



# 2016 California Walnut Objective Measurement Report

Cooperating with the California Department of Food and Agriculture

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## RECORD WALNUT PRODUCTION FORECAST

The 2016 California walnut production is forecast at 670,000 tons, up 11 percent from 2015's production of 603,000 tons. This forecast is based on the 2016 Walnut Objective Measurement (O.M.) Survey, which was officially conducted August 1 through August 23, 2016. There were a few samples completed before August 1 for training and scheduling purposes.

The 2016 walnut season began well with adequate chilling hours and a fair amount of winter rains. Weather during bloom was considered average, with some ideal days and some days of stronger winds and wet weather. Spring rain increased the threat of blight. Hot weather in August resulted in an earlier than usual start to harvest, which is expected to begin in early September.

The 2016 Walnut O.M. Survey utilized a total of 729 blocks with two sample trees per block. Survey data indicated an average nut set of 1,406 per tree, up 11 percent from 2015's average of 1,272. Percent of sound kernels in-shell was 98.7 percent Statewide. In-shell weight per nut was 21.6 grams, while the average in-shell suture measurement was 32.2 millimeters. The in-shell cross-width measurement was 32.7 and the average length in-shell was 38.2 millimeters. All of the sizing measurements were below average levels since 1985.

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

## 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

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.

On the accessible branch, every first of 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

## DATA RELIABILITY

The 80 percent confidence interval is from 612,000 tons to 728,000 tons.



**California Walnut Acreage, Production, Price, and Value In-Shell: 1997-2016**

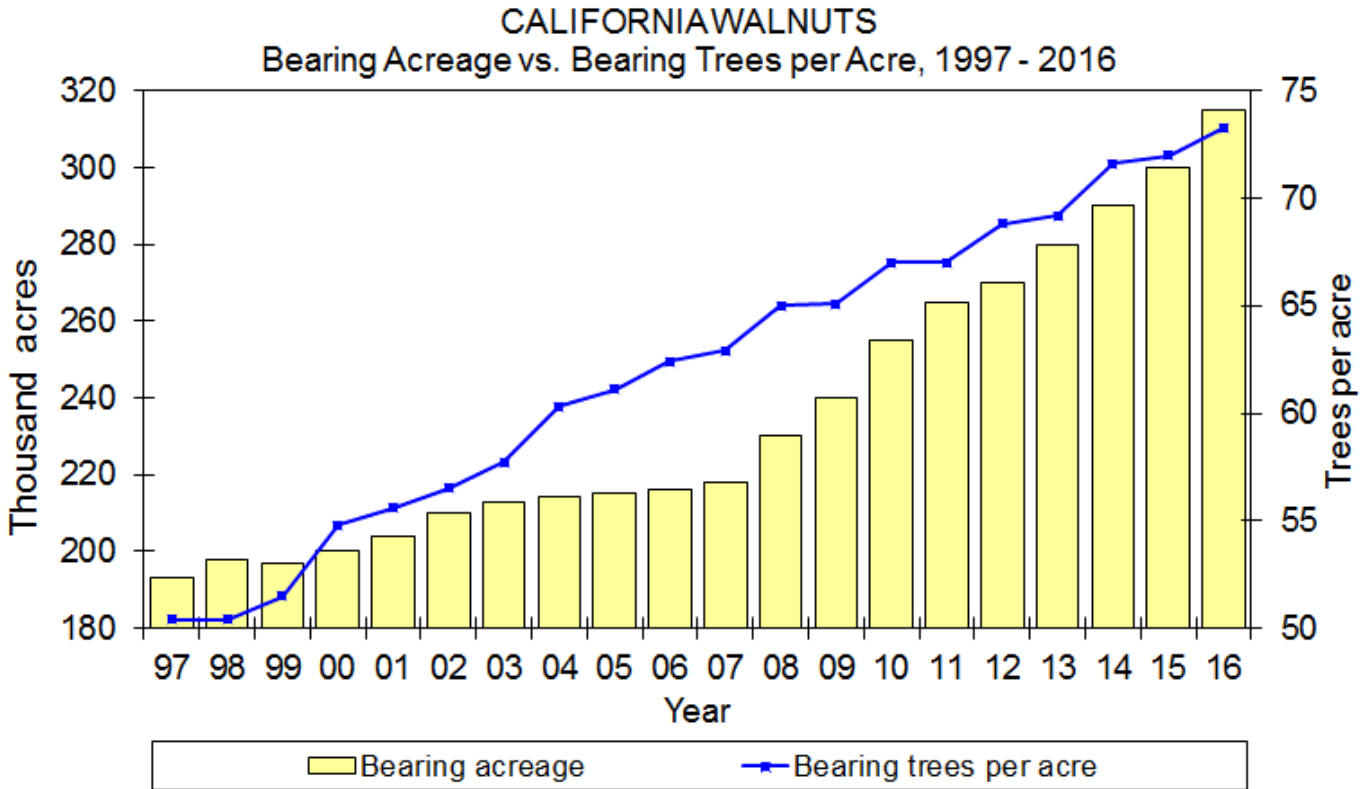
Year	Bearing acres	Trees per acre	Per bearing acre	Total production	Price per ton	Total value	
			<i>Tons</i>		<i>Dollars</i>		
							<i>1,000 Dollars</i>
1997	193,000	50.4	1.39	269,000	1,430	384,670	
1998	198,000	50.4	1.15	227,000	1,050	238,350	
1999	197,000	51.5	1.44	283,000	886	250,738	
2000	200,000	54.8	1.20	239,000	1,240	296,360	
2001	204,000	55.6	1.50	305,000	1,120	341,600	
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 <sup>1</sup>	300,000	72.0	2.01	603,000	1,620	976,860	
2016 <sup>2,3</sup>	315,000	73.3	2.13	670,000	(NA)	(NA)	

