United States Department of Agriculture
National Agricultural Statistics Service

2021 California Walnut Objective Measurement Report

Pacific Regional Office · P.O. Box 1258 · Sacramento, CA 95812 · (916) 738-6600 · www.nass.usda.gov/ca

Released: September 1, 2021 - 12:00 p.m. PDT

WALNUT PRODUCTION FORECAST DOWN

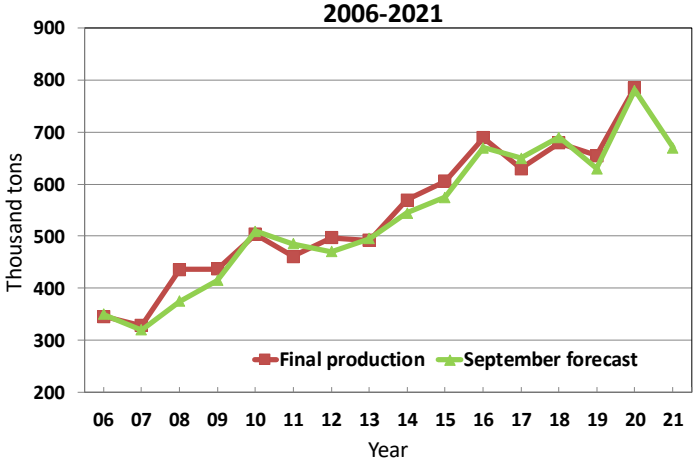
The 2021 California walnut production is forecast at 670,000 tons, down 15% from 2020's record production of 785,000 tons. The forecast is based on 385,000 bearing acres, up 1% from 2020's estimated bearing acreage of 380,000.

Widespread freezing temperatures in late fall of 2020 resulted in frost damage to walnut orchards across the state. Growers reported the frost damage delayed leaf out and reduced nut set in affected orchards. Additionally, because of the state's drought conditions, orchards experienced a higher degree of freeze injury. Walnut growers throughout the state struggled with drought conditions and water availability, as most of the state is in a drought emergency. Chilling hours were up from last year.

Survey data indicated an average nut set per tree of 992, down 17% from 2020's average of 1,197. Percent of sound kernels in-shell was 99.5% statewide. In-shell weight per nut was 22.2 grams, while the average in-shell suture measurement was 32.4 millimeters. The in-shell cross-width measurement was 33.4 and the average length in-shell was 37.9 millimeters.

Estimated nut sets, sizing measurements, average number of trees per acre, and estimated bearing acreage were used in the statistical models.

CALIFORNIA WALNUTS
Sept. Objective Forecast vs. Final Production
2006-2021



SURVEY HISTORY

The Walnut O.M. Survey began in 1958 to fulfill industry needs for an accurate walnut production forecast prior to harvest. The original sample was chosen proportionally to county and variety of bearing acreage. With each succeeding year, additions and deletions have been made in the sample to adjust for acreage removed, new bearing acreage, and operations that choose not to participate in the survey.

SAMPLING PROCEDURES

The 2021 Walnut Objective Measurement (O.M.) Survey was officially conducted from July 25 through August 26, 2021. There were a few samples completed before July 25th for training and scheduling purposes. There were 1,402 trees sampled from 701 orchards.

Once a block is randomly selected and permission is granted by the operation for enumerators to enter the block, two trees are randomly selected. An accessible branch is chosen which is 5-15 percent of the total cross-sectional area of the primary limbs and reachable with a twelve-foot ladder. Measurements are made on the trunk, each primary, and each split leading to and including the accessible branch. The sample tree and accessible branch are marked by a single tag, so that the same trees are sampled the following year if that orchard is selected. On the accessible branch, every nut is counted and the first of every five nuts is picked for use in size and grade determinations. If available, at least ten nuts are harvested from the accessible branch for this purpose.

The following measurements are made on nuts selected for sizing:

1. Weight of nut including hull
2. Width of shell at suture
3. Width of shell 90 degrees to suture line (cross-suture)
4. Length of shell
5. Kernel grade
6. Weight of nut in-shell

The Objective Measurement Survey is funded by the California Walnut Board.

DATA RELIABILITY

The 80 percent confidence interval is from 610,000 tons to 730,000 tons.

