Black tea in China

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ABSTRACT: The study relates to regional distribution, cultivars and quality characteristics of Chinese black tea, its main scientific and technological achievements since 1950, development trends, major promotional strategies and the main challenges faced by the Chinese black tea industry. The paper systematically investigates and analyzes its trade prospects. The results reveal that since 1950, Chinese black tea industry has experienced revival in two important stages of development and structural optimization, which first resulted in an all-time high output of 131,300 tons of black tea in 1989, after which it was followed by a continuous dramatic drop to only 45,300 tons in 2007. However, since 2007, because of constant improvement in structural optimization and overall quality of black tea, the output of Chinese black tea increased again year by year, reaching a total of 68,500 tons in 2010. The main challenge faced by the Chinese black tea industry is its low export volume because of its high production cost due to which its export price is higher than that of the world average. To promote sustainable development of Chinese black tea industry in the future, we have put forward four strategies i.e. 1), Relying on science and technology; 2), Optimization of its production structure; 3), Speeding up establishment of Chinese international tea auction center; and 4), Creation of famous tea brands of Chinese black tea.

Keywords: Black tea; B.T. Production structure; BT Trade; B.T. Reforms; Development strategy of black tea; Science and Technology Innovations in black tea

Introduction

Black tea is one of the six tea types available in China. Earliest records of black tea production have been found to be those of the early Ming Dynasty (1311–1375 AD). In the beginning of the 17th century, Souchong black tea was produced in Wuyi Mountain, Fujian province.[15] In 1610, Dutch East India Company first transported and sold Chinese souchong – "Bohea" to Netherlands and then successively transported Chinese black tea to Britain, West Europe, North America and other countries during 1618–1650. Then, since middle period of the 19th century, drinking culture and production technology of Chinese black tea started to spread, which further promoted rapid development of black tea production, trade and its consumption all over the world, making black tea the most fashionable and healthy drink for the people of West Europe, North America, Russia and other developed countries.[20]

Overview of Basic Production and Trade Conditions of Chinese Black Tea

Global Historical Position and Developmental Course of Chinese Black Tea

Before 1500, Chinese black tea was sold abroad through the land-based "Silk Road". In the beginning of 17th century, Chinese Bohea was first shipped to Europe. In 1684 AD, the maritime trade was opened and thus the offshore "Silk Road" was initiated from Guangzhou to Europe. This greatly expanded the channels for Chinese tea exports to the world, thereby promoting production and trade development of Chinese black tea. During the Opium War in 1842, Chinese Government was forced to open five ports for commercial transactions, which finally promoted production and trade of Chinese black tea into an unprecedented period of great prosperity. As recorded in historical materials, the export of Chinese black tea increased sharply from 8048 tons in the year 1843 to 134,000 tons in 1886, with the annual average growth rate of 36.40%. The Black tea exports in 1886 accounted for 82% of the gross tea trade volume all over the world approximately and the export income was 60% of the gross export income of various goods throughout the country at that time. This was the highest record for tea exports in the Old China.[20] However, after this, the production and sale of Chinese black tea decreased significantly due to two factors, firstly, because of the changed political situation in China, which was continuously witnessing the flames of internal war, and the two World Wars, and secondly, because of the promotion of the black tea production and trade in India, Sri Lanka, Africa and other countries. Since the founding of New China in 1949, Chinese black tea recovered and has developed rapidly. The exports of black tea again rose rapidly from 72,300 tons in 1984 to more than 100,000 tons during 1988 - the highest since the establishment of new China.[21] However, again in 2007, the output of Chinese black tea dropped to 56,000 tons.

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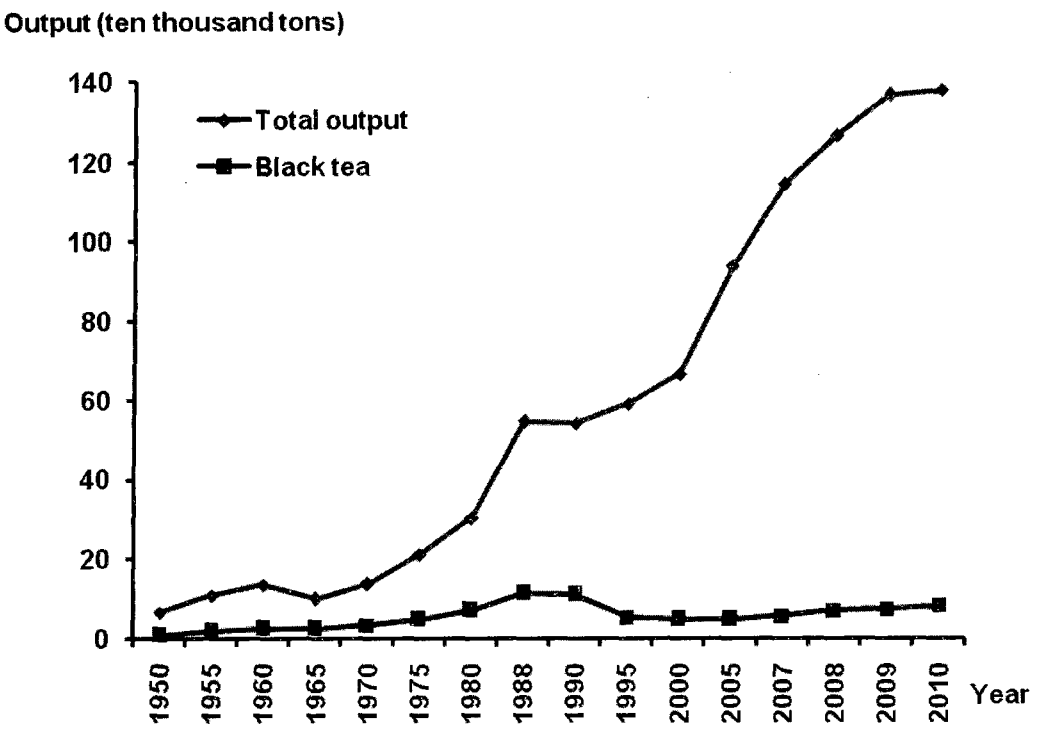

