

Carrot Production in California

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Historic Background

Carrot was not an important commercial crop in California prior to World War 1. Between 1919 and 1943, however, California carrot acreage went from 580 acres to over 30,000 acres (Figure 1). In 1946 it was the second most important vegetable crop in California, after lettuce. This rise was partly due to the reputation of fresh carrots as a healthy food, as California carrots were normally marketed with the tops on as proof of freshness^[6]. Acreage was primarily in Imperial, Los Angeles and Monterey counties^[6,7]. In 1959, Bolthouse Farms began to sell carrots packed in cellophane bags, creating the “cello” carrot market^[1]. In the 1970s and 1980s, several large operations moved to the Bakersfield area, which has since overtaken the Imperial Valley as the center of production^[10].

The popularity of cut-and-peel (or baby) carrots, which were invented by a Bakersfield grower in the late 1980s, caused carrot consumption to rise and acreage to more than double over the next decade^[5,7]. Since producing cut-and-peel carrots requires expensive and specialized equipment, this shift

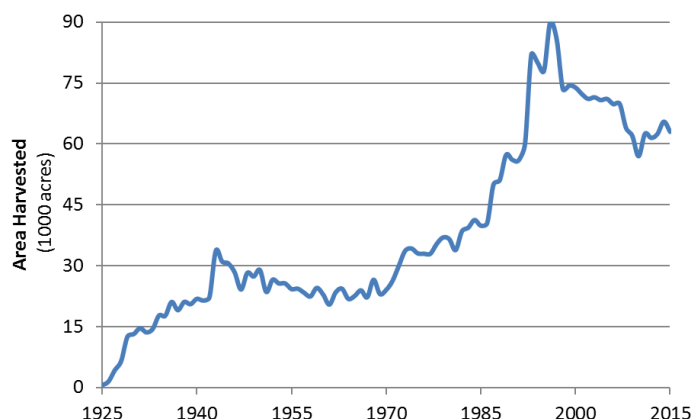


Figure 1: Acres of carrots harvested in California since 1920^[7,8].

in the industry has caused it to be centered around processing facilities in Bakersfield^[10]. A drop and stabilization in acreage since the early 2000s is likely due to improved processing efficiency of cut-and-peel carrots, which allows lower production to meet demand^[3]. The recession in 2008 also contributed to a drop in US carrot consumption, as consumers were more likely to buy whole carrots, which are less expensive than cut-and-peel carrots and tend to be eaten less quickly^[5].

Today's Production

In 2012, China produced most of the world's carrots, followed by Russia and the United States^[2]. For the past 10 years, California has grown 80-90% of the US carrot crop^[8]. Other producers include Michigan and Texas. California grows mostly carrots for the fresh market, but has some processing acreage^[8]. Almost 60% of California's 2012 carrot crop was produced in Kern County, and 25% in Imperial County. Carrots are also grown on the southern

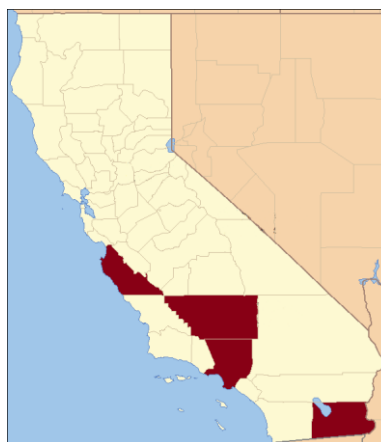


Figure 2: Top carrot-producing counties in California^[8].

and central coasts, especially in Monterey and Los Angeles counties (Figure 2) ^[8].

Carrots are harvested year-round in California. They are generally mechanically harvested, except for those sold with the tops

on. They are mostly grown under sprinkler irrigation in areas other than the Imperial Valley, where they are established with sprinklers and then furrow-irrigated ^[4].

Yield

Average California carrot yields somewhat increased in the first half of the 20th century, likely due to improved cultural methods (Figure 3) ^[7]. However, they have remained relatively stable since the 1970s. Modern breeding has generally focused on non-yield characteristics such as flavor, nutritional profile and suitability for the cello and cut-and-peel markets ^[9]. In addition, the proportion of processing carrots, whose yields are about double those of fresh carrots, has steadily decreased over the years ^[7].

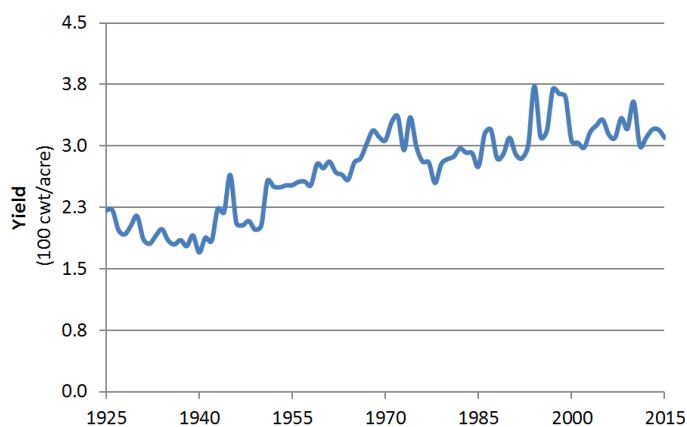


Figure 3: Average California carrot yields since 1920 ^[7,8].

Fertilization

According to a fertilizer use survey administered every four years between 1998 and 2010, average annual N application to fresh market carrot declined from 209 lbs N/acre/year in 1998 and 160 lbs N/acre/year in 2010. Carrot growers applied N between 2 and 5 times per year, and the average rate per application ranged between 34 and 92 lbs N/acre. In 1998-2006, 90-100% of California carrot acreage received N fertilizer, while in 2010 only 78% did. Nitrogen fertilizer rates were similar for processing carrots ^[8].

During the same period, average annual phosphate (P_2O_5) application to fresh market carrot ranged between 120-200 lbs P_2O_5 /acre.

Carrot growers applied P once or twice a year, with most growers only applying once. Between 60-80% of the California carrot acreage received P fertilizer. Average reported P application to processing carrots was somewhat higher than for fresh market carrots, between 100 and 340 lbs P_2O_5 /acre/year, and split applications were somewhat more common ^[8].

Average annual potash (K_2O) application to fresh market carrot ranged between 60-116 lbs K_2O /acre. There has been a trend for application rates to decline in recent years. Carrot growers normally applied K only once. On average, a third of carrot acreage received K fertilizer ^[8].

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This document is available online at https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Carrot_Production_CA.pdf

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