California English Walnut Acreage, Production, Price And Value In-Shell

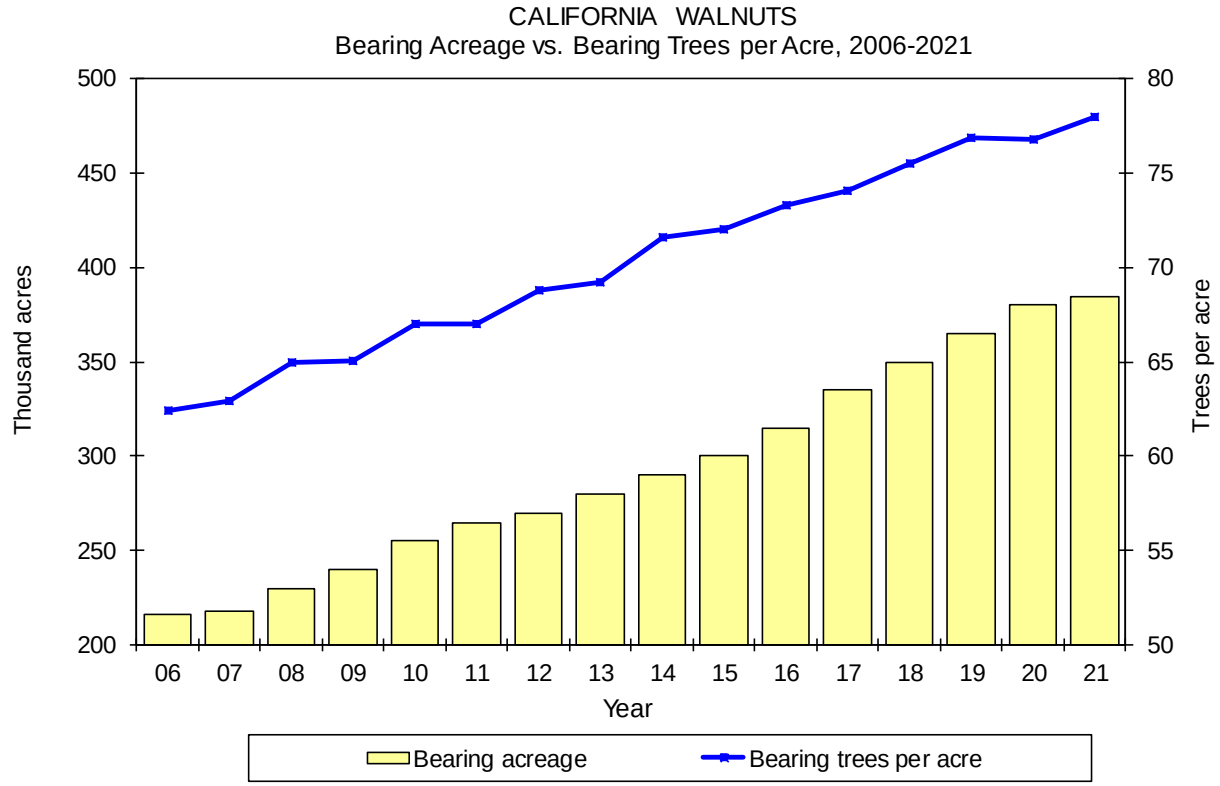
Year	Bearing acres	Trees per acre	Per bearing acre	Total production	Price per ton	Total value
			Tons		*Dollars*	*1,000 Dollars*
2002	210,000	56.5	1.34	282,000	1,170	329,940
2003	213,000	57.7	1.53	326,000	1,160	378,160
2004	214,000	60.3	1.52	325,000	1,390	451,750
2005	215,000	61.1	1.65	355,000	1,570	557,350
2006	216,000	62.4	1.60	346,000	1,630	563,980
2007	218,000	62.9	1.50	328,000	2,290	751,120
2008	230,000	65.0	1.90	436,000	1,280	558,080
2009	240,000	65.1	1.82	437,000	1,710	747,270
2010	255,000	67.0	1.98	504,000	2,040	1,028,160
2011	265,000	67.0	1.74	461,000	2,900	1,336,900
2012	270,000	68.6	1.84	497,000	3,030	1,505,910
2013	280,000	69.2	1.76	492,000	3,710	1,825,320
2014	290,000	71.6	1.97	571,000	3,340	1,907,140
2015	300,000	72.0	2.02	606,000	1,670	1,012,020
2016	315,000	73.3	2.19	689,000	1,850	1,274,650
2017	335,000	74.1	1.88	630,000	2,490	1,568,700
2018	350,000	75.5	1.94	679,000	1,350	916,650
2019	365,000	76.9	1.79	655,000	1,890	1,237,950
2020 [1]	380,000	76.8	2.07	785,000	1,220	957,700
2021 [2 3]	385,000	78.0	1.74	670,000	NA	NA

[1] Price per ton and total value are May 2021 preliminary data.

