

California's Changing Land Use Patterns for Crop Production, 1959–2017

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California's land use trends include a significant reduction of land in farms and total cropland, together with conversion of land used for annual field crops to tree and vine crops. The significant investment in perennial crop production has increased tree nuts, vineyards, and other specialty crops' share of irrigated land use from 30% in 1959 to over 65% in 2017.

Perennial and field crop acreage adjustments occurring over time are changing the nature of California's agricultural landscape. Given the intensity of many major California crops, these adjustments require time as well as major capital commitments. Growers make planting decisions for field crops and most vegetables annually but decisions for tree fruit, vine, and nut crop acreage adjustments begin several years before planting new trees or vines. Tree and vine crops typically involve a land commitment of 25 years or more. With limited total crop acreage that has been decreasing over time due to urbanization and development, acreage increases for one crop are typically offset by decreases for another.

California farmers' crop production decisions are important to the state's economy as well as to consumers throughout the U.S. and in export markets. These decisions also interact with important environmental issues, such as water availability and quality. California's unique combination of land resources and climate is favorable for production of a variety of specialty crops, as well as widely produced commodities. Official reports mention production of some 250 crops (or more), with statistics reported for at least 75 major crops. The CA Department of

Food and Agriculture reports 75 crop and livestock commodities in which California is the leading, and in 14 cases, the sole U.S. producer. With 24.5 million acres of land in farms, California's 70,521 farms produced gross cash income of over \$50.1 billion in 2017. This dollar figure was a significant change from 20 years earlier (1997) when 87,991 farms produced \$20.0 billion of gross cash income on 28.8 million acres of land in farms.

California Land Allocation

California has a large land area, but the amount suitable for crop production is relatively limited. For example, California's total land area is listed at 99,698,560 acres (or 155,779 square miles), but just 24,522,801 acres of that land is in farming (Table 1). The majority (61%) of California's 2017 land in farms consisted of permanent pasture and rangeland (11,606,249 acres), woodland and woodland pasture (1,847,551 acres), and land in farmsteads, homes, buildings, facilities, ponds, and roads (1,471,562 acres).

Harvested cropland in 2017 totaled only 7,857,512 acres, which was roughly equivalent to the 7,833,593 acres of irrigated land. These irrigated acres, which make up about 7.8% of California's total land area, produce the specialty crops for which California is renowned. A comparison of California acreages reported in the 1959 and 2017 censuses with intervening years, reveal both variability and trends. Most pronounced is the reduction of over 12.3 million acres of land in farms from 1959 to 2017, which amounts to roughly one-third of the 36.9 million acres available in 1959. A smaller overall reduction of about 26% in total cropland occurred between 1959 and 2017. There was a small 2.0% decrease in harvested cropland, while

irrigated land increased almost 6% during the same 58-year period.

As shown in Table 1, both specialty and field crops are grown on California's irrigated land. Specialty crops' share of irrigated land has increased over time, from 30.6% in 1959 to 65.3% in 2017, while the field crops' share decreased from 69.4% to 34.7% during the same period.

Looking at specialty crop data for the most recent 20 years (1997–2017), one observes acreage decreases for vegetables (-112,644 acres), non-citrus fruits (-232,183), and citrus fruits (-3,596). At the same time, total grape acreage increased by 64,745 acres (7.4%), berry acreage increased 22,611 acres (74.6%), and nut acreage increased 1,154,377 acres (132.8%). The net specialty crop change was an increase of 893,310 acres (21.2%).

The acreage of each of the field crop categories in Table 1 decreased during the 20 years from 1997 to 2017. The largest acreage decreases were for grain and other field crops (-764,383) and cotton (-734,651), followed by irrigated pasture (-248,603), hay, haylage and silage (-121,402), and rice (-77,371) for a total decrease of 1,946,410 acres. Overall, California's irrigated land area decreased from 8,886,693 to 7,833,593 acres (-1,053,100) and specialty crop acreage increased by 893,310 acres, accounting for the decrease of 1,946,410 acres of field crops.

Specialty Crop Acreage Adjustments

Total specialty crop acreage has trended upward steadily over time. For the period from 1959 to 2017, each of the specialty crop categories except non-citrus fruits registered significant acreage increases. Note in Table 1 that the

Table 1. California Land, Cropland and Irrigated Land in Farms by Major Crops, 1959–2017

