

China's Strawberry Industry: An Emerging Competitor for California?

by

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China is becoming an important player in the world strawberry market. Although its yields per acre are much lower than California's, its costs per acre are much lower as well. China's production and exports are growing rapidly. For some countries, frozen strawberry imports from China are increasing while frozen imports from California are decreasing.

China is an increasingly important competitor for California in the global markets for many specialty crops, including strawberries. Strawberry production in China has grown substantially, because strawberries are a relatively profitable crop in that country. There are no official statistics reported in China's *Agriculture Yearbook* regarding the size of China's strawberry industry, but there is broad agreement that China's strawberry acreage has grown. Trade data indicate that China's strawberry exports have also grown rapidly in recent years. In this article, we discuss the Chinese strawberry industry, and provide comparisons to California's strawberry sector.

The actual dimensions of China's strawberry industry are not known with any certainty. While there is general agreement on China's strawberry acreage—roughly six times greater than California's—estimates of yields and, therefore, production differ widely. Table 1 reports three alternative estimates of China's strawberry acreage, yield and production, with comparisons to California's strawberry crop. One of the estimates reported in Table 1 puts China's annual production at twice California's level. The Market and Economy Information Department of China's Ministry of Agriculture estimates China's average yields to be nearly 40 percent of California's yields, and therefore estimates average annual production to be 3.39 billion pounds in China from 2001-2003, compared to California's production of 1.6 billion pounds. The other two estimates from China have substantially lower yields, and indicate that production there might be roughly the same as in California. The Chinese Strawberry

Association estimates China's annual production to be 1.75 billion pounds, and researchers from Nanjing Agricultural University suggest a slightly smaller number, about 1.5 billion pounds.

As shown in Table 1, estimates of Chinese acreage do not vary much, and they suggest that China's strawberry acreage was over six times as large as California's average strawberry acreage from 2001 through 2003. Variation in annual production estimates is thus largely due to huge differences in yield estimates, which range from 8,675 to 19,109 pounds per acre. We obtained a fourth yield estimate from Mr. Zhang Lei, FAS Agricultural Specialist in the U.S. Embassy in Beijing, who indicated that field-produced strawberries yield about 10,000 pounds per acre, and greenhouse strawberries yield about 14,000 pounds per acre. All of these estimates are substantially below California's average yield of 56,800 pounds per acre. Even the highest estimate for China is only about one-third of California's yield.

China's strawberry production is less geographically concentrated than U.S. production. Strawberries are produced in many different provinces in China. Hebei, the top strawberry-producing province, accounts for about one quarter of China's total

Table 1. California's Annual Strawberry Production Compared to Estimates of China's Production

Estimate	Time Period	Land Area -acres-	Total Production --billion lbs--	Yield -lbs/acre-
California ¹	2001-2003	25,734	1.61	56,800
Chinese Strawberry Association ²	2002-2004	166,066	1.75	10,554
China's Ministry of Agriculture ³	2001-2003	168,514	3.39	19,109
Nanjing Agricultural University ⁴	2001	172,900	1.50	8,675

¹ California Agricultural Statistics Service.

² U.S. Department of Agriculture.

³ Ministry of Agriculture, China.

⁴ Yinghuang Zhou, Xianhui Geng, Liyue Huo, Feilun Du, Lv Chen and Jun Xiong (2001), "Chinese Strawberry Industry--Middle-term Report", Nanjing Agricultural University.

Table 2. Strawberry-Producing Regions in China, 2001-2003 Average

Regions	Land Area --acres--	Production million lbs.	Yield lbs./acre
Hebei	29,652	782.5	26,322
Shandong	25,781	621.9	24,129
Liaoning	19,521	473.8	24,395
Jiangsu	17,297	260.9	14,937
Zhejiang	11,037	206.8	18,837
Anhui	11,029	147.6	13,381
Sichuan	8,237	111.3	13,418
Henan	7,742	132.5	15,858
Hunan	7,001	54.6	8,218
Shanghai	6,836	107.6	16,114
Others ^a	24,381	491.2	--
Total	168,514	3,390.7	19,109.3

Source: Ministry of Agriculture, China.

^a "Others" aggregates acreage and production for all provinces and municipalities with less than 5,000 acres.

production. The top three production regions account for 55 percent of total production. In contrast, California alone accounts for 89 percent of U.S. volume, and the top three states (California, Florida and Oregon) account for 97 percent of U.S. volume. Within California, Ventura County accounts for just under 30 percent of California production, and the top three counties (Ventura, Monterey and Santa Barbara) account for 69 percent of California production.

