United States Department of Agriculture
National Agricultural Statistics Service

2023 California Almond
Objective Measurement Report

2023 CALIFORNIA ALMOND FORECAST UP 1 PERCENT

California's 2023 almond production is forecast at 2.60 billion meat pounds, up 4% from May's subjective forecast and 1% higher than last year's crop of 2.57 billion meat pounds. The forecast is based on 1.38 million bearing acres. Production for the Nonpareil variety is forecast at 1.10 billion meat pounds, 10% above last year's deliveries of 1.00 billion meat pounds. The Nonpareil variety represents 42% of California's total almond production.

The almond bloom began in the middle of February and peaked at the end of the month. Record level rainfall and unprecedented stormy conditions hindered bee pollination activity in orchards across the state. Cooler than normal temperatures continued through early summer and delayed the maturity of the crop. Growers have been irrigating, applying pest treatments, and preparing for harvest, which is expected to begin in the next month.

The average nut set per tree is 3,953, a decrease of 3% compared to 2022. The Nonpareil average nut set of 4,004 is 1% higher than last year. The average kernel weight for all varieties sampled was 1.67 grams, up 14% from the 2022 average weight. The Nonpareil average kernel weight was 1.69 grams, up 9% from the 2022 average weight. A total of 98.4% of all nuts sized were sound.

SAMPLING PROCEDURES

To determine tree set, nuts are counted along a path within a randomly selected tree. Work begins at the trunk and progresses to the end of the terminal branch. Using a random number table, one branch is selected at each forking to continue the path. A branch's probability of selection is directly proportional to its cross-sectional area. This methodology is used because of its statistical efficiency. The method also makes it possible to end up at any one of the tree's numerous terminal branches.

Since the selected path has a probability of selection associated with it, this probability is used to expand nut counts and arrive at an estimated set for the entire tree.

Along intermediate stages (i.e., the bearing surface between forkings), every fifth nut is picked. All nuts on the terminal branch are picked. These nuts are used to determine size and weight measurements.

The survey began May 31 and sampling was completed by July 3. There were 1,824 trees sampled for the 2023 survey in 912 orchards. Additional orchards were not sampled for one of the following reasons:

1) Orchard had been sprayed.
2) Orchard had been recently irrigated and was wet.
3) Orchard had been pulled.
4) Grower would not grant permission or could not be contacted.

The Objective Measurement Survey is funded by the Almond Board of California.

DATA RELIABILITY

The 80 percent confidence interval is from 2,240 million meat pounds to 2,960 million meat pounds. This means that the results of our sampling procedures will encompass the true mean 80 percent of the time.

TABLE 1: OBJECTIVE MEASUREMENT SURVEY COUNTS; COMPARISON OF NUT ESTIMATES AND ORCHARDS SAMPLED BY COUNTY AND VARIETY, 2022-2023

County and Variety	2022		2023	
	Nuts per tree	Orchards sampled	Nuts per tree	Orchards sampled
STATE LEVEL	4,082	880	3,953	912
BY COUNTY				
Colusa	2,631	44	4,336	39
Fresno	3,929	181	2,946	171
Kern	4,099	134	4,374	158
Madera	2,614	97	3,001	114
Merced	6,780	128	4,686	138
San Joaquin	3,954	44	3,196	39
Stanislaus	3,369	147	4,260	148
Tulare	5,297	38	4,677	38
Other [1]	3,344	67	4,771	67
BY VARIETY				
Butte	4,173	66	4,043	54
Carmel	4,417	38	4,959	39
Independence	4,624	89	4,048	91
Monterey	3,908	177	3,598	178
Nonpareil	3,966	347	4,004	376
Padre	4,928	48	4,055	40
Other [2]	3,763	115	3,856	134

[1] Other includes: Butte, Glenn, Kings, Solano, Tehama, and Yolo.
[2] Other includes: Aldrich, Bennett, Fritz, Mission, Price Cluster, Shasta, Sonora, Supareil, Winters, and Wood Colony.

