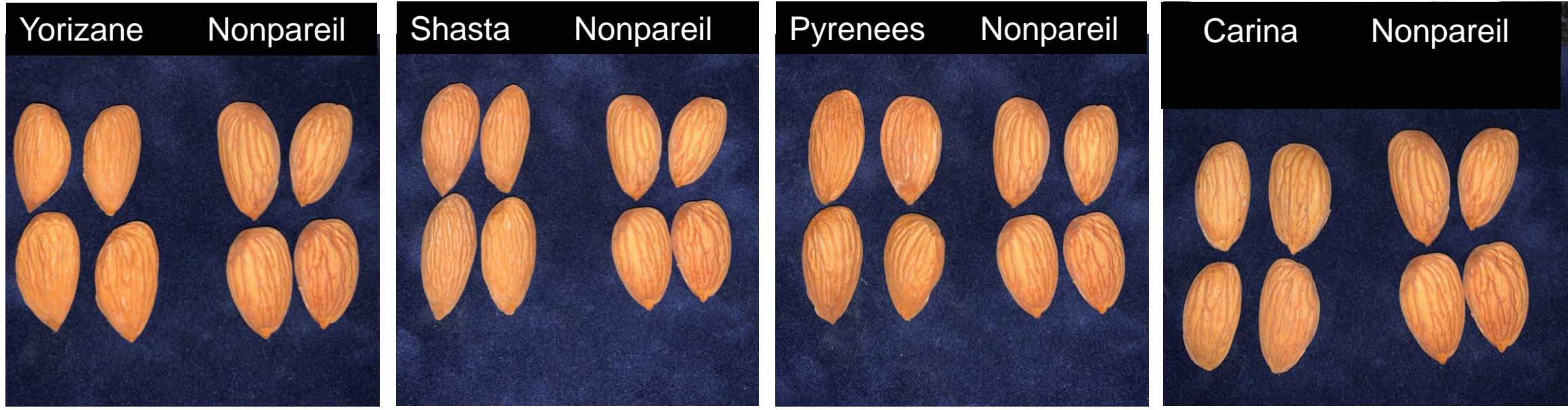
Late-season second-leaf trees in the Butte County trial. Bare root trees on Krymsk 86 rootstock were planted out of cold storage in late May 2023. About 20% failed to grow and had to be replanted.



Potassium deficiency leaf symptoms developed in the Constanti variety in the Kern County trial.

Table 5. Percent Kernel Defects in Harvested Samples of Experimental Varieties in the Stanislaus County Trial. 2024.							
	Doubles (%)	Crease (%)	Twins (%)	Blanks (%)	Shrivel (%)	NOW	Brown Spot / Plant Bug
Pyrenees	7.3	3.0	1.3	1.3	2.8	2.5	4.3
Y119-12-11	5.8	1.5	3.3	8.8	6.3	0.8	3.5
Y-117-106-03	5.7	9.3	2.3	2.3	8.3	2.0	2.3
Monterey	4.3	1.3	1.7	0.7	1.3	9.3	2.7
Conway	4.0	8.0	3.0	4.0	4.7	4.7	1.0
UCD B4	3.5	6.0	2.3	3.8	12.0	8.0	2.8
UCD B6	3.3	3.0	0.7	3.3	2.3	3.0	2.3
UCD B12	3.0	11.3	5.0	19.0	7.7	1.0	2.0
UCD B14	3.0	9.3	0	4.3	11.5	4.5	3.5
Nonpareil	3.0	1.0	4.5	6.8	2.0	1.5	2.5
Independence	2.5	1.5	1.5	1.3	3.5	1.5	5.3
UCD B2	2.0	8.7	1.3	2.3	3.0	9.3	2.3
Florida	1.5	3.3	2.3	0.3	1.8	0	2.5
Y117-91-03	1.5	1.0	6.0	6.0	5.5	0.3	4.8
P10.023	1.5	6.0	1.3	16.3	4.8	4.5	2.5
UCD B3	1.3	5.0	0	3.7	2.3	2.0	1.3
Butte	1.0	1.7	1.0	0.3	1.3	1.3	4.0
UCD B9	1.0	6.7	1.7	2.0	2.3	5.0	3.0
UCD B15	1.0	12.3	3.0	46.0	13.8	2.0	1.5
Penta	0.8	3.5	0	5.5	3.8	1.5	50.0
Shasta	0.8	3.0	3.3	4.3	5.8	0.8	3.0
Aldrich	0.7	4.7	1.7	4.0	2.0	2.0	3.0
Vela	0.5	2.3	0.8	6.0	4.8	3.3	8.0
Carina	0.3	3.8	2.8	3.3	4.3	0.3	3.8
Constanti	0.3	2.7	1.0	1.0	2.3	0	1.3
Lassen	0.3	1.0	0.3	1.0	0.5	5.5	11.0
UCD B8	0	12.3	2.3	20.0	6.7	9.3	2.3
Mira	0	5.0	1.3	3.3	2.3	0.3	3.3
Yorizane	0	3.5	1.5	1.3	4.3	1.0	5.0

Fig 1. The 2024 top four yielding varieties in the Stanislaus County variety trial.



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