Table 2 reports acreage, production and yield for the top ten strawberry-producing provinces in China, and Figure 1 shows their geographic location. The top three strawberry-producing provinces, Hebei, Shandong and Liaoning, are in northern China, which has favorable weather conditions for strawberry production. Hebei's production season is from November to mid-June. Good weather for strawberries, combined with superior growing techniques and varieties, means that northern yields are much higher than southern yields, as Table 2 shows. Jiangsu, which has the highest strawberry production of the southern provinces, has an average yield that is less than two-thirds of the average yields of the top three provinces. Jiangsu's production season is from mid-December through June. This regional yield difference is similar to differences in the United States, where Florida's average yield is about 40 percent of California's, and all other states have yields less than 60 percent of Florida's.

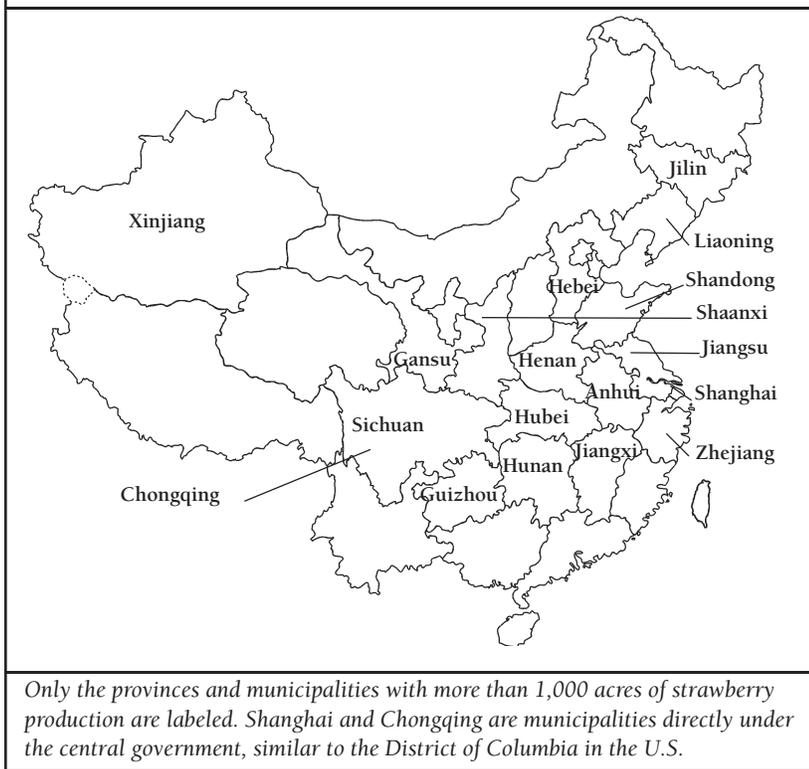
However, Florida's growing season is shorter compared to California's growing regions, particularly those in the northern part of California. No such differences in length of growing seasons are apparent among China's strawberry-growing provinces.

Production

The majority of China's strawberry growers are small-scale family farmers who grow a variety of crops. The average grower cultivates less than 0.7 acres in total, and most growers do not hire labor. The use of hired labor is limited to the harvest season, if it is used at all. In other cases, neighbors might share labor during busy times. The daily wage for field labor is \$1.20 to \$2.40. Some farmers use methyl bromide to fumigate the soil before planting, but information on methyl bromide usage, and the usage of fumigants more broadly, is very limited. China's strawberry growers face significant disease problems, which fumigation with methyl bromide or other chemicals can reduce. Methyl bromide can be purchased in small enough quantities to be a viable option for small growers, so the use of the fumigant itself is not limited by the small size of the average grower's farm. However, other factors, such as knowledge of effective fumigation techniques, may be limited by scale considerations. If fumigation becomes more widespread in China, disease will become a less important factor and yields could increase substantially.

In California, the average strawberry grower has 63 acres of strawberries, although 70 percent of growers have less than 50 acres. Unlike in China, the typical California grower hires a substantial amount of field labor. According to University of California estimates, a strawberry grower requires 700 to 1,000 hours per acre of harvesting labor, depending on the production region, at a cost per hour of \$9 to \$10 (<http://coststudies.ucdavis.edu>). The majority of California's strawberry acreage is fumigated before planting, with methyl bromide or another fumigant, to control pests and diseases.