Figure 1. Annual output and proportional change of Chinese black tea

The proportion of black tea to the total tea production dropped sharply from about 20.1% in 1980s (1980–1986) to 5.6% in the 21st century (2000–2007). On an average, the proportion of black tea increased by 0.2% annually from 1950 to 1988, while it decreased by 1.8% annually from 1988 to 2007. After 2007, the output of Chinese black tea increased slightly with a total of 68,500 tons in 2010. The overall trend has been that over the years, with the rapid increase in the production of different kinds of Chinese tea, the relative output of Chinese black tea has a declining trend. In the last 60 years, the increase was only 13.95%. The main reason is low export volume of black tea, and at the same time, rapid increase of domestic market and high export volume of green tea, oolong tea, white tea, post-fermented tea and scented tea.[5,6,22] From the comprehensive survey of Chinese black tea, during the period of more than 600 years, its development course can be divided into the following five stages.[9]:

Stage 1 (1340–1840): This is the initial developmental stage of Chinese black tea which was characterized by scattered and small scale production. The tea was mostly processed with fresh tea leaves from medium and small leaf tea plants, and in the form of strips with pitch-black colour, so it was called "black tea" in Europe. Zhengshan Souchong from Fujian province was a typical representative of the Chinese black tea in this period. It was the Chinese black tea which was the first to enter the European market. The production technology and drinking method of the Chinese black tea also spread to India and Indonesia along with the growth of black tea trade and exports to West Europe, North America, Russia, etc. In the year 1678 (the 17th year of Emperor Kangxi in Qing dynasty), around 19,800 tons of Chinese black tea was exported to Britain which accounted for more than 97% of gross tea imports in Britain; during the years 1786–1810, about 2200–2400 tons of Chinese black tea was exported to USA which accounted for 82–95% of gross tea imports in the US.[20]

Stage 2 (1840–1886): The period between1840–1886 was a flourishing and prosperous stage for the Chinese black tea, when it was at the historical peak of its production and trade. In 1886, the total tea output in China reached 250,000 tons, which was 5.5 times more than that in 1840, quantity of the export increased six times, and the annual rate of increase of the total tea production and exports were 12.0% and 13.0% respectively.

Stage 3 (1886–1949): It is the declining stage of Chinese black tea. Due to deterioration of political and economic environment in China, tea taxation became extremely high and at the same time there

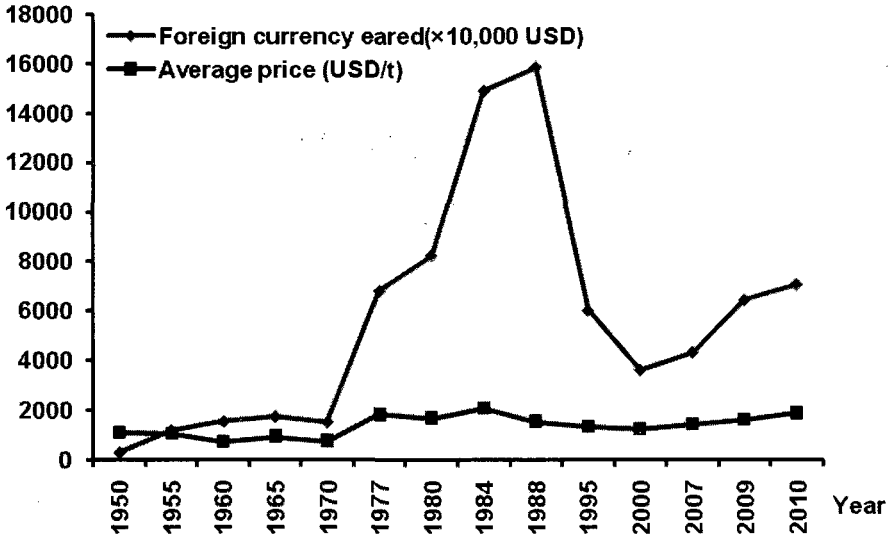

Figure 2. The export prices of Chinese black tea

were no improvements or innovations in the relevant technologies. Moreover, the ocean "Silk Road" was interrupted because of the two World Wars, resulting in gradual decline of Chinese black tea production and its export trade. Till the end of 1940s, black tea production and exports fell to the lowest. In 1949, the tea output in China was only 51,200 tons and the exports were 21,700 tons, which respectively fell by 79.52% and 83.81%, compared to that in the year 1886. In 1949, only 2500 tons of black tea was exported.

