

China: The Citrus Revolution

The state of mandarin, navel orange, pumelo, tangerine and orange

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It is widely believed that over the next few years China's processing of citrus will continue to increase. Meanwhile, fresh fruit consumption is likely to continue to rise and evolve as domestic demand for US-style sweet oranges grows. In a parallel development, essential oil production will increase proportionally with juice production. However, added value uses for citrus (such as freeze-dried lemon slices) could impact essential oil production. Yet it is important to note that this sort of supply fluctuation is normal in an emerging market. Overall, the next five to 10 years should be very interesting.

Citrus' Potential

China's "citriculture" traces back some 4,000 years. Based on the region's ancient literature, it is clear that commercial citrus production began at least 2,500 years ago. Chinese historian Sima Qian, for example, recorded in his book *Shi Ji* that farmers who grew 1,000 orange trees were as rich as those who governed 1,000 families. Citrus production developed primarily in Hubei and Hunan provinces.

While China hasn't yet become a global citrus power, there is ample evidence that growth is possible. For example, just a few years ago China exported just one full container load of apple juice each year. Today, it is the primary supplier to the US market.

Inside the Citrus Belt

World production of citrus fruit stands at around 100 million tons per year, of which China contributes 18 million tons. (To use an industry measure, 100 million tons yields

approximately 561 million boxes.) Just over half of this is consumed as fresh fruit. China, the world's third largest producer of oranges, produces about 134 million boxes, of which just 6.6 million boxes are processed. The remainder are destined for the fresh fruit market. This ratio is indicative of the challenges facing the Chinese citrus essential oil industry's future.

Rather than having one citrus belt, the Chinese Ministry of Agriculture has devised a plan to create four citrus belts within China and link them under a plan titled "Construction Advantageous Citrus Regions in China." This plan will be enacted between 2008 and 2015. About 95% of total Chinese citrus production occurs in nine key provinces, primarily along a stretch of the Yangtze River known as the "Yangtze citrus belt." (Chongqing and Sichuan represent the country's processing hub, whereas Fujian/Zhejiang encompass primary canning activities.) Just one of the region's numerous citrus nurseries alone contains some three million trees. For comparison, all of Florida contains some 60 million citrus trees; Brazil, ~150 million.*

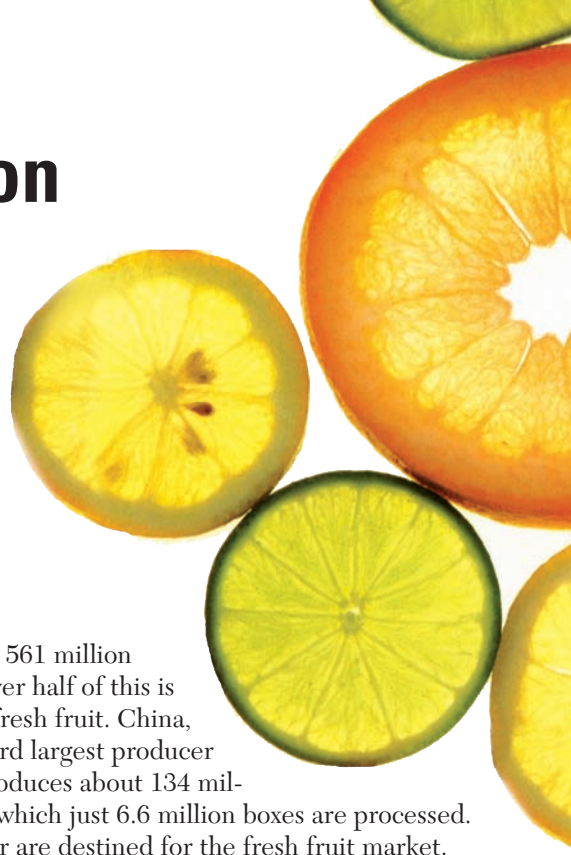
The region's agricultural prosperity is made possible by the environmentally controversial—but for the citrus industry, crucial—Three Gorges Dam, which was completed in October 2008 at a reported cost of \$25 billion. This engineering behemoth stands 660 ft high, and spans 1.2 miles. It takes more than an hour to get from one end

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*Florida and Brazil account for 45% of the world's orange production, 82% of which is processed as juice.

At a Glance

Over the course of two recent visits to China—in 2004, and again in 2008—the authors have gained unique insights into the past, present and future of Chinese citrus. The country is already a major citrus growing region, but rapid expansion over the next few years is anticipated as fresh fruit demand increases and processing capacities grow. Similarly, China's role in the F&F industry has experienced a rapid rise over the past decade, with domestic consumption increasing appreciably on an annual basis. To support this growing economic expansion and increasing demand for premium products, the country has firm plans to become a significant force in the processing of citrus fruit, primarily for juice extraction. Citrus essential oil production will certainly parallel this growth.





to the other by taxi. The structure's 26 generators produce ~10% of China's power supply. The resulting rising waters, which fuel the country's citrus production, have displaced whole cities; countless people have had to relocate (**pictured**).