FIELD SAMPLING ACTIVITIES

TABLE 2: WEIGHT, SIZE AND GRADE OF AVERAGE ALMOND SAMPLE, 2022-2023

| District and variety | Kernel weight (grams) | Kernel size (millimeters) | | | Grade (percent of nuts) [1] | | | | | | |
| | | Length | Width | Thickness | Edible nuts | | Insect damage | Shrivel | Natural gum | Blank | Other |
					Singles	Doubles					
STATE LEVEL											
2022	1.47	22.12	12.69	10.03	94.2	4.5	[2]	1.0	0.1	[2]	0.1
2023	1.67	23.90	13.15	9.92	90.6	7.8	[2]	1.4	0.1	[2]	0.1
BY COUNTY											
Colusa											
2022	1.48	21.93	13.03	9.85	94.0	2.9	[2]	2.8	0.3	[2]	0.1
2023	1.58	22.78	13.70	9.80	92.9	6.0	[2]	1.0	[2]	0.1	[2]
Fresno											
2022	1.43	22.08	12.75	10.04	95.0	3.3	[2]	1.1	0.1	0.2	0.3
2023	1.60	23.56	12.97	9.77	92.7	5.9	[2]	1.3	[2]	[2]	0.1
Kern											
2022	1.31	21.05	12.06	9.77	93.8	4.4	[2]	1.6	[2]	[2]	0.2
2023	1.59	23.43	12.59	9.76	93.0	6.3	[2]	0.6	[2]	0.1	[2]
Madera											
2022	1.47	22.01	12.77	10.18	92.4	6.1	[2]	0.8	0.4	[2]	0.4
2023	1.78	25.17	13.82	10.21	89.8	10.2	[2]	[2]	[2]	[2]	[2]
Merced											
2022	1.46	21.98	12.47	10.13	93.7	6.2	[2]	0.1	[2]	[2]	[2]
2023	1.69	23.83	12.88	10.00	88.3	9.6	[2]	2.0	0.1	[2]	[2]
San Joaquin											
2022	1.63	22.82	13.12	10.19	97.7	1.8	[2]	0.5	0.1	[2]	[2]
2023	1.99	24.70	13.99	10.33	87.3	7.0	[2]	4.4	1.2	[2]	[2]
Stanislaus											
2022	1.56	22.44	12.87	10.24	94.0	4.5	[2]	1.0	0.6	[2]	[2]
2023	1.70	23.85	13.09	9.99	89.0	9.1	[2]	1.5	0.4	[2]	0.1
Tulare											
2022	1.57	23.37	13.16	9.95	92.8	5.6	[2]	1.2	[2]	[2]	0.3
2023	1.67	24.76	13.44	9.88	88.3	8.7	0.4	1.6	[2]	[2]	1.0
Other [3]											
2022	1.58	22.97	13.55	9.66	95.8	1.9	0.1	2.0	0.1	[2]	0.1
2023	1.68	23.94	13.73	9.71	92.7	5.2	[2]	2.0	[2]	[2]	[2]
BY VARIETY											
Butte											
2022	1.13	18.20	11.79	9.92	95.8	2.8	[2]	1.1	0.1	[2]	0.2
2023	1.36	20.33	12.16	9.99	89.0	9.8	[2]	0.8	0.2	0.2	[2]
Carmel											
2022	1.47	22.17	12.20	10.16	88.4	9.9	[2]	1.6	0.1	[2]	[2]
2023	1.72	25.31	12.41	10.13	83.0	15.2	[2]	1.7	0.1	[2]	[2]
Independence											
2022	1.68	24.00	13.47	10.17	97.5	1.0	[2]	1.0	0.1	[2]	0.4
2023	1.88	25.32	13.93	10.05	93.3	4.6	[2]	1.6	0.3	[2]	0.2
Monterey											
2022	1.55	23.74	12.30	10.18	88.6	10.3	[2]	0.7	0.1	0.1	0.3
2023	1.82	25.75	12.95	10.25	81.0	17.9	[2]	0.8	0.2	[2]	[2]
Nonpareil											
2022	1.55	22.61	13.33	9.99	95.9	3.0	[2]	1.0	0.1	[2]	[2]
2023	1.69	23.85	13.59	9.78	94.0	4.0	[2]	1.8	0.1	[2]	0.1
Padre											
2022	1.10	18.28	11.51	9.90	96.9	2.0	[2]	0.9	[2]	[2]	0.2
2023	1.21	19.66	11.73	9.56	95.8	2.7	[2]	1.5	[2]	[2]	[2]
Other [4]											
2022	1.33	21.02	12.04	9.85	94.4	3.8	[2]	1.1	0.4	0.2	0.1
2023	1.54	23.00	12.66	9.80	93.0	6.0	[2]	0.8	0.2	[2]	[2]