Stage 4 (1950–1988): The period from 1950 to 1988 was the revival stage of Chinese black tea development. The production of black tea output in 1988 reached 114,500 tons and the exports were 103,400 tons, which increased by 12 times to that in 1950 (Table 1); the proportion of black tea exports in the total volume of Chinese six major tea types and in the total volume of global black tea exports occupied approximately 52.2% and 15% respectively.

Stage 5 (1989–): This is the structural optimization stage of Chinese black tea starting 1989. Due to production of high-quality tea of various types, domestic market developed rapidly. A large number of black tea producing areas were transformed into areas for production and selling of the green tea in the domestic market. Consequently, production and trade scale of black tea dropped dramatically. In 2007, national black tea output was reduced to 45,300 tons and the export volume was only 30,300 tons, i.e. reduced by 62.5% and 70.70% respectively compared to that in 1988. The ratio of export volume and sales volume in domestic market was adjusted from 5:1 to 3:1. However, after 2007

Table 1. Annual output and proportional changing trend of Chinese black tea

Year	Total output (× 10,000 t)	Black tea (× 10,000 t)	Proportion of black tea (%)	Year	Total output (× 10,000 t)	Black tea (× 10,000 t)	Proportion of black tea (%)
1950	6.52	0.87	13.34	1990	54.01	10.97	20.31
1955	10.80	1.85	17.13	1995	58.96	5.20	8.82
1960	13.58	2.5	18.41	2000	66.5	4.73	7.11
1965	10.06	2.40	23.86	2005	93.49	4.79	5.12
1970	13.6	3.3	24.26	2007	114.0	5.60	4.91
1975	21.05	4.8	22.8	2008	125.8	6.97	5.54
1980	30.38	7.10	23.37	2009	135.9	7.19	5.29
1988	54.54	11.43	20.96	2010	137.0	8.15	5.95

Note: The outputs of the "black tea" in 1955 and 1965 are the deduced numbers.

Table 2. Export volume and price variation of Chinese black tea

Year	Export volume (× 10,000 t)	Foreign currency earned (× 10,000 USD)	Average price (USD/t)	Year	Export volume (× 10,000 t)	Foreign currency earned (× 10,000 USD)	Average price (USD/t)
1950	0.26	287	1087	1984	7.23	14880	2059
1955	1.12	1172	1046	1988	10.34	15831	1531
1960	2.10	1539	733	1995	4.55	6006	1320
1965	1.91	1736	923	2000	2.95	3609	1223
1970	2.03	1520	750	2007	3.03	4318	1425
1977	3.76	6800	1808	2009	4.0	6437	1609
1980	4.94	8228	1666	2010	3.80	7058	1860

*Annual average.
Note: Unit: ten thousand tons, ten thousand US dollars, US dollars per ton.

because of the continuous improvements in structural optimization and overall quality of black tea, Chinese black tea production slightly recovered. In 2010, national black tea output increased to 81,500 tons, and the ratio of export volume and the sales volume in the domestic market was adjusted to 1:1. The annual output and the proportion of China black tea from 1950–2010 are shown in Table 1 and Figure 1.

Regional Distribution and Climatic Conditions of Chinese Black Tea

The black tea producing areas in China start from Zhoushan Islands in Zhejiang Province and the eastern bank of Taiwan Province in the east, to Yingjiang Tea Area in Yunnan Province in the west, and from Tongshi in the south of Wuzhi Mountain Region in Hainan Province in the south to the tea region at the south of Shennongjia in Hubei Province in the north; the distribution approximately ranges between NL21.3°–31.5° and EL122.2°–95.5°; the region covers all tea areas in South China and in the south of the Yangtze River, most part of southwest tea area and a small part of the tea area in the north of the Yangtze River, involving 14 provinces (autonomous regions) as Hainan, Guangdong, Guangxi, Yunnan, Sichuan, Chongqing, Hubei, Hunan, Jiangxi, Fujian, Zhejiang, Anhui, Jiangsu and Taiwan.