	Census Year						
	1959	1969	1978	1987	1997	2007	2017
	Acres						
Land in Farms	36,887,948	35,722,348	33,130,362	30,598,178	28,795,834	25,364,695	24,522,801
Total Cropland	12,965,640	11,245,140	11,721,056	10,894,503	11,062,811	9,464,647	9,597,439
Harvested Cropland	8,021,836	7,649,021	8,899,360	7,676,287	8,676,242	7,633,173	7,857,512
Irrigated Land	7,395,570	7,240,131	8,603,719	7,596,091	8,886,693	8,016,159	7,833,593
	Specialty Crops						
Vegetables	814,322	849,349	1,168,847	1,102,167	1,536,484	1,504,919	1,423,840
Non-Citrus Fruits	472,528	497,320	486,233	538,191	597,339	444,664	365,156
Grapes	469,234	458,261	644,302	707,748	870,527	868,330	935,272
Citrus Fruits	242,475	266,141	248,632	268,836	315,758	303,101	312,162
Nuts	250,571	365,978	540,710	637,889	869,369	1,210,203	2,023,746
Berries	14,271	10,530	14,204	16,600	31,356	42,081	52,930
Total Specialty Crop	2,263,401	2,447,579	3,102,928	3,271,431	4,220,833	4,373,298	5,113,106
Specialty Share of Irrigated Land	30.60%	33.81%	36.06%	43.07%	47.50%	54.56%	65.27%
	Field Crops						
Rice	NA	NA	485,416	399,193	514,081	531,075	436,710
Cotton	820,724	659,904	1,520,708	1,083,811	1,036,316	471,378	301,665
Hay, haylage, silage	1,369,343	1,286,866	1,204,421	1,279,364	1,465,504	1,554,197	1,344,102
Irrigated Pasture	NA	NA	868,768	631,991	733,506	741,911	484,903
Grain & Other	2,942,102	2,845,782	1,421,478	930,301	916,453	344,300	153,107
Total Field Crops	5,132,169	4,792,552	5,500,791	4,324,660	4,665,860	3,642,861	2,720,487

Source: USDA Census of Agriculture, various years.

acreage of vegetables, non-citrus fruits, and citrus fruits each peaked in 1997. The acreage of grapes, nuts, and berries continued to grow through 2017. Nuts and grapes have registered the most substantial acreage increases over the total period, while the largest percentage increases are for nuts, followed by berries and grapes. Acreage adjustments vary by individual crops within each of the specialty crop categories.

Vegetable Crops: In both 1997 and 2017, California's top twenty crops included five vegetable crops. Harvested acreage for these five crops in 2017, with the change from 1997 in parentheses, were: all lettuce, 250,157 (+22,591); tomatoes, 253,267 (-59,782); broccoli, 109,423 (-24,007); carrots, 62,677 (-5,958); and garlic, 29,962 (+1,609). Lettuce, California's number one vegetable crop, not only increased acreage between 1997 and 2017, but the variety mix changed significantly.

Head lettuce decreased from 159,874 to 101,907 acres, while leaf lettuce increased from 40,479 to 57,885, and Romaine increased from 27,213 to 90,364 acres. During the same 20 years, spinach increased from 17,841 to 48,374 acres.

Non-Citrus Fruits: Non-citrus fruit acreage (primarily tree fruits) increased from 1959, peaked in 1997, and then decreased through 2017 (Table 1). The decrease from a total of 597,339 acres in 1997 to 365,156 acres resulted in the 2017 acreage being 107,372 acres below the 1959 total. Total acreage (bearing and nonbearing) of the majority of California tree fruits decreased from 1997 to 2017. The largest 20-year acreage decrease was for plums and prunes, which lost 92,491 acres, with 64,702 acres standing in 2017. Standing 2017 acreage for other tree crops with 20-year losses in parentheses include: apples, 13,637 (-36,067); peaches, 44,987

(-35,617); nectarines, 17,618 acres (-23,985); avocados, 57,192 (-17,797); apricots, 11,834 (-14,537); figs, 7,394 (-13,172); pears, 11,011 (-10,982); and kiwifruit, 4,173 (-2,245). Acreage of four fruit crops increased between 1997 and 2017; pomegranates, 26,245 to 30,917 acres; sweet cherries, 14,957 to 36,853 acres; dates 4,893 to 11,423 acres; and olives 2,059 to 42,420 acres. With the large net loss of acreage, non-citrus fruit was the only specialty crop category with fewer acres in 2017 than in 1959.

Grapes: California's total grape acreage increased from 870,527 acres in 1997 to 935,272 acres in 2017. In 1997, wine production comprised 48% of California grape acreage, while raisins accounted for 40%, and table grapes were 11.3%. The distribution by utilization in 2017 was 67.6% wine, 19.1% raisin, and 13.4% table grapes, with the major change attributed to raisin production converting to wine production. Over the two decades, the absolute acreages of wine and table grapes each significantly increased while the acreage of grapes used for raisins declined.

Citrus Fruit: The total acreage of citrus varied between 242,475 and 268,836 acres from 1959 and 1987, then increased and varied between 315,378 and 303,101 acres during the period from 1997 to 2017 without a clear overall trend. The relative overall stability, however, obscures some pronounced changes in the acreage of individual fruits. The total acreage of mandarins and mandarin hybrids increased from 10,100 acres in 1998 to 63,300 acres in 2018, while Valencia oranges decreased from 78,300 to 28,600 acres during the same period.