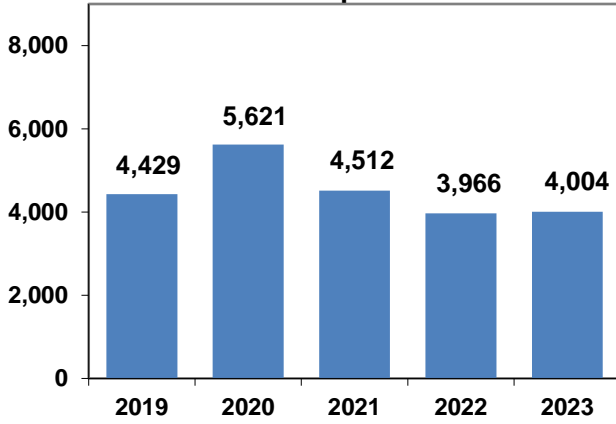[1] Percentages may not add to 100 due to rounding.
[2] Not shown if less than 0.05 percent.
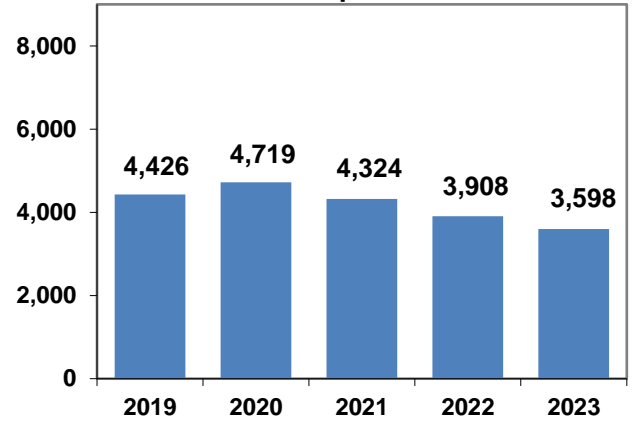[3] Other includes: Butte, Glenn, Kings, Solano, Tehama, and Yolo.
[4] Other includes: Aldrich, Bennett, Fritz, Mission, Price Cluster, Shasta, Sonora, Supareil, Winters, and Wood Colony.
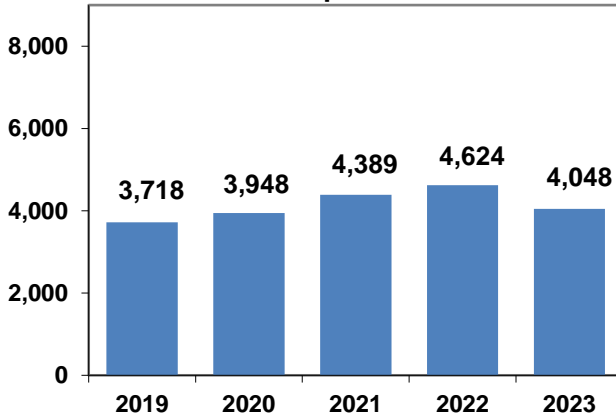
ALMONDS NUT SET BY VARIETY