Wide regional distribution, varying geographical factors and diverse climatic conditions of Chinese black tea production areas lead to development of characteristic black tea cultivars and production areas. These are divided into the following three production sub-areas of black tea:

(1) The production area of the arbor and small (semi) arbor type large-leaf black tea cultivars, which are mainly located in the tropical climatic and southern subtropical climatic regions in the South China tea areas (including Hainan, Guangdong and Guangxi) and in the south of the southwest tea area (Yunnan, Sichuan and south of Guizhou), where the annual average temperature is higher than 18°–20°, while the extreme minimum temperature is -30°C, the accumulated temperature (≥10°C) is higher than 6000–6500°C; the average annual rainfall is 1000–1500 mm and the frost-free period is 300–365 days. It is the major tea-producing area for the excellent broken black tea in China: the typical products include Yunnan black tea, Yingde black tea, Hainan C.T.C. broken black tea, high fragrant type Golden hair black tea, etc.;

(2) The production areas of the small (semi-) arbor type medium-leaf cultivars are mainly located in the medium subtropical monsoon climatic area in the central part of the southwest tea area and the south of the Yangtze River, where the annual average temperature is 15.5–17°C, the extreme minimum temperature is -8°C, the accumulated temperature (≥10°C) is higher than 5500°C; the average annual rainfall 1000–1400 mm, the frost-free period 230–280 days, the altitude is high. The soil pH is 5.0–5.5 and it is rich in organic matter. This is the major producing area of traditional congou black tea. The most famous black teas in this area include Qimen black tea in Anhui, Zhengshan souchong in Fujian, Wuning congou in Jiangxi, Hunan congou, etc.;

(3) The production area of shrub type small-leaf cultivars is located in the north part of the South-China tea area and the southwest tea area and in the tea area at the north of the Yangtze River, where it is relatively cold.

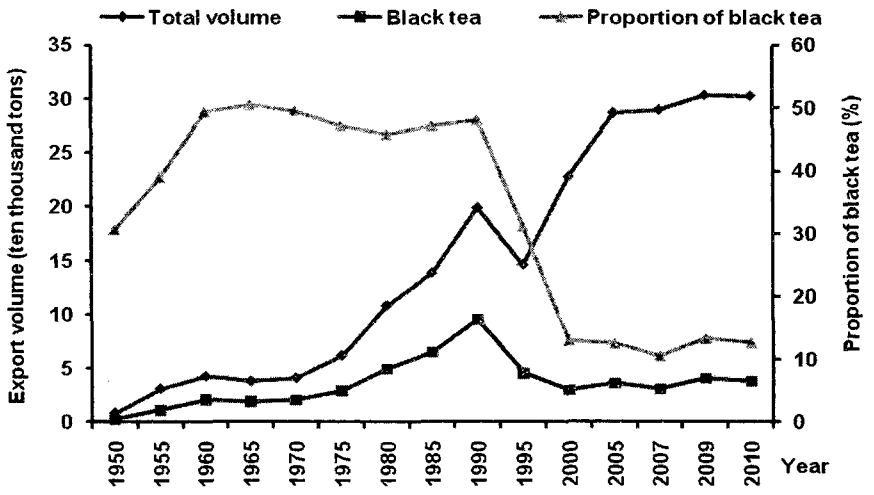

Figure 3. Variation of Chinese tea export volume and black tea export value

The most famous products are Yichang congou, Sichuan congou and Zhejiang congou.[6]

Scale, Cultivars and Quality Characteristics of Chinese Black Tea

According to the differences in the shapes and quality characteristics of tea leaves, Chinese black tea can be divided into three main types: souchong, congou and broken black tea. In 1988, Chinese black tea output volume was 114,300 tons, in which, the broken black tea was about 100,000 tons, congou and souchong were nearly 20,000 tons. The former was mainly exported while the latter was mainly sold in domestic market. In 2007, Chinese black tea output was stabilized at 45,300 tons, in which export of broken black tea was more than 30,000 tons, while the rest 15,000 tons of congou and souchong were sold in the domestic market.

Souchong

Souchong was originally produced in Tongmuguan, Fujian province, in the beginning of the 17th Century. This can be divided into Zhengshan souchong and other souchongs. The stripe shaped black tea from Xingcun Town is called "Zhengshan souchong", while the slightly lower quality souchong from Zhenghe, Tanyang, Pingnan, Gutian, Shaxian and Qianshan in Jiangxi is generally called "other souchongs" or "artificial souchong".

Zhengshan souchong grows in the north of Wuyi Mountain with the altitude of 1000–1500 m, where it is cool in the summer and warm in the winter and is rather cloudy. The distinct tea quality is characterized by the stripe-shaped leaf which is heavy and plump, the colour is black bloomed, the tea infusion is red and thick, the high aroma resembles pine resin flavour, the taste is mellow and thick and has Longan flavour; if mixed with milk, syrupy milk tea will be formed. In the 1870s, the annual output of souchong was 1200 tons, and the tea was sold to European and American markets. The current annual output is 1000–1500 tons.