<sup>1</sup> Price per ton and Total value are July 2016 preliminary data.

<sup>2</sup> Bearing years include plantings of the following: Chandler, Chico, Howard, Tulare (2012 & 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 (2011 and Earlier); Franquette, Franquette Scharsch, Mayette, Placentia, Poe, Willsons/Willsons Wonder, Woodland (2009 & Earlier); all other varieties not specified (2010 & Earlier).

<sup>3</sup> Price per ton and Total value preliminary data will be released July 2017.

NA Not Available



**Walnut Objective Measurement Survey Data, by District: 2007-2016**

Measurement	Year	Coast <sup>1</sup>	Sacramento Valley <sup>2</sup>	San Joaquin Valley <sup>3</sup>	State <sup>4</sup>
In-Shell Weight (gm)	2007	19.1	21.4	18.7	20.3
	2008	20.0	23.5	20.7	22.2
	2009	17.0	23.1	20.6	22.0
	2010	20.8	22.5	19.3	21.3
	2011	20.6	25.1	21.3	23.6
	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
In-Shell Width (mm)	2007	31.6	31.5	32.4	31.9
	2008	31.4	32.7	32.6	32.6
	2009	29.8	32.5	32.9	32.5
	2010	32.1	32.1	32.1	32.1
	2011	31.6	32.8	32.6	32.7
	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
In-Shell Cross-Width (mm)	2007	31.6	32.5	32.9	32.6
	2008	31.4	33.2	32.6	32.9
	2009	29.9	33.1	33.1	33.0
	2010	31.6	32.2	32.0	32.1
	2011	31.3	33.3	32.9	33.1
	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
In-Shell Length (mm)	2007	37.4	37.3	38.1	37.6
	2008	39.2	39.5	39.1	39.3
	2009	36.9	39.6	39.1	39.3
	2010	39.8	38.4	38.7	38.5
	2011	39.0	39.4	39.3	39.4
	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
Kernel Grade - Percent Sound	2007	97.8	97.9	99.2	98.4
	2008	96.4	98.6	97.3	98.0
	2009	94.9	97.0	99.6	97.9
	2010	98.9	97.8	97.8	97.8
	2011	99.4	98.2	99.6	98.7
	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
Nuts Set Per Tree	2007	1,221	1,548	1,162	1,357
	2008	973	1,592	1,270	1,416
	2009	1,531	1,758	1,250	1,523
	2010	1,263	2,047	1,313	1,690
	2011	1,594	1,606	1,119	1,388
	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

<sup>1</sup> Coast includes: Contra Costa, Lake, Monterey, Napa, San Benito, San Luis Obispo, Santa Clara, and Sonoma counties.

