

2022-23 California Navel Orange Objective Measurement Report



California Department of Food and Agriculture

Cooperating with the USDA, National Agricultural Statistics Service

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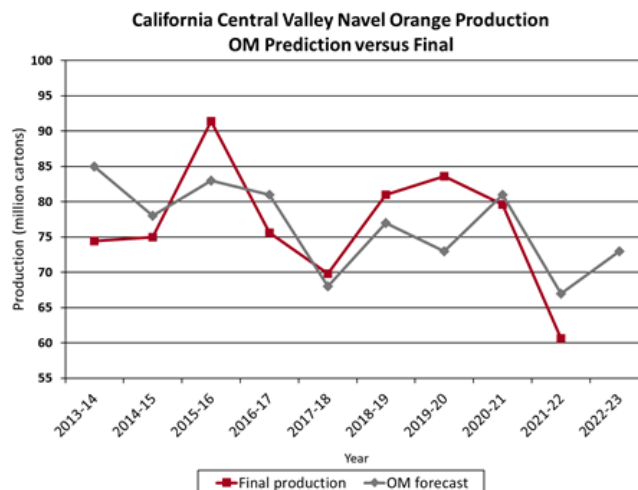
The “Cara Cara Variety Navel Production” Total was corrected to cartons instead in boxes.

NAVEL ORANGE PRODUCTION FORECAST

The initial 2022-23 California Navel orange forecast is 76.0 million cartons, up 19% from the previous year. Of the total Navel orange forecast, 73.0 million cartons are estimated to be in the Central Valley. Cara Cara variety Navel orange production in the Central Valley is forecast at **8.0 million cartons**. These forecasts are based on the results of the 2022-23 Navel Orange Objective Measurement (O.M.) Survey, which was conducted from June 17 to September 1, 2022. Estimated fruit set per tree, fruit diameter, trees per acre, bearing acreage, and oranges per box were used in the statistical models estimating production.

This forecast includes production of conventional, organic, and specialty Navel oranges (including Cara Cara and Blood orange varieties).

Survey data indicated a fruit set per tree of 351, up 47% from the previous year and well above the five-year average of 315. The average September 1 diameter was 2.106 inches, below the five-year average of 2.194 inches. The Cara Cara orange set was 307 with a diameter of 2.147 inches.



CALIFORNIA NAVEL ORANGE AVERAGE SET PER TREE BY COUNTY

Year	Fresno	Tulare	Kern	Central Valley ¹
2013-14	303	253	261	265
2014-15	311	308	396	333
2015-16	449	387	460	412
2016-17	296	380	472	384
2017-18	172	266	368	273
2018-19	375	425	483	426
2019-20	214	339	346	319
2020-21	289	332	298	319
2021-22	209	233	274	239
2022-23	245	382	350	351

¹ Includes Madera, Fresno, Tulare, Kings, and Kern counties.

SURVEY SAMPLE

A sample of 785 Navel orange groves was randomly selected proportional to county and variety bearing acreage, and 717 of the groves were utilized in this survey. Once a grove was randomly chosen and grower permission was granted, two trees were randomly selected. The Navel orange sample included conventional, organic, Cara Cara, and Blood orange groves.

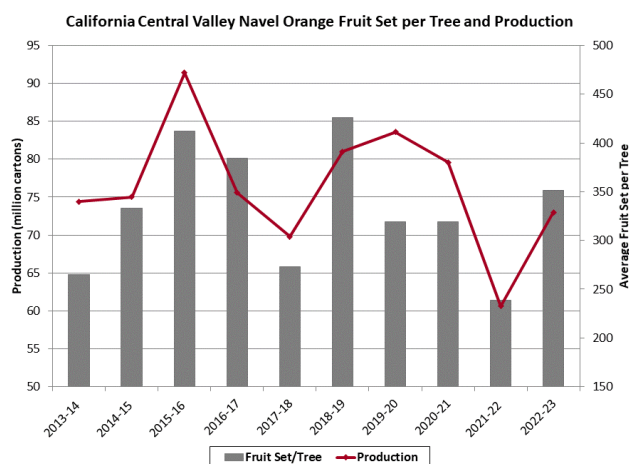
For each randomly selected tree, the trunk was measured along with all connected branches. A random number table was then used to select a branch, and then all connected branches from the randomly-selected branch were measured.

This process was repeated until a branch was reached with no significant limbs beyond this point. This randomly-selected branch, called the terminal branch, was then closely inspected to count all fruit connected to this branch, as well as all of the fruit along the path from the trunk to the terminal branch. Since each selected path has a probability of selection associated with the path, a probability-based method was then applied to estimate a fruit count for the entire tree.

In the last week of the survey period, fruit diameter measurements were made on the right quadrant of four trees surrounding the two trees of every third grove. These measurements were used to estimate an average fruit diameter per tree. Of the 717 utilized groves, 8 were in Madera County, 109 were in Fresno County, 425 were in Tulare County, and 174 were in Kern County.

SURVEY HISTORY

A Navel Orange Objective Measurement Survey has been conducted in the Central Valley every year since the 1984-85 crop year, except for the 1991-92 season due to a lack of funding. The data from the first two years were used for research purposes in developing crop-estimating models. The Cara Cara forecast was undertaken at the request of the California Citrus Advisory Committee.



CALIFORNIA CENTRAL VALLEY NAVEL ORANGE DATA

Crop year ¹	Number of sampled groves	Final utilized production (Cartons) ²	Forecast utilized production (Cartons) ²	Bearing acres	Average trees per acre	Average set per tree	Average September 1 diameter ³ (Inches)
2003-04	498	77,000,000	76,000,000	129,000	124	358	2.410
2004-05	526	86,000,000	90,000,000	131,000	125	392	2.495
2005-06	569	92,000,000	82,000,000	133,000	127	461	2.230
2006-07	539	67,000,000	64,000,000	135,000	129	294	2.268
2007-08	543	88,000,000	84,000,000	135,000	130	390	2.245
2008-09	527	67,000,000	62,000,000	135,000	131	202	2.276
2009-10	533	82,000,000	78,000,000	134,500	132	294	2.336
2010-11	519	93,000,000	90,000,000	133,500	133	418	2.143
2011-12	535	88,000,000	85,000,000	132,000	133	318	2.270
2012-13	539	82,000,000	90,000,000	127,000	134	344	2.195
2013-14	542	74,400,000	85,000,000	125,000	134	265	2.338
2014-15	534	75,000,000	78,000,000	124,000	134	333	2.205
2015-16	520	91,400,000	83,000,000	120,000	135	412	2.248
2016-17	537	75,600,000	81,000,000	117,000	135	384	2.213
2017-18	540	69,800,000	68,000,000	113,000	135	273	2.341
2018-19	703	81,000,000	77,000,000	113,000	135	426	2.117
2019-20	737	83,600,000	73,000,000	112,000	137	319	2.169
2020-21	733	79,600,000	81,000,000	110,000	138	319	2.198
2021-22	707	60,600,000	67,000,000	109,000	137	239	2.143
2022-23 ⁴	717		73,000,000	108,000	138	351	2.106

¹ Data for 2006-07 (freeze year) was not used in forecasting the 2022-23 crop.

² Prior to the 2010-11 season, cartons had a standard equivalent weight of 37.5 lbs. Beginning in the 2010-11 season, cartons have a standard equivalent weight of 40 lbs.

³ Size data before the 2006-07 season are from the orange industry. Size data beginning 2007-08 are from the USDA-NASS, Pacific Regional Office objective measurement survey.

⁴ USDA, NASS, Pacific Regional Office preliminary forecast for 2022-23.

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