Congou

Similar to souchong, congou is only produced in China and is the earliest black tea variety in the world. It is the Chinese traditional export product. Before the Opium War, it almost monopolized global market in black tea trade. There are 20 provinces (autonomous regions) involved in tea production, among which 14 provinces produce congou. According to the production areas, Chinese congou can be classified into Qimen congou (including Fuliang congou and Huoshan congou), Yunnan congou, Guangdong congou (including Yingde congou and Heshan congou), Ningde congou, Yihong congou (including Shimen congou), Sichuan congou (including Guizhou congou), Hubei congou, Fujian congou (Tanyang, Bailin and Zhenghe congou), Zhejiang congou, Taiwan congou and Jiangsu congou, etc.; when the Chinese congou is classified according to raw fresh leaves, it can be divided into large-leaf congou and small-leaf congou. The large-leaf black tea is made of fresh leaves of arbor and small (semi-) arbor type tea plants and is also called "red-leaf congou", and its representative products are Yunnan congou and Guangdong congou; while the small-leaf congou is mainly made of fresh leaves of small arbor and shrub type medium and small-leaf tea plants. It is also called "black leaf congou" because the color and tea leaves are

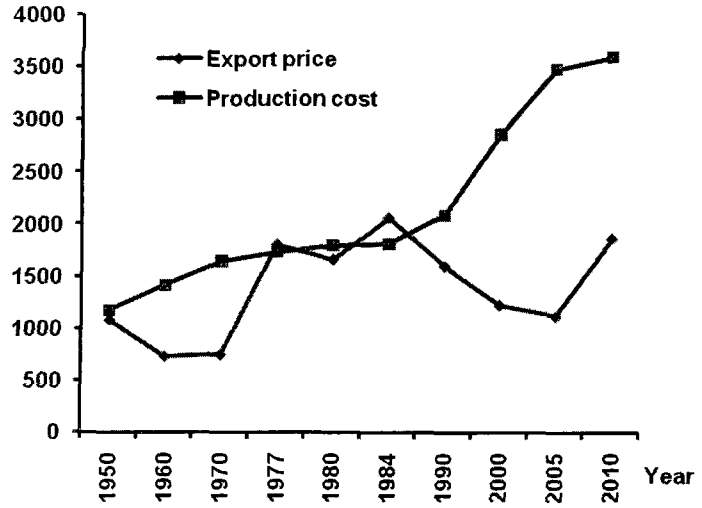

Figure 4. Change of average export price and production cost of Chinese tea

black bloomed. The representative products are Qimen congou and Yichang congou.

Chinese congou key of commerce is rated into 7 degrees, wherein, Yunnan congou and Qimen congou range from Degree 1 to Degree 7, while other congou varieties only range from Degree 2 to Degree 7. According to the statistics, the annual production and sale volume of Chinese congou was approximately 50,000 tons between 1840 and 1895.[20,9] However, the production declined the current volume has not even reached 20,000 tons.

Generally speaking, "black congou" is characterized by its tight strip which is elegantly slim or fat and bold; the tip is nice, and the color and lusture are black bloomed in appearnce. Among others, the dry Qimen congou tea is grayish "elegant light", Ninghong congou tea is tight, round and straight and slightly red fibrous, strips of Yichang, Sichuan and Fujian congou are tight, fat and bold or tight and is elegant and has golden tips; the infusion color is bright red, the aroma is sweet, mellow and lasting, and the taste is mellow and thick. Among the others, the flavor of Qimen congou is like that of honey: sweet, thick and lasting with slight orchid flavor. It is one of the three most fragrant black teas in the world for its unique "Qimen flavor". Sichuan congou has "sugar flavor" because of its inborn fresh flavor. In 1979, the export price of "Zaobaijian"–one of the most precious varieties of Sichuan congou–was US $7320 per ton, which created the highest record of Chinese black tea export price. On the other hand, the strip of "red-leaf congou" has a taste of sweetness and is full of pungency. This "red-leaf congou" is an up-and-coming youngster of Chinese congou. The famous high quality congou - "Golden tip black tea" first produced by Yingde in Guangdong in the 1990s and by Yunnan at the beginning of the 21st Century are the most highly rated commodity among Chinese congous. The best material for "Golden tip" is the clone improved cultivars of large-leaf type, such as "Yinghong No. 9", "Renhua Baimao" and "Yunkang series", or the picking standard is one bud, one leaf, one bud or two leaf shoots. At present, the annual output of Chinese high fragrant and quality congou is about 2000 tons and the market price is about 30 times higher than that of exported broken black tea. They are mainly sold in domestic market.

Broken Black Tea

Earlier, before the Opium War, congou was cut into broken short strips, chips and powders and was exported to Europe from Guangzhou. It was the earliest broken Black tea in China. But the direct processing of broken Black tea with fresh leaves from tea plant began only in 1958.

Broken Black tea is classified according to the processing method. There are two kinds of broken Black tea: Orthodox and Non-orthodox. The Non-orthodox process includes Rotorvane process, C•T•C process, Lange process, L•T•P process, etc. Characters and styles of the broken Black tea, produced by different processing methods, are different from each other, but the variety classification and specification standards are similar. Accordingly, there are four types: leaf tea, broken tea, tablet tea and dust tea.