[2] Bearing years include plantings of the following: Chandler, Chico, Howard, Tulare (2017 & Earlier); 50-55, 59-124, 4946, Amigo, Ashley, Bardoni, Cisco, Earhorn, Grove, Gustine, Honeycutt, Houston, Jensen, Lompoc, Marchetti, Nuggett, Payne, Pedro, Serr, Sunland, Tehama, Trinta, UCD 67-13, Vina, Westside (2016 and Earlier); Franquette, Franquette Scharsch, Mayette, Placentia, Poe, Willsons/Willsons Wonder, Woodland (2014 & Earlier); all other varieties not specified (2015 & Earlier).

[3] Price per ton and total value preliminary data will be released May 2022.

NA Not Available



Walnut Objective Measurement Survey Date, By District

Measurement	Year	Coast [1]	Sacramento Valley [2]	San Joaquin Valley [3]	State [4]
In-Shell Weight (gm)	2012	17.6	23.7	19.8	22.1
	2013	19.5	24.9	20.8	23.3
	2014	17.2	22.6	19.2	21.2
	2015	19.6	24.0	20.8	22.7
	2016	19.2	22.7	19.5	21.6
	2017	20.2	24.0	22.4	23.4
	2018	20.7	23.7	20.5	22.3
	2019	23.0	23.8	21.2	22.7
	2020	20.6	23.5	20.0	22.0
	2021	26.9	22.9	21.4	22.2
In-Shell Width (mm)	2012	30.5	32.3	32.0	32.1
	2013	31.3	33.3	32.8	33.1
	2014	30.6	32.8	32.2	32.5
	2015	31.6	33.0	32.6	32.8
	2016	31.3	32.1	32.3	32.2
	2017	31.3	32.5	33.3	32.7
	2018	31.7	32.0	32.9	32.3
	2019	32.1	31.9	32.7	32.3
	2020	30.9	32.0	32.4	32.2
	2021	31.9	32.1	32.8	32.4
In-Shell Cross-Width (mm)	2012	30.5	32.9	32.3	32.6
	2013	30.6	33.0	33.4	33.1
	2014	30.7	32.3	32.7	32.4
	2015	31.9	32.7	33.0	32.8
	2016	31.4	32.8	32.7	32.7
	2017	31.1	33.1	33.9	33.3
	2018	31.9	32.9	33.4	33.1
	2019	32.6	33.0	33.4	33.2
	2020	31.2	33.4	33.1	33.2
	2021	32.9	33.3	33.6	33.4
In-Shell Length (mm)	2012	36.9	38.7	38.4	38.5
	2013	37.8	39.1	38.8	39.0
	2014	36.6	38.1	38.1	38.1
	2015	38.4	38.6	38.4	38.5
	2016	37.9	38.1	38.4	38.2
	2017	38.4	38.2	39.4	38.6
	2018	37.9	37.8	38.5	38.1
	2019	39.7	38.6	39.0	38.8
	2020	37.8	38.7	38.5	38.6
	2021	36.0	37.3	38.5	37.9
Kernel Grade - Percent Sound	2012	97.2	97.5	99.1	98.0
	2013	97.9	98.8	99.0	98.8
	2014	99.0	98.5	99.0	98.7
	2015	99.0	97.8	99.6	98.5
	2016	93.4	98.4	99.5	98.7
	2017	97.2	97.5	99.4	98.1
	2018	98.0	98.9	98.7	98.8
	2019	97.9	98.6	99.2	98.9
	2020	91.8	98.4	98.8	98.5
	2021	100.0	99.5	99.4	99.5
Nuts Set Per Tree	2012	1,461	1,582	1,120	1,375
	2013	857	1,402	1,050	1,239
	2014	1,021	1,509	1,214	1,372
	2015	851	1,355	1,164	1,272
	2016	950	1,561	1,215	1,406
	2017	879	1,302	938	1,141
	2018	1,055	1,166	1,196	1,176
	2019	808	935	1,056	983
	2020	847	1,199	1,203	1,197
	2021	645	949	1,052	992

[1] Coast includes: Contra Costa, Lake, Monterey, Napa, San Benito, San Luis Obispo, Santa Clara, and Sonoma counties.