NONPAREIL TYPE
Nuts per Tree

Year	Nuts per Tree
2019	4,429
2020	5,621
2021	4,512
2022	3,966
2023	4,004

MONTEREY TYPE
Nuts per Tree

Year	Nuts per Tree
2019	4,426
2020	4,719
2021	4,324
2022	3,908
2023	3,598

INDEPENDENCE TYPE
Nuts per Tree

Year	Nuts per Tree
2019	3,718
2020	3,948
2021	4,389
2022	4,624
2023	4,048

BUTTE TYPE
Nuts per Tree

Year	Nuts per Tree
2019	5,261
2020	5,923
2021	4,793
2022	4,173
2023	4,043
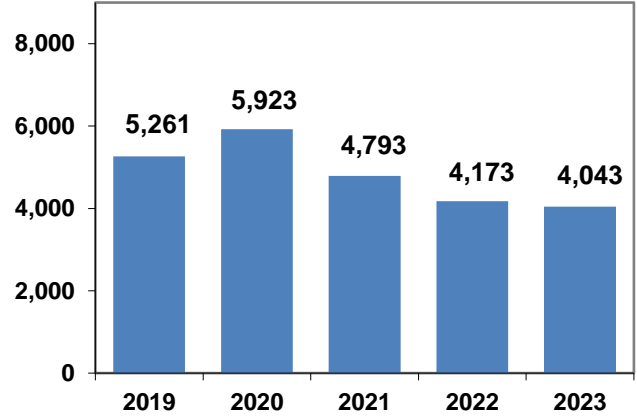
ALMONDS
NUTS PER TREE, BY COUNTY & STATE

■ Colusa ■ Fresno ■ Kern ■ Madera ■ Merced ■ San Joaquin ■ Stanislaus ■ Tulare ■ State

2022: Colusa 2,631; Fresno 3,929; Kern 4,099; Madera 2,614; Merced 6,780; San Joaquin 3,954; Stanislaus 3,369; Tulare 5,297; State 4,082

2023: Colusa 4,336; Fresno 2,946; Kern 4,374; Madera 3,001; Merced 4,686; San Joaquin 3,196; Stanislaus 4,260; Tulare 4,677; State 3,953
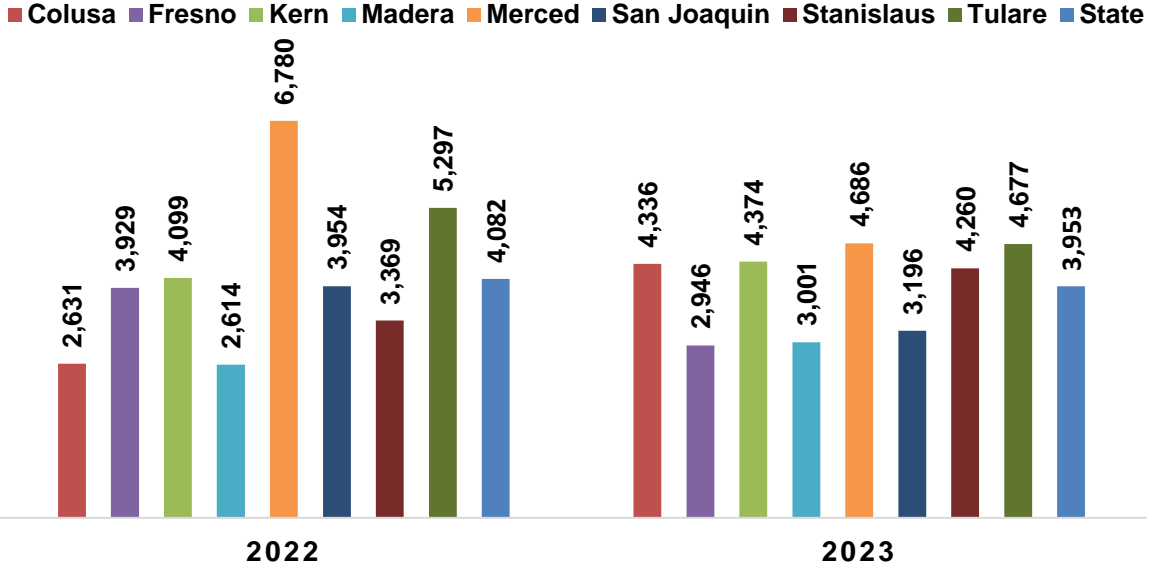
TABLE 3: CALIFORNIA ALMOND ACREAGE, PRODUCTION AND TREES PER ACRE, 1991-2023