In 1958, for the first time, Orthodox process was used to produce Chinese broken Black tea in Anhua, Hunan province. In 1964, large-scale trial-production began in six tea factories: Menghai in Yunnan, Yingde

in Guangdong, Xinsheng in Sichuan, Bajiao in Hubei, Wengjiang in Hunan, and Furong in Jiangsu. Between 1988 and 1990, the annual broken Black tea output was approximately 100,000 tons. However, the current level is only between 30,000 tons and 40,000 tons.

During the 1970s, broken Black tea, produced by the rotorvane process, was developed by Yingde in Guangdong and Furong in Jiangsu. Yingde Tea Manufacturing Factory developed the first rotor machines. The first broken Black tea produced by rotor machines imitated Rotorvane mechanism. Broken Black tea produced by this method could also be divided into four kinds of products: leaf tea, broken tea, tablet tea and dust tea.[8] Now, most of the Black broken tea factories in China make use of this method. In addition, since the late 1980s, China has developed a series of innovative black tea varieties such as potpourri type Golden hair black tea, milk flavor high-level black tea, litchi flavor black tea, non-caffeine black tea, quick dissolving black tea and fixing black tea, etc., all of which are warmly welcomed by the domestic consumers.[6]

Development Trends of Chinese Black Tea Production and Trade

Changing trends in Chinese black tea output and proportion to total tea production

After 1886, when Chinese black tea was at the historical tea peak of its production and trade; it started to decline and in 1949 went down to the lowest level of production. From 1950, once again, Chinese tea entered into a new era of recovery and development. The area of tea gardens expanded from 169,300 hectares to 1,680,000 hectares in 2010.[19,18,5] The total output of tea increased from 65,200 tons to 1,370,000 tons with annual increase of 33.46%, but the output of Chinese tea did not record a continuous increase. The proportion of black tea output in the total tea output in China also displayed a changing "low-high-low", trend because the original major Black tea production areas were being transformed to produce other tea varieties because of their increasing demand.

Changing trends of Chinese black tea export and prices

The export volume and export price of Chinese black tea from 1950 to 2010 are summarized in Table 2 and Figure 2. During the 60 years from 1950 to 2010, the export volume of Chinese black tea displayed the same fluctuating trend of "first increase and then decrease" as that of its production volume: from 1950 to 1988, the export volume of black tea increased rapidly year by year to 38 times in 38 years with annual increase of 102.0%. It reached 103,400 tons in 1988, which exceeded the highest export record of 100,100 tons of black tea in 1880. Then, it strikingly decreased year by year with annual decrease of 7.86%. Up to 2000, the export volume of Chinese black tea decreased, so much that it only accounted for 2.98% of the world black tea export volume. The total volume of foreign currency earned by the exported black tea and the average price also recorded the same changing trends. The export price of black tea increased from US $1087 per ton in 1950 to US $1808 per ton in 1977. In 1984, it reached the highest record of US $2059 per ton, since the establishment of New China.

During the period of 1950–1984, the export price of black tea increased by 89.45% (annual average increase of +2.63%); decreased, year by year, to the lowest price

Table 3. Variation of Chinese black tea export volume and total tea export volume

Year	Total volume (× 10,000 t)	Black Tea (× 10,000 t)	Proportion (%)	Year	Total volume (× 10,000 t)	Black Tea (× 10,000 t)	Proportion (%)
1950	0.85	0.26	30.6	1990	19.87	9.55	48.1
1955	3.11	1.12	38.9	1995	14.61	4.55	31.1
1960	4.26	2.10	49.3	2000	2.95	13.0	22.77
1965	3.79	1.91	50.4	2005	28.66	3.58	12.5
1970	4.10	2.03	49.5	2007	28.95	3.03	10.5
1975	6.18	2.91	47.1	2009	30.29	4.03	13.3
1980	10.80	4.94	45.7	2010	30.24	3.80	12.6
1985	13.81	6.50	47.1				

*Annual average.
Note: Unit: ten thousand tons, %.

of US $877 per ton in 2003 and then bounced back to US $1425 per ton in 2007. From 1984 to 2010, Chinese annual average export price decreased by 9.67% (annual average decrease of 0.3%) and the foreign currency earned also decreased year by year. Calculated for the period of 1950–2010, the total volume of the earned foreign currency still increased by 39.32%, and the annual average price increased by 1.19%. The export price of black tea increased from US $1087 per ton in 1950 to US $1808 per ton in 1977. In 1984, it reached the highest record of US $2059 per ton since the establishment of New China. During the period of 1950–1984, the exporting price of black tea increased by 89.45% (annual average increase of +2.63%), decreased to the lowest price of US $877 per ton in 2003, and correctively then bounced back to US $1425 per ton in 2007. From 1984 to 2010, Chinese annual average export price decreased by 9.67% (annual average decrease of 0.3%) and the foreign currency earned also decreased year by year. During the period 1950–2010, the total volume of the earned foreign currency still increased by 39.32% and the annual average price increased by 1.19%.

