

Dry Bean Production in California

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Types of bean

The term “dry beans” refers to any edible legume that is harvested at maturity for the dry seeds. Four major types of bean are grown in California.

- **Common beans** (*Phaseolus vulgaris*) include such types as kidney, pinto, black and cranberry beans. California mostly grows these for seed and specialty markets.
- **Lima beans** (*Phaseolus lunatus*) have two genetic subtypes: large and small (or baby). The baby type is more heat tolerant than the large type. Common and lima beans were domesticated in the Andes and in Central America, and both have bush and vining varieties ^[10].
- **Garbanzo beans** (*Cicer arietinum*) are deep-rooted, spreading drought-tolerant legumes

that were domesticated in the Middle East. There are two major types. Kabuli types (marketed as garbanzos) have a large seed and are sold whole, either dried or canned. Desi types (marketed as chickpeas) have a small seed and are usually sold processed, for foods like hummus. California only grows kabuli types.

- **Blackeye beans** (*Vigna unguiculatis*; also called blackeye pea, cowpea and southernpea) were domesticated in West Africa. Of all the bean types grown in California, they are the most adapted to heat and salinity, and do well on poor soils with little or no fertilizer.

Bean production in California

Common beans were a staple of indigenous people in pre-Spanish California, and were also grown by the missions. Beans, along with small grains and corn, were common crops on the ranches in Mexican California ^[1]. A small but fairly consistent acreage of common bean has been grown as a rotation crop through California agricultural history ^[11]. California has also been an important seed producer for wetter bean-growing states ^[11,13].

Henry Lewis of Santa Barbara is credited with being the first to commercially plant lima beans in California, which he reportedly bought in 1868 off a sailor returning from Peru ^[5]. By the early 20th century limas had become extremely profitable, with large rainfed acreages

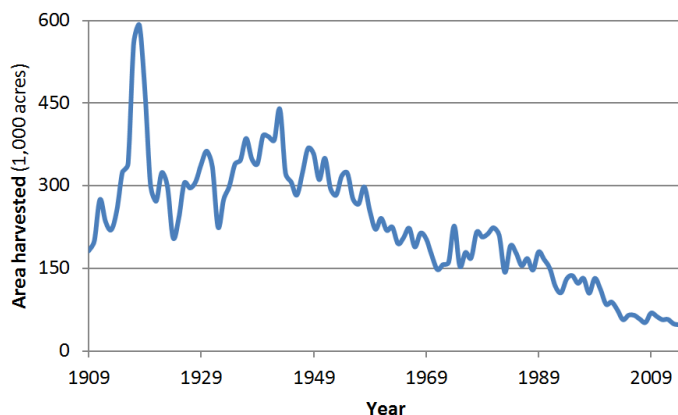


Figure 1: Acres of dry beans harvested in California since 1909 ^[14].

along the Southern California coast. At one point Ventura County produced 75% of the world's lima beans, and they remained its most important crop until the 1950s ^[5]. Limas were grown as sole crops, as well as intercropped in

new orchards^[2]. In 1908, the Lima Bean Grower's Association funded the newly established University of California Division of Agronomy's first breeding work^[13]. Starting in the 1950s, lima bean production on the coast began to decline, as fresh vegetables and later strawberries began to be more profitable.

Garbanzos were also grown in the mission fields. Historically, garbanzos were usually grown as a summer dryland crop on the coast. However, with the long drought in the late 1980s and early 90s came interest in the garbanzo as a drought-resistant winter rotation crop for the central San Joaquin valley^[3]. Production of garbanzos rose from 1,000 acres in 1988 to more than 15,000 acres by 1992^[14]. California dominated production through the 1990s. However, in the 2000s acreage has declined as more land has shifted to higher value crops, and production has shifted to the Pacific Northwest^[14].

The first recorded commercial production of blackeyes in California was in 1880. California and Texas have historically accounted for almost all dry blackeye production. California blackeye acreage remained relatively stable through most of the twentieth century, at around 50,000-60,000 acres^[6]. However, starting in the late 1980s acreage began to decline steeply, and from 2005-2015 has fluctuated between 5,000 and 15,000 acres^[14].