Year	Bearing acres [1]	Trees per acre	Total Meat Production			Price per lb.	Value of production
			Metric Tons [2]	Million lbs.	Lbs. per acre	dollars	1,000 dollars
1991	405,000	89.6	222,000	490	1,210	1.19	564,179
1992	401,000	90.5	249,000	548	1,370	1.30	691,340
1993	413,000	92.0	222,000	490	1,190	1.94	930,618
1994	433,000	92.6	333,000	735	1,700	1.34	965,202
1995	418,000	93.7	168,000	370	885	2.48	880,896
1996	428,000	94.4	231,000	510	1,190	2.08	1,018,368
1997	442,000	95.5	344,000	759	1,720	1.56	1,160,640
1998	460,000	96.3	236,000	520	1,130	1.41	703,590
1999	485,000	97.3	378,000	833	1,720	0.86	687,742
2000	510,000	99.0	319,000	703	1,380	0.97	666,487
2001	530,000	101.0	376,000	830	1,570	0.91	740,012
2002	545,000	101.0	494,000	1,090	2,000	1.11	1,200,687
2003	550,000	103.0	472,000	1,040	1,890	1.57	1,600,144
2004	570,000	103.0	456,000	1,005	1,760	2.21	2,189,005
2005	590,000	104.0	415,000	915	1,550	2.81	2,525,909
2006	610,000	105.0	508,000	1,120	1,840	2.06	2,258,790
2007	640,000	105.0	630,000	1,390	2,170	1.75	2,401,875
2008	710,000	107.0	739,000	1,630	2,300	1.45	2,343,200
2009	750,000	108.0	640,000	1,410	1,880	1.65	2,293,500
2010	770,000	108.0	744,000	1,640	2,130	1.79	2,903,380
2011	800,000	111.0	921,000	2,030	2,540	1.99	4,007,860
2012	820,000	112.0	857,000	1,890	2,300	2.58	4,816,860
2013	880,000	112.0	912,000	2,010	2,280	3.21	6,384,690
2014	930,000	114.0	848,000	1,870	2,010	4.00	7,388,000
2015	950,000	114.0	862,000	1,900	2,000	3.13	5,868,750
2016	970,000	116.0	971,000	2,140	2,210	2.39	5,052,460
2017	1,030,000	117.0	1,030,000	2,270	2,200	2.53	5,603,950
2018	1,090,000	119.0	1,034,000	2,280	2,090	2.50	5,602,500

Year							
2019	1,180,000	122.0	1,161,000	2,560	2,170	2.45	6,169,100
2020	1,250,000	122.0	1,413,000	3,115	2,490	1.71	5,251,410
2021	1,320,000	122.0	1,329,000	2,930	2,220	1.86	5,341,920
2022	1,350,000	122.5	1,163,000	2,565	1,900	1.40	3,515,400
2023 [3][4]	1,380,000	124.7	1,179,000	2,600	1,880	—	—