Annual tonnage and citrus type by province are listed below (figures as of 2008):

- **Chongqing:** This region produces 300,000 tons of oranges: 120,000 tons of navel oranges in Fengjie, 100,000 tons of common oranges in Kaixian and 80,000 tons of common oranges in Jiangjin.
- **Fujian:** This core citrus area contributes 900,000 tons of citrus to national totals. Pinghe nets 600,000 tons of Chinese pomelo (Guangxi Miyou) and Yongchun produces 300,000 tons of tangerines (Pangan).
- **Guangdong:** Meixian produces 300,000 tons of Chinese pomelo (Shatianyou).
- **Guangxi:** This top performing region produces 1.1 million tons of citrus in and around Guilin—242,000 tons of oranges, 704,000 tons of mandarin and 154,000 tons of pomelo.
- **Hubei:** Production in Zigui centers on navel oranges, totaling 160,000 tons.
- **Hunan:** This province totals 500,000 tons of citrus. Hongjiang produces 140,000 tons and 60,000 tons of oranges and mandarin/pomelo, respectively. Shimen produces 300,000 tons of satsuma mandarin.
- **Jiangxi:** This region, north of Guangdong, produces 490,000 tons of navel oranges: Xunwu, 180,000 tons; Anyuan, 160,000 tons; Xinfeng, 150,000.
- **Sichuan:** Of the 346,000 tons of citrus produced here there are: 143,000 tons of navel oranges in Jintang, 51,000 tons each of mandarin and oranges in Fenshou, and 101,000 tons of mandarin in Pujiang.
- **Zhejiang:** The region produces 300,000 tons of citrus. Changzhou produces 90,000 tons of Huyou pomelo, while Yishui produces 210,000 tons of mandarin.



Just one of the numerous nurseries in the "Yangtze citrus belt" alone contains some three million trees; for comparison, all of Florida contains some 60 million citrus trees; Brazil, ~150 million.



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Processing and Commercialization: Limitations and Promise

China is the world's largest consumer of fresh citrus, mainly mandarin and orange; its per capita consumption is 13 kg and rising (world average: 17 kg). Meanwhile, the country's fresh sweet orange and lemon consumption has also grown rapidly. Due to the concentrated maturing period for domestic fruit, an oversupply of citrus occurs in China in November and December. At that time, the fresh fruit market moves to northern China where there is no citrus.

Simultaneously, the availability of healthy food options in the country is low, with per capita consumption of orange juice sitting at just 0.3 L. (The world average is 3 L, with the United States and Western Europe averaging 15–20 L.) However, Chinese consumers are now seeking out beverages with higher juice content. As a result, the government is looking to increase domestic juice production, rather than relying on Brazilian and Floridian imports. As the thinking goes: if they have their own juice industry, they'll have their own essential oil.

Further development is needed. In recent years, typical Chinese storage of citrus products consisted of haphazard stacks of boxes. In addition, much of the transportation has been human-powered (carts, shoulder-borne baskets, etc.) or at least indelicate enough to harm the crops (unsecured citrus piled in truck beds). In addition, infrastructure and the condition of the roads can render free movement troublesome. Meanwhile, there remain technical hurdles, including rather crude processing equipment. In a typical scenario, oil/water emulsion is piped 100 mt away in plastic pipes to concrete settlement tanks. The essential oil is then "recovered" by separation/centrifuge. Despite this, the situation is rapidly becoming more sophisticated. At present, there may not be dewaxing equipment in many facilities, but there will be soon.

The opportunities are obvious, but the challenges demanding. The volume of citrus product that China produces, paired with its boundless potential, rising domestic appetites and growing technical abilities make this region one to watch over the next decade.

Pest Control

The first recorded commercial use of biological controls for citrus pests in China dates back to 304 AD. At the time, red tree ants were sold in nests to control pests in Jiao Zhi (now Guangdong). This method has been used effectively ever since. Another creative solution involves the individual wrapping of lemons in paper while still on the branch in order to shield the fruit from pests (**pictured**). Today, of course, farmers use more modern techniques such as bug zappers and portable solar-powered pest killers. And, of course, pesticide sprays remain prominent, at times applied too liberally for the international market. Common pesticide and citrus disease chemicals include carbendazin (against anthracnose), lorsban (against rhyparia beetle), BT (against orange dog) and omethoate (against locusts).



A local creative solution for pest control involves the individual wrapping of lemons in paper while still on the branch in order to shield the fruit from pests. Upon harvest these are then unwrapped by hand..

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