In China roughly 80 percent of the strawberries are produced in plastic-covered greenhouses, instead of in fields, as in California. Generally, field-grown strawberries are produced mid-season in China, when weather conditions are most favorable, and greenhouse production extends the season both earlier and later. There are three main types of greenhouses, with different costs and expected lifetimes. Wood-framed

Figure 1. Major Chinese Strawberry Production Regions

greenhouses are the cheapest, costing about \$350, according to Jiangsu government officials. Wood-framed greenhouses last two to three years. Steel-framed greenhouses cost more, up to \$1,200, but last significantly longer—nine to ten years. A less common type of greenhouse is the “sunshine greenhouse” used by some large growers. “Sunshine greenhouses” have three brick walls, with one plastic-covered frame wall. Although sunshine greenhouses are superior in terms of productivity and useful lifetime, they are fairly uncommon due to their substantial initial cost of \$1,200 to \$2,400.

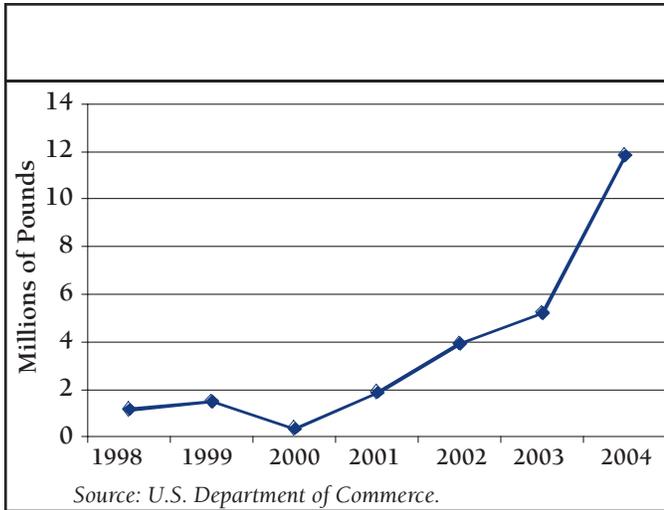
One similarity between the California and China strawberry industries is the varieties grown. University of California varieties, such as Camarosa, are planted on about 60 percent of California acreage. Some of these varieties are also grown in China. Generally, strawberry varieties planted in China mostly originated elsewhere. Japan and the U.S. are the most important sources, although some varieties have been obtained from Europe. Imported varieties are sometimes then propagated within China. Unlike California growers, who buy certified disease-free and pest-free nursery plants every year, most growers in China propagate plants on-farm, or they may buy plants from other growers who do so. These grower-propagated plants

cost \$0.018 to \$0.024 per plant, about one-fourth of what California growers pay for certified plants, and about one-fifth of what certified imported plants would cost in China. However, some growers in China do purchase certified imported plants, in order to meet quality requirements in production contracts with buyers such as McDonalds. The low-cost, grower-propagated plants are risky to use because grower-propagated plants may carry diseases and/or pests that can reduce both plant vigor and yields. This means that if growers in China increase their use of certified plants, they will be able to increase yields. Another possible avenue for increasing yields would be the development of more strawberry varieties specifically tailored to conditions in China’s major production regions. China reportedly has an extensive breeding program underway.

Domestic Market

Domestically, China’s demand for fresh strawberries is growing rapidly. As urban incomes have increased, and as consumers’ consumption patterns have changed, the domestic demand for fresh strawberries has taken off. About 80 percent of China’s production is consumed domestically as fresh strawberries. The fresh strawberry market in China is primarily a regional market, rather than a national one. Each production area tends to sell to nearby population centers. Prices therefore vary by production area. Within a season, prices tend to reach a maximum around the Chinese New Year, in January or February, and reach a minimum mid-season when volume is highest, regardless of the region.

For example, fresh strawberries from Hebei in the north are sold primarily in Beijing, Tianjin, Liaoning Province, Jilin Province and Heilongjiang Province. Fresh market prices range from \$0.24 to \$1.20 per pound, with a seasonal average between \$0.36 and \$0.55. From November through mid-April, Hebei strawberries are sold in the fresh market. From mid-April through the end of the season in June, they are sold in the processed market. There are many processing facilities in Hebei that produce canned strawberries, strawberry jam and strawberry wine, as well as frozen strawberries, the dominant processed product.



ern production region, are sold primarily in Shanghai, Jiangsu Province, Zhejiang Province and Anhui Province. Fresh market prices range from \$0.48 per pound to \$1.20 per pound, with an average price of \$0.72 per pound.

California's strawberry industry, in contrast, serves a national fresh strawberry market. All production regions ship across the country (and to Canada) during their fresh strawberry production season. As in China, the demand for fresh strawberries has been growing. About three-fourths of California's total strawberry production is marketed as fresh strawberries, and about 88 percent of fresh strawberries are consumed domestically.

Export Markets

China's strawberry exports in 2004 were 150 million pounds, or about nine percent of the China Strawberry Association's estimated average production volume for the 2002-2004 time period. In 2004, California exported about 12 percent of its total fresh production and five percent of its total frozen production.