[1] Bearing acreage is defined as plantings four years and older.
[2] Rounded to nearest thousand, metric ton = 2,204.62 pounds.
[3] Price and value will be available in the annual Noncitrus Fruits & Nuts publication, released in May 2024.
[4] Preliminary estimate of bearing acres is based on the Almond Acreage Report and the Almond Nursery Sales Survey.
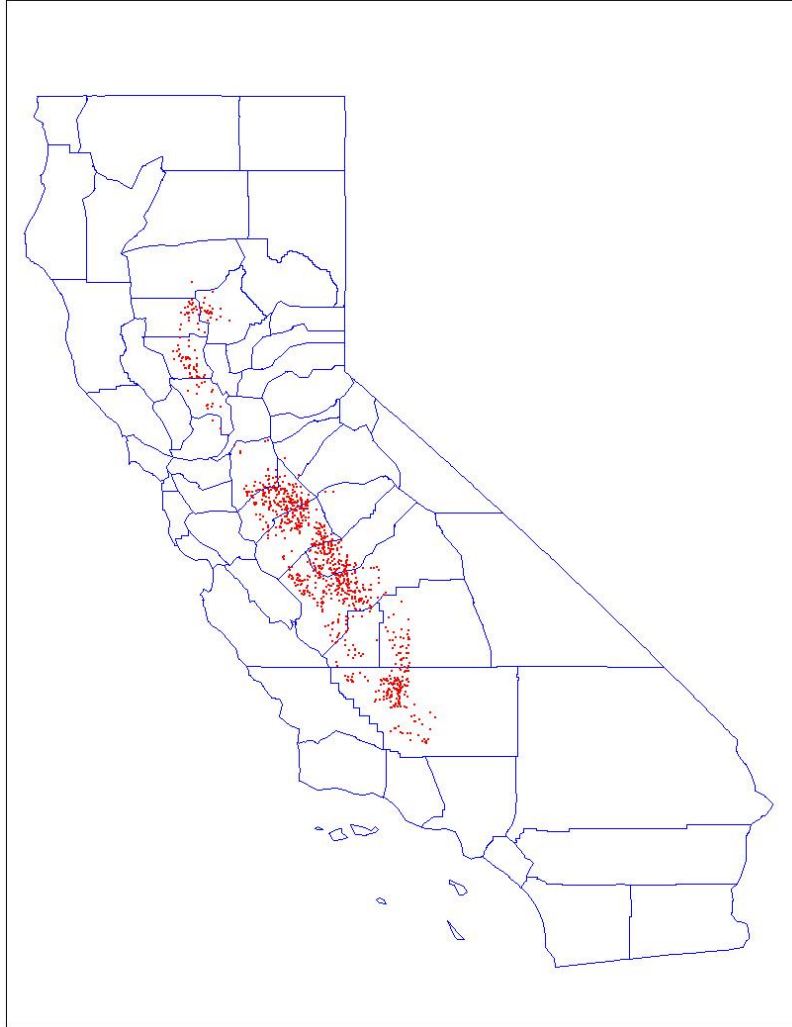
2023 ALMOND OM SAMPLE DISTRIBUTION

TABLE 4: 2023 ALMOND OM SAMPLE DISTRIBUTION BY COUNTY AND VARIETY

	Butte	Carmel	Independence	Monterey	Nonpareil	Padre	Other[1]	Total
Butte	0	0	0	1	15	0	0	**16**
Colusa	5	0	0	5	22	1	6	**39**
Fresno	10	0	23	35	61	9	33	**171**
Glenn	0	0	0	0	23	0	0	**23**
Kern	13	1	7	43	61	5	28	**158**
Kings	0	0	2	4	5	0	1	**12**
Madera	5	1	8	31	46	6	17	**114**
Merced	10	13	17	25	45	11	17	**138**
San Joaquin	2	2	8	0	24	0	3	**39**
Solano	0	0	2	0	1	0	0	**3**
Stanislaus	8	22	21	19	44	8	26	**148**
Tehama	0	0	0	0	2	0	0	**2**
Tulare	1	0	3	13	20	0	1	**38**
Yolo	0	0	0	2	7	0	2	**11**
Total	**54**	**39**	**91**	**178**	**376**	**40**	**134**	**912**

[1] Other includes Aldrich, Bennett, Fritz, Mission, Price Cluster, Shasta, Sonora, Supareil, Winters, and Wood Colony.