[2] Sacramento Valley includes: Butte, Colusa, El Dorado, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo, and Yuba counties.

[3] San Joaquin Valley includes: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties.

[4] District and State averages are derived by weighting county averages by county bearing acreage figures.

Walnut Objective Measurement Survey Date, By Variety

Measurement	Year	Ashley [1]	Chandler	Eureka [2]	Franquette [2]	Hartley	Howard	Payne [2]	Serr	Tehama [1]	Tulare	Vina	Other
In-Shell Weight (gm)	2012	18.6	22.8	20.8	18.9	23.6	23.2	18.3	18.3	20.7	21.4	19.9	20.5
	2013	21.4	23.8	22.7	21.6	24.3	25.3	18.9	17.8	20.6	22.6	21.4	18.5
	2014	17.8	21.8	20.7	19.8	22.8	22.2	21.2	16.1	14.6	20.5	19.2	20.5
	2015	19.9	23.2	20.4	20.5	24.7	23.8	19.3	18.0	18.5	22.5	20.1	22.3
	2016	17.8	21.9	21.2	20.8	23.1	22.2	19.9	17.1	18.7	20.5	19.6	18.8
	2017	22.5	23.6	21.9	19.6	25.6	22.6	18.6	18.7	20.5	23.2	22.1	19.0
	2018	---	22.6	20.1	20.9	24.4	22.7	21.7	19.2	---	21.0	20.8	17.0
	2019	---	22.4	22.9	22.1	24.5	23.7	22.1	19.6	---	22.3	22.1	19.4
	2020	---	22.4	21.7	21.2	24.2	22.4	22.5	16.1	---	20.5	19.0	18.3
	2021	---	22.5	---	---	22.9	22.5	---	18.3	---	20.9	21.7	19.4
In-Shell Width (mm)	2012	31.7	32.0	30.1	29.9	32.7	31.7	32.0	32.4	32.3	33.3	30.5	31.1
	2013	32.8	32.8	31.9	31.3	33.5	33.4	33.1	33.4	33.0	34.8	31.8	30.5
	2014	31.6	32.4	31.1	31.1	33.3	32.6	32.2	32.1	31.2	33.7	31.1	31.6
	2015	32.1	32.6	31.1	31.6	33.5	32.9	32.9	32.8	31.7	34.3	31.3	32.5
	2016	31.9	31.9	31.8	31.0	33.2	31.4	33.3	32.6	32.7	33.6	31.2	31.1
	2017	32.2	32.6	31.7	30.3	33.2	31.9	32.2	33.2	33.3	34.8	32.1	30.9
	2018	---	32.1	31.0	30.7	32.9	31.3	34.0	33.5	---	34.1	30.5	30.2
	2019	---	31.8	33.6	30.8	32.9	31.8	33.1	33.6	---	34.5	32.7	31.9
	2020	---	32.0	31.7	31.9	32.9	31.5	32.5	32.1	---	33.6	30.4	31.1
	2021	---	32.1	---	---	32.7	31.7	---	33.4	---	34.1	32.3	33.0
In-Shell Cross-Width (mm)	2012	31.3	32.9	31.2	30.6	32.6	33.2	31.9	31.7	32.1	33.3	31.2	31.9
	2013	32.4	33.0	33.0	31.0	33.0	33.6	33.5	32.8	32.6	34.8	32.4	30.8
	2014	31.0	32.4	32.2	30.9	33.0	32.3	32.5	31.5	30.2	33.9	31.8	30.7
	2015	32.2	32.7	32.1	31.5	33.5	32.6	33.0	32.4	31.3	34.3	32.0	32.5
	2016	31.7	32.8	31.8	31.6	33.0	33.0	32.7	31.7	32.2	33.5	32.0	32.4
	2017	33.0	33.4	32.0	31.1	33.5	32.8	32.8	32.2	32.6	34.9	33.0	32.1
	2018	---	33.1	31.3	31.2	33.0	33.0	34.1	32.9	---	34.1	31.6	31.6