<sup>2</sup> Sacramento Valley includes: Butte, Colusa, El Dorado, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo, and Yuba counties.

<sup>3</sup> San Joaquin Valley includes: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties.

<sup>4</sup> District and State averages are derived by weighting county averages by county bearing acreage figures.

**Walnut Objective Measurement Survey Data, by Variety: 2007-2016**

Measurement	Year	Ashley	Chandler	Eureka	Franquette	Hartley	Howard <sup>1</sup>	Payne	Serr	Tehama	Tulare <sup>1</sup>	Vina	Other
In-Shell Weight (gm)	2007	15.8	21.5	21.0	18.6	22.2	22.5	17.2	15.7	16.8	22.2	18.2	17.5
	2008	19.7	22.2	21.1	20.3	25.0	23.8	18.4	18.6	22.5	22.8	20.0	19.3
	2009	19.9	22.9	21.0	19.3	23.7	22.3	18.2	18.5	20.6	21.8	18.7	17.3
	2010	18.5	21.7	19.7	20.4	23.4	21.9	18.1	16.8	18.9	22.1	18.7	18.0
	2011	21.0	23.7	20.4	20.4	25.7	23.5	20.3	20.5	19.9	23.6	21.1	21.5
	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	
In-Shell Width (mm)	2007	31.0	31.7	31.1	29.9	32.3	32.0	32.1	32.5	31.0	34.5	30.3	30.3
	2008	32.0	32.3	31.2	31.0	33.6	32.1	32.6	32.7	32.8	34.8	31.4	31.1
	2009	32.4	32.4	31.6	30.1	33.2	32.1	32.7	33.1	32.0	34.3	30.7	31.5
	2010	31.6	31.8	30.3	30.9	32.8	31.6	32.1	32.2	32.0	34.3	30.3	30.3
	2011	32.3	32.5	30.9	30.8	33.3	31.9	33.7	33.5	33.2	34.6	31.0	31.2
	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	
In-Shell Cross-Width (mm)	2007	31.6	32.7	32.0	30.9	32.8	34.1	32.4	32.3	31.4	34.8	31.7	31.9
	2008	32.0	32.9	31.6	31.5	33.4	34.1	32.2	31.9	32.5	34.5	32.2	32.1
	2009	32.6	33.0	32.3	30.7	33.2	33.8	32.7	32.7	32.4	34.3	32.0	32.5
	2010	31.4	32.2	31.0	31.0	32.4	32.5	31.7	31.0	31.5	34.1	30.8	30.8
	2011	31.9	33.3	31.5	30.5	33.4	33.0	32.8	32.2	32.3	34.6	31.7	31.7
	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	
In-Shell Length (mm)	2007	35.7	38.1	43.3	36.8	37.9	37.4	37.3	36.4	36.7	38.9	36.8	37.7
	2008	37.4	39.2	43.4	39.3	40.9	38.0	37.4	37.6	37.7	39.3	38.4	39.7
	2009	38.0	39.9	43.5	38.1	40.2	38.0	38.6	38.2	37.7	38.9	37.9	40.1
	2010	36.9	38.6	41.8	39.1	39.6	36.6	38.7	37.4	36.7	39.4	37.6	38.8
	2011	38.0	39.5	43.6	37.8	40.5	37.1	39.3	38.6	37.8	39.4	38.7	39.2
	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	
Kernel Grade - Percent Sound	2007	96.5	99.4	99.5	96.0	98.5	98.5	99.3	98.5	93.5	99.0	97.7	95.9
	2008	93.5	98.7	91.7	97.6	99.2	99.0	99.0	94.5	96.5	98.1	99.1	93.5
	2009	96.9	98.6	99.2	98.3	97.3	98.1	99.2	98.8	99.7	96.3	97.7	91.0
	2010	98.4	98.5	99.9	98.4	98.2	96.7	96.1	96.3	95.1	97.3	95.2	98.3
	2011	95.5	99.3	100.0	96.7	98.2	98.2	99.7	97.7	97.5	99.5	99.1	97.9
	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	
Nuts Set Per Tree	2007	1,875	1,069	1,731	1,569	1,738	1,197	1,202	1,710	2,058	963	1,183	1,640
	2008	1,688	1,425	2,271	1,343	1,498	1,156	1,395	1,371	1,127	1,438	1,235	1,712
	2009	1,691	1,346	1,512	2,220	2,001	1,419	1,306	1,066	1,893	1,281	1,755	1,074
	2010	2,630	1,683	1,165	1,891	2,076	1,609	1,294	1,647	1,383	1,000	1,407	1,729
	2011	1,093	1,415	1,052	1,670	1,840	1,272	906	1,129	721	1,065	1,197	984
	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	