Nuts: Table 1 and Figure 1 illustrate the dramatic growth in California tree nut acreage. Total nut acreage grew from 250,571 acres in 1959 to 2,023,746 acres in 2017, an increase of 1,773,175 acres. The nut share of California's total irrigated acreage reached 25.8% in 2017. The latest distribution of total nut acreage is almonds, 62.6%, walnuts,

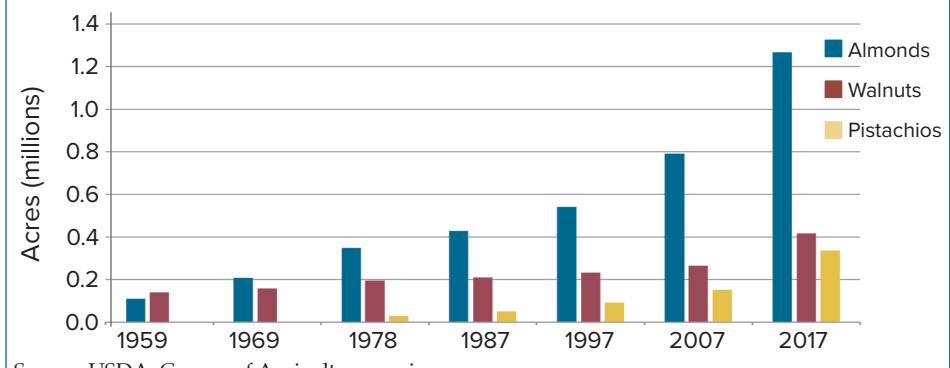
20.6%, pistachios, 16.6%, and other nuts, 0.3%. The acceleration in tree nut acreage during the most recent 20 years is clear in Figure 1. Total nut plantings increased 1,152,893 acres between 1997 and 2017, with almonds adding 725,593 acres, walnuts increasing by 183,746 acres, and pistachios by 243,554 acres.

Berries: Growth of California berry acreage since 1959 has been substantial, with particularly increased acreage since 1997. Berry crops are labor-intensive and high value. California's 2017 strawberry crop had a total value exceeding \$3.1 billion, ranking number four in total receipts following dairy, grapes, and almonds. The total value of raspberries and blueberries ranked 19th and 39th, respectively. Strawberry plantings registered the largest absolute acreage increase between 1997 and 2017 (+8,387 acres), followed by blueberries (+7,039), raspberries (+4,847), and blackberries (+1,627). While strawberries continue to dominate California berry acreage their relative share has decreased from 90.5% in 1997 to 69.5% in 2017.

Economic Factors Associated with Acreage Adjustments

The trends in irrigated land allocations and acreage adjustments evident in California Agricultural Census's since 1959 are all about producers' profit expectations and the profitability of individual commodities. Many factors can enter into the formation of expected profits and the weights attached to different factors likely vary by producers/investors. Empirical studies on perennial crop plantings have found that recent measures of revenue per acre

Figure 1. California Tree Nut Acreage, 1959–2017



Source: USDA. Census of Agriculture, various years.

(price times average per acre yields) are positively associated with acres planted. As expected, input costs tend to be inversely related to acres planted. Long-term changes in consumer demand are also reflected in acreage adjustments, as are changing trade relationships and comparative advantage.

Acreage adjustments outlined above have some obvious ties with changing consumer preferences and shifts in demand. The lettuce acreage allocations from iceberg to leaf and Romaine, together with the increase in spinach acreage, are closely related to the growing popularity of pre-cut and packaged salad greens and salad kits. Likewise, the growth of mandarin and mandarin hybrid plantings is due to the popularity of small "easy peeler" mandarin varieties.

Consumer preferences shifted from California's major apple varieties (Red Delicious, Granny Smith and Gravenstein) to a plethora of new and tastier varieties (e.g., Honeycrisp, Gala, Fuji, Braeburn, Jazz, and Cameo) grown in other states. Meanwhile, wine grape vineyards steadily replaced apple orchards in several California areas. Increasing export demand and the comparative profitability of nut crops were at the center of increased acreage of almonds, walnuts, and pistachios. The 2017 ranking of California agricultural product export values lists almonds as number one (\$4.48 billion), pistachios as number three (\$1.52 billion), and walnuts as number four (\$1.37 billion). The growth of blueberry acreage can

be associated with the well-publicized healthful properties of blueberry consumption and California's seasonal timing of production, beginning when imports phase out in the early spring and ending when volumes from the Northwest ramp up in June.

Concluding Comments

California's important agricultural land use and irrigated land cropping decisions since 1959, as reported by the USDA's quinquennial agricultural censuses, reflect developing trends in domestic and export demand and have involved substantial capital investments. The major and continuing trends have been decreasing cropland and conversion of irrigated cropland from field crop to specialty crop use. This conversion has required large capital investments, and the new high-value specialty crop production has been an important factor in increased annual agricultural revenues. Perennial crops' growing share of crop acreage has reduced California farmers' annual cropping flexibility.

Suggested Citation:

Carman, Hoy F. "California's Changing Land Use Patterns for Crop Production, 1959-2017." *ARE Update* 23(2) (2019): 9–11. University of California Giannini Foundation of Agricultural Economics.

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Table 2. California Berry Acreage by Crop: 1959, 1997, and 2017

Census Year	1959	1997	2017
Crop	acres		
Blackberries	418	550	2,177
Blueberries	43	223	7,262
Raspberries	181	1,730	6,577
Strawberries	11,285	28,381	36,768
Other Berries	2,344	472	146
Total	14,271	31,356	52,930