	2019	---	32.9	34.1	31.4	33.1	33.8	33.9	33.0	---	34.6	33.6	33.4
	2020	---	33.3	33.4	32.3	33.2	33.5	33.4	31.2	---	33.8	31.5	32.8
	2021	---	33.3	---	---	32.9	33.5	---	33.0	---	34.4	33.1	34.0
In-Shell Length (mm)	2012	37.3	38.6	45.0	36.7	39.4	37.2	38.7	37.6	37.8	38.8	38.0	39.4
	2013	37.0	39.3	42.2	38.5	39.8	37.6	38.4	37.1	37.3	39.0	38.2	37.5
	2014	36.7	38.2	42.6	37.1	39.3	36.7	40.4	36.5	36.3	38.1	37.7	37.1
	2015	36.9	38.9	41.6	36.9	39.5	37.3	39.0	36.0	35.7	38.4	37.8	40.2
	2016	37.1	38.3	42.9	37.6	39.2	36.4	40.7	36.8	37.3	38.3	38.1	38.4
	2017	38.7	38.7	41.3	37.2	40.1	36.0	39.7	37.0	37.3	39.2	39.0	37.0
	2018	---	38.5	41.6	36.9	38.9	36.0	41.0	37.4	---	37.8	37.5	35.8
	2019	---	38.9	41.2	38.1	39.9	36.7	41.6	37.9	---	39.3	39.6	37.7
	2020	---	38.9	40.0	38.2	40.1	36.6	40.2	36.4	---	38.9	37.4	38.0
	2021	---	37.9	---	---	38.8	36.2	---	37.5	---	37.9	38.7	39.0
Kernel Grade - Percent Sound	2012	94.6	98.8	100.0	96.9	97.6	97.0	94.9	96.9	98.7	98.3	98.0	97.3
	2013	95.4	99.4	99.9	98.9	98.7	98.4	95.7	97.8	99.3	98.5	99.0	98.1
	2014	99.2	98.8	99.8	99.7	98.6	98.2	93.5	98.1	99.3	98.9	99.3	98.9
	2015	95.7	99.1	100.0	96.3	97.1	98.4	100.0	97.7	96.7	99.1	99.1	97.7
	2016	94.1	99.4	98.8	97.0	97.4	98.6	98.3	98.1	99.9	99.0	99.7	92.2
	2017	97.2	98.5	97.4	95.7	97.5	98.3	97.7	97.7	91.5	98.3	98.0	94.2
	2018	---	99.0	90.2	99.9	99.1	99.3	97.3	98.7	---	98.1	98.6	93.7
	2019	---	98.8	100.0	99.8	98.8	98.2	98.0	99.8	---	99.5	99.9	98.7
	2020	---	98.4	87.9	95.0	98.5	98.9	100.0	99.3	---	99.3	97.5	98.7
	2021	---	99.8	---	---	99.0	99.1	---	95.6	---	98.9	100.0	99.0
Nuts Set Per Tree	2012	1,535	1,344	1,373	1,710	1,750	1,020	1,175	1,298	1,627	1,239	1,195	1,532
	2013	1,966	1,229	1,786	832	1,525	1,192	1,032	1,089	1,312	908	1,196	1,056
	2014	2,380	1,338	1,274	2,360	1,615	1,137	2,165	1,399	2,864	1,054	1,313	888
	2015	2,082	1,263	1,580	2,673	1,537	994	1,613	1,431	911	1,048	1,062	977
	2016	1,781	1,446	996	3,332	1,806	1,070	1,510	1,292	1,136	1,076	1,262	1,052
	2017	1,543	1,194	947	2,048	1,491	1,032	724	993	486	748	774	1,123
	2018	---	1,125	1,602	1,564	1,551	960	972	1,310	---	1,180	1,182	1,762
	2019	---	1,071	1,052	1,284	1,077	719	804	659	---	837	970	1,273
	2020	---	1,174	1,139	1,779	1,472	1,009	1,272	1,594	---	1,077	1,380	1,588
	2021	---	988	---	---	1,272	838	---	847	---	972	1,056	1,157

[1] Beginning in 2018, the Ashley and Tehama varieties were included in "Other" and not published separately.