Fluctuations in Chinese black tea export volume and total tea export volume

Since 1950s, the changing trend for Chinese black tea export volume and the total export volume of Chinese six tea types are summarized in Table 3. By integrating the results of Figures 1, 2 and 3, it is easy to see that the changing trend of the absolute volume and relative volume of Chinese black tea export is not in line with the changing trend of total output and export volumes of the Chinese tea. They were positively correlated before 1990 and negatively correlated in the following years. Namely, the export proportion of black tea is 30–40% in 1950s. It reached a peak in the late 1960s, before Decline.

The export proportion of black tea in the total exports was 30-40% in 1950s. It reached a peak in the 1960s and Stabilized at about 50%. It fluctuated between 45–50% during 1970s and 1980s, when it decreased to 45% in the late 1970s and in early 1980s. It continuously decreased after the new peak of 1990. In 2007, the export volume of the black tea accounted for only 10.5% of the total export volume. It decreased by 20.1% when compared to 1950s and 35–40% when compared with 1960s to 1980s[7,1,3] In spite of the fact that the total export volume of Chinese tea increased synchronically with the increase of the total output volume (r = 0.97**), the export volume of black tea and its proportion in the total tea export volume in China displayed a synchronic increase before 1990 (annual average increase of 89.33% with 18% annually) and a striking decrease year by year after 1990 (a decrease of 68.3% i.e. -28.5% annually).

Main Challenges Faced by the Chinese Black Tea Industry

Due to the international and national political and economic situations, Chinese black tea has faced severe challenges since 1990s, where after its production and output volume and its proportions in the total China tea production and output volumes have greatly decreased. When compared to 1990, the output volume of Chinese black tea decreased by 49.0%, and the proportion of the total black tea output volume in the total tea output proportion of decreased from 20.31% to 4.91% in 2007. The export volume of black tea decreased by 9.82% and its proportion in the total export volume of Chinese six tea types decreased from 16.91% to 10.47% (Table 3 and Figure 3). This is because of the following reasons.

Firstly, the cost of black tea production has been higher than that of the average level of major tea production countries in the world, over a long period of time. According to statistics, in the middle and late 1980s, the production cost of Chinese black tea had reached US $1.5 per kilogram and was 6.3 times, 2.6 times, or 27.0% and 41.0% respectively, higher than those in Bangladesh, Kenya, Sri Lanka and India. Entering into the 21st century, the average production cost of domestic Black

Table 4. Change of average export price and cost of production of Chinese black tea

	US $ per tons									
Year	**1950**	**1960**	**1970**	**1977**	**1980**	**1984**	**1990**	**2000**	**2005**	**2010**
Export price	1087	733	750	1808	1666	2059	1597	1225	1115	1860
Production cost	1179	1415	1650	1734	1797	1810	2080	2850	3470	3580

Note: The production cost is calculated from the data obtained from some factories producing black tea in Guangdong.

broken tea increased further and reached over US $2.8 per kilogram. In 2010, it increased to US $3.58 per kilogram, $1.72 more than the average export price (Table 4). The high production cost of Chinese black tea is mainly caused by the high cost of production inputs, labor and energy as well as the low unit area yield.[14,10,19,11,18,17,16,8,12]

Secondly, the export price of black tea has been below the world average level over a long period of time. From 1960s to 1990s, the average export price of Chinese black tea was US $1471 per ton, which was much lower than those in North India (US $2221.5), Sri Lanka (US $1892.4) and Kenya (US $2028.1) and was 24.4% lower than the world average price of US $1945.4 per ton.[2,5] Entering into the 21st century, the average export price of Chinese black tea decreased further. In 2000, the exported black tea was 36,086,000 tons and the average price was only US $1225 per ton, which was much lower than those from India (US $2077), Sri Lanka (US $2378) and Kenya (US $2300) in the same year. The gap widened and reached 20% (Figure 4).

Thirdly, the export price of black tea and the domestic sale price have been reversed for a long period, which caused a shortage of the export goods supply. Since China opened up domestic market, the purchase price of exported black tea has been lower than the domestic sale price of black tea and other teas. Affected by the "double stresses" that the export cost of black tea has been higher than the world average cost and the export sale price of black tea has been lower than the world average price and domestic sale price over a long period of time, the business of black tea production became unprofitable and it was difficult to maintain the production. The growers had to shift to premium black tea and other teas for domestic market, which had higher price and were sold well with profit. This also resulted in the dramatic decline in the exports of Black broken tea.

For the above-mentioned three reasons, the production of Chinese export black tea has been nearly in an unprofitable state over a long period of time and caused the decrease of China Black tea production in the last twenty years.