In China, the importance of exports varies by production region. Hebei exports about nine percent of its production, while Jiangsu exports about one-quarter of its annual production. This difference may be due in part to the differences in growing conditions, which lead to lower berry quality in the south, particularly later in the season. Lower-quality berries are used for processing, so given that the vast majority of exports are processed berries, a region with a larger share

processed berries in total production exports a share of production, other things equal.

recent growth in China's exports of fresh and strawberries has been remarkable. According to the USDA, China's fresh strawberry exports totaled 2.52 million pounds in 2004, a 54 percent increase over its 2002 volume. Hong Kong and the United Kingdom are the two largest importers of U.S. fresh strawberries.

Approximately 70 percent of China's frozen strawberry production is exported. Frozen strawberries are also growing rapidly: Exports totaled 76.9 million pounds in 2004, almost double the export volume of 76.9 million pounds. China exports its frozen strawberries to many countries. Australia and Japan are the largest importers, but Australia, Canada and the U.S. also import significant volumes. China has dramatically increased its frozen strawberry exports to the U.S. over the past few years, as shown in Figure 2. Within three years, volume increased from 2 million to 12 million pounds. Over the same time period, Canada and Japan substantially increased their imports from China as well.

China's increased exports contrast with a mixed picture for California's exports over the same time period. California's fresh strawberry exports grew substantially between 2001 and 2003, almost doubling, and then declined by about ten percent in 2004. Frozen exports declined by nearly 50 percent between 2002 and 2003, and then fell slightly (four percent) between 2003 and 2004. Canada buys over one-half of California's frozen strawberry exports, so the increase in China's exports to Canada could have a significant effect on California.

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Strawberry production in China is often on small plots that are integrated with production of other crops.

Photo by Wensi Zhang.

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One potentially important difference between China's exports and California's exports is that California's exports of fresh strawberries are more important than its exports of frozen strawberries, in terms of volume and share of production. In contrast, frozen exports are much more important in China. The California Strawberry Commission's Processor Task Force has concluded that China's processed strawberry exports are a potential threat to the California industry. Alternatively, the Task Force found that China is not currently a threat to California's fresh markets. Indeed, because fresh strawberries are not available in China from July until production begins again in November or later, the Task Force sees an opportunity to export fresh strawberries to China during this market window. However, strawberries are not currently approved for import into China, by China's State General Administration for Quality Supervision, Inspection and Quarantine.

One market where China's strawberries have proven to be competitive is in Japan, which is an important export market for California. In 2003, China replaced the U.S. as the largest supplier of frozen strawberries to Japan. California's exports to Japan have declined, while China's exports have increased. In 2004, California's exports to Japan were roughly one-quarter of the 2002 level of exports. Because frozen strawberries from China cost roughly one-half as much as frozen strawberries from the U.S., this trend of an expanding market share for China and a declining market share for the U.S. and California is projected to continue.

In conclusion, China is becoming a more important competitor for California strawberries. Although estimates of the size of the strawberry industry in China vary, by all accounts it is growing rapidly. To the extent that its current yields are limited by disease problems and production techniques, China has the potential to increase production even without increasing acreage. China's share of exports of processed strawberries to third markets historically important to the U.S. has been increasing, while the U.S. share has declined. All indications suggest that China will become an increasingly important competitor for the California strawberry industry.

For additional information,
the authors suggest the following resources:

- Carter, Colin A., James A. Chalfant, Rachael E. Goodhue and Wensi Zhang. "How Large is China's Strawberry Industry?" *The Pink Sheet*. California Strawberry Commission. June, 2005.
- China's Ministry of Agriculture (2001-2003) "Production and Acreage of Major Agricultural Commodity-12." <http://www.agri.gov.cn/sjzl>.
- USDA Foreign Agricultural Service Global Agriculture Information Network Report #CH2616 (2004), "China, Peoples Republic of: Strawberries Annual 2004," prepared by Ralph Gifford and Zhang Lei. http://www.fas.usda.gov/scriptsw/AttacheRep/attache_lout.asp.
- USDA Foreign Agricultural Service (2005), "Strawberry Situation and Outlook in Selected Countries-February 2005." <http://www.fas.usda.gov/htp/horticulture/strawberry.html>.
- Yang, Wei and Tom Payne. "The Chinese Strawberry Industry in Perspective." *California Strawberry Commission Industry Newsletter*. Summer, 2004.
- Yinghuang Zhou, Xianhui Geng, Liyue Huo, Feilun Du, Lv Chen and Jun Xiong (2001), "Chinese Strawberry Industry--Middle-term Report," Nanjing Agricultural University.

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