<sup>1</sup> Beginning in 2007, the Howard and Tulare varieties were taken out of "Other" and published separately.

**Percentage Distribution of Walnut Shell Suture Size, by District and Variety: 2012-2016**

District and Variety	U.S. Standards Size Intervals <sup>1</sup>																													
	2012					2013					2014					2015					2016									
	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 <sup>2</sup> -----																													
<b>DISTRICTS:</b>																														
Coast	1	29	22	26	23	0	0	44	26	14	16	0	0	36	21	19	23	1	0	58	22	12	7	1	0	42	25	19	13	0
Sacramento Vly.	0	62	19	12	6	0	2	77	11	7	4	0	1	71	14	9	5	0	1	73	14	8	4	0	0	61	20	13	5	0
San Joaquin Vly.	0	56	21	15	8	0	2	66	16	10	6	0	1	57	22	15	6	0	1	63	19	11	6	0	0	59	21	14	5	0
<b>VARIETIES:</b>																														
Ashley	1	49	19	23	8	0	0	74	10	8	8	0	0	54	19	11	14	2	0	62	16	12	10	1	0	52	25	13	10	0
Chandler	0	56	22	15	6	0	1	69	15	9	5	0	1	63	19	13	5	0	0	67	18	10	4	0	0	56	24	15	5	0
Eureka	0	14	51	12	24	0	0	54	39	4	4	0	0	33	45	17	5	1	0	35	37	16	11	0	0	43	32	13	12	1
Franquette	0	22	18	25	31	3	0	47	19	13	21	0	0	44	28	15	13	1	0	55	20	12	12	0	0	34	23	32	12	0
Hartley	0	70	16	9	5	0	1	81	10	6	2	0	0	80	10	7	3	0	1	80	11	5	3	0	0	80	11	6	3	0
Howard	0	49	24	16	9	1	3	76	10	7	4	0	1	65	16	11	6	1	2	67	15	9	7	0	0	47	24	19	10	1
Payne	0	61	17	14	9	0	3	67	10	9	11	0	0	64	18	12	6	0	0	69	21	5	4	0	0	80	12	5	2	0
Serr	0	67	18	11	5	0	1	78	12	7	3	0	0	60	16	14	9	0	0	70	14	10	5	0	0	68	18	9	5	0
Tehama	0	68	22	8	2	0	0	70	17	10	3	0	0	33	38	19	9	0	0	53	19	10	15	2	0	73	21	4	1	0
Tulare	1	79	10	7	3	0	8	81	6	3	2	0	3	76	11	7	3	0	5	82	7	4	3	0	2	80	10	6	3	0
Vina	0	30	26	23	20	1	1	56	17	15	11	0	0	42	23	19	15	1	0	44	25	17	14	0	0	39	28	23	11	0
Other	0	42	21	23	13	0	0	29	17	23	29	1	0	56	15	14	14	0	1	64	17	10	8	0	0	40	19	24	16	0
STATE	0	59	20	14	7	0	2	72	13	8	5	0	1	65	17	12	6	0	1	69	16	9	5	0	0	60	21	13	5	0
Number of Shells Measured	14,627					14,631					14,803					14,813					14,426									

<sup>1</sup> 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".  
<sup>2</sup> Percentage distributions based upon nut samples taken in the field, may not equal 100 percent due to rounding.

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

California agricultural publications are available free-of-charge on the Internet at:  
[www.nass.usda.gov/ca](http://www.nass.usda.gov/ca)