Dry bean production spiked during the two world wars, as California farmers supplied beans to the troops in Europe (Figure 1). In 1919, near the height of the California bean boom, about 90% of the crop was lima beans^[2]. Overall, production of dry beans has declined for the last half century (Figure 1). This pattern mirrors that of other field crops such as cotton, small grains and sugar beets, which have also declined as more land is being dedicated to higher value perennial crops such as tree nuts and grapes^[14].

Yield

Bean yields have more than doubled over the course of the twentieth century (Figure 2). This is partly due to varietal improvement, which began on lima beans in 1908 and has steadily progressed for all bean types. The increasing use of irrigation has also contributed. Increases in garbanzo yields in the 2000s are also due to the shift from dryland summer to irrigated winter cultivation, and the adoption of improved agronomic practices^[3].

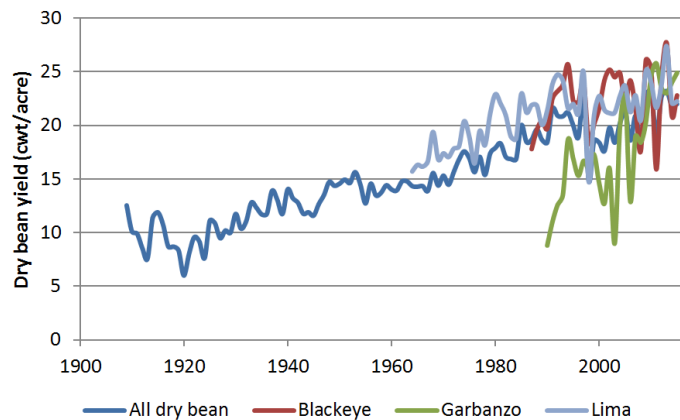


Figure 2: Average yields of all dry beans, blackeyes, garbanzos, and lima beans^[14].

Today's Production

In 2014, California was the 7th largest bean producer in the US, accounting for about 5% of the nation's total bean crop. North Dakota and

Michigan were the largest producers. However, California grows the country's entire dry lima crop, and about a third of the blackeye crop^[14].

Of the 48,000 acres of dry beans harvested in 2014, almost half were lima beans (Table 1). Garbanzo and blackeyes were the other major categories. About 20% of the crop is other bean types, including dark and light red kidney beans, cranberry beans and canario beans.

Table 1: Types of beans as a percentage of total 2014 California dry bean acreage ^[14].

Type	%
Baby lima	31.4
Large lima	16.6
Other dry beans (including kidney, cranberry)	19.6
Garbanzo	18.9
Blackeye	13.5

Currently, beans are mostly grown in the San Joaquin and Sacramento Valleys. Fresno, Sutter, San Joaquin, Colusa and Stanislaus counties are the most important bean-growing counties (Figure 3). Large limas, which need cooler nights, are mostly grown in the south delta area, while baby limas are grown in the warmer areas north and south of the bay delta ^[10]. Cowpeas, which are more tolerant to heat and salinity than other dry bean types, are

mostly grown on the East side of the southern San Joaquin Valley ^[6].

Except for a small acreage of rainfed dry lima beans along the coast, all dry beans are irrigated. Garbanzos are grown as a cool season crop, while the rest are warm-season. All four types are important rotation crops. Blackeye beans and common beans, which have a short season, are often grown as double crops with small grains or forage crops, while the longer season garbanzo and lima beans are usually single crops ^[8].

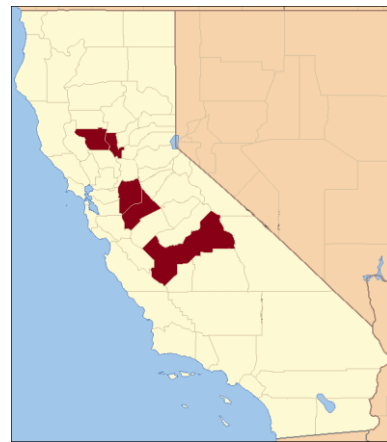


Figure 3: Location of the major bean producing counties in California, 2002-2012 ^[14].

Fertilization

According to production cost studies prepared by the University of California, which reflect normal production practices, fertilizer rates for dry common and lima beans range from about 80 to 120 lbs N/acre and 20-30 lbs P₂O₅/acre. The whole N rate may be applied at

planting, or split into starter and sidedress applications. A small amount of K may be included in the starter fertilizer ^[4,9]. Blackeyes are not normally fertilized ^[7]. Current data for garbanzos is not available, but historically they have not been fertilized ^[12].

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