[2] Beginning in 2021, the Eureka, Franquette, and Payne varieties were included in "Other" and not published separately.

Percentage Distribution of Walnut Shell Suture Size, by District, and Variety

District and Variety	U.S. Standards Size Intervals [1]																											
	2017						2018						2019						2020						2021			
	Mth	Jmb	Lge	Med	Bby	Oth	Mth	Jmb	Lge	Med	Bby	Oth	Mth	Jmb	Lge	Med	Bby	Oth	Mth	Jmb	Lge	Med	Bby	Oth	Mth	Jmb	Lge	Med	Bby	Oth
	- - - - - - - - - - - - - - - Percent of Total [2] - - - - - - - - - - - - - - -																											
DISTRICTS:																												
Coast	0	43	21	16	19	1	0	50	19	21	10	0	0	60	17	17	6	0	0	39	24	20	15	2	0	64	12	15	8	0
Sacramento Vly.	1	65	16	11	8	0	0	57	20	14	8	1	0	55	20	16	8	1	0	59	21	14	5	0	0	57	21	15	7	0
San Joaquin Vly.	1	77	13	7	1	0	1	69	18	9	3	0	2	65	18	12	4	0	0	62	19	15	4	0	1	71	15	10	3	0
VARIETIES:																												
Ashley [3]	2	55	22	11	10	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chandler	0	68	16	10	5	0	0	60	22	13	5	0	0	53	23	17	7	0	0	58	23	15	4	0	0	59	20	14	6	0
Eureka [4]	0	50	30	8	12	1	0	28	28	32	12	0	0	72	18	11	0	0	3	54	18	9	15	0	--	--	--	--	--	--
Franquette [4]	0	26	20	29	25	0	0	29	19	35	16	1	0	42	18	17	18	5	0	58	24	15	3	0	--	--	--	--	--	--
Hartley	0	79	11	7	3	0	0	71	16	9	4	0	0	74	14	8	4	0	0	76	15	6	2	0	0	72	16	9	3	0
Howard	1	56	17	12	13	1	0	45	23	17	13	1	0	55	18	15	10	1	0	47	24	21	8	0	0	48	23	18	11	0
Payne [4]	0	58	18	21	3	0	0	91	7	1	1	0	0	77	18	4	0	0	0	83	13	4	0	0	--	--	--	--	--	--
Serr	1	77	14	5	2	0	1	82	12	4	2	0	3	77	11	8	2	0	1	61	13	14	11	1	0	77	10	8	5	0
Tehama [3]	0	84	7	5	5	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tulare	5	84	5	3	2	0	3	83	8	5	2	0	5	83	7	3	2	0	1	79	9	8	2	0	3	84	7	5	1	0
Vina	0	57	24	10	7	1	0	39	21	19	15	6	0	73	17	7	3	0	0	21	21	46	12	0	0	54	28	12	5	0
Other	0	37	18	20	24	1	0	25	12	33	30	0	1	49	23	21	6	0	0	42	20	25	12	0	1	77	13	6	3	0
STATE	1	69	15	10	6	0	1	62	19	12	6	0	1	60	19	14	6	0	0	60	20	15	5	0	1	63	18	13	5	0
Number of Shells Measured	14,369						14,336						13,775						14,319						13,539			

[1] Sizes used are as follows: Mammoth -- Larger than 96/64" in diameter; Jumbo -- 80/64" to 96/64"; Large -- 76/64" to 80/64" for Eureka variety, 77/64" to 80/64" for all other varieties; Medium -- 73/64" to 76/64" for Eureka, 73/64" to 77/64" for all others; Baby -- 60/64" to 73/64"; and Others -- below 60/64".

[2] Percentage distributions based upon nut samples taken in the field, may not equal 100 percent due to rounding.

[3] Beginning in 2018, the Ashley and Tehama varieties were included in "Other" and not published separately.

[4] Beginning in 2021, the Eureka, Franquette, and Payne varieties were included in "Other" and not published separately.

The California Walnut Industry has been very supportive. We appreciate your continued cooperation!

For more California agricultural statistics, visit www.nass.usda.gov/ca