Major strategies to promote the development of Chinese black tea industry

To promote sustainable development of Chinese Black tea industry, and to pay more attention on the changing supply and demand relations of international and domestic tea market, trade pattern and consumption structure and the existed problems faced by the China Black tea industry, the following four strategies and countermeasures have been put forward:

1. Rely on science and technology to improve management, reduce cost and enhance quality. As mentioned above, the greatest problems restricting the development of Chinese black tea are high cost, low quality and low sale price. In order to enhance the market competition of the traditional bulk export black tea, the unit cost must be reduced and the tea quality must be improved with great efforts. Firstly, mechanized picking, farming and processing technologies are recommended on a large scale, so to reduce the manual operation and labor costs. This is the most effective way to reduce the production cost of the tea. Secondly, advocate the fine clone cultivar with high unit area yield, and clean production techniques to improve the unit area yield. Thirdly, to energetically reform the tea processing techniques and advocate energy-saving technologies.

2. Adjust and optimize the production structure of the black tea and highlight Chinese characteristic "high fragrant" black tea products and the deeply-refined processing products. Emphasis should be to develop technology of extracting bioactive constituents, such as EGCG, theaflavin, tea polyphenol, theanine etc, in order to raise the added value of tea products.[6,4]

3. Speed up the establishment of Chinese International Tea Auction Center and on-line commercial tea market to greatly reduce the trade cost of black tea. The practice has proved that such trade methods have advantages of shortening transaction time, lowering transaction cost, promoting requisite production and sale and realizing "high price for high quality". Besides, the small-scale tea farmers must be guided to form voluntary professional tea cooperation organizations, so as to enhance the organization and industrialization of tea industry. It is quite beneficial to reduce the export cost of Chinese tea.[5,12]

4. Energetically carry forward Chinese tea culture, create famous tea brands and realize "high price for high quality" of Chinese black tea. It will promote the consumption of tea drinking and improve the popularity of tea products.

References

1. Cai J., 2006, Analysis of export situation of Chinese tea in 2005 and its expectation. *Chinese Tea* 2: 7–6.
2. Caleb O., 1993, Tea Production in Kenya and Scientific Research Contributions to its Success. *World Tea, International Symposium on Tea Science*, pp. 74–88.
3. Chang K., 2006, The Status of world tea production and sale of and its middle period expectation. *Chinese Tea* 1: 4–6.
4. Chen D. & Zhuo M., 2009, The research on recover and development strategies of Chinese black tea production and trade in the past 50 years. *China Tea* 1: 4–7; 2: 7–10.
5. Chen D., 1997, On trade development strategies (1, 2 and 3) of Chinese tea from the change of the international tea supply and demand relation. *Guangdong Tea* 54: 5–13; 55: 12–20; 54–57: 20–30.
6. Chen D., Ling C. & Zhuo M., 2008, Tea Art and Tea Appraisal Technology. Guangdong Science and Technology Press, Guangdong, pp. 3–80.
7. Chen Z., 1995, Thinking aroused by taking part in the 11th tea group conference among governments. *Chinese Tea* 2: 15–17.
8. Chen Z., 2005, Chinese Tea Culture. Shanghai Culture Publishing House, Shanghai, pp. 34–49, 213–221.
9. Cheng Q. & Zhuang X., 1995, World Tea Industry in 100 years. Shanghai Science and Technology and Education Press, Shanghai, pp. 15–48, 246–507.
10. Ding J., 1987, Research and discussion on world tea in the 20th century. *Guangdong Tea* 20(2): 15–21.
11. Ding J., 1990, Production and sale tendency of Kenyan and Indonesian tea. *Yunnan Tea* 1: 56–58.
12. Ding J., 2006, Brand - the engine for the sustainable development of Chinese tea. Briefing of International Tea Science and Culture Research Conference of the Overseas Chinese Tea Development and Research Foundation 111: 11–14.
13. Feng H., 2008, Chinese tea production and consumption. *Chinese Tea* 6: 4–6.
14. Huang J., 1985, Foreign affair department of the ministry of agriculture, stock raising and fishery, kenyan tea surpasses the former producing country. *World Agriculture* 1: 12.
15. Kong Z., 2005, Chinese Black Tea. Zhejiang Photographic Press, Zhejiang, pp. 1–50.
16. Ponniah S., 1993, Current status of tea production in Srilanka, World Tea, *International Symposium on tea Science*, pp. 63–73.
17. Sogo K., 1992, Production and consumption of tea in the World. *World Tea* 21–22.
18. Wang D., 1990, Change of international tea markets & main measures of tea producing countries. *Tea Report* 1: 15–17.
19. Wang Y., 1987, Analysis of production and sale status and future export tendency of Indian tea. *Guangdong Tea* 20(2): 1–7.
20. Xie T., 1985, Tea trade and merchants of Guangzhou before and after Opium War. *Guangdong Tea* 15(3): 1–6.
21. Zhuang X. & Wang X., 1991, Discussion on development strategy of Chinese tea from the change of international market. *Yunnan Tea* 2: 2–5.
22. Zhuo M., & Chen D., 2008, The thought of Guangdong modern tea industry building status tendency and development strategies. *China Tea* 6:12–14.

Tea bioactive compound extraction factory in Jiangsu

Rejuvenation with grafting in Guangdong

Renhua maimao - black tea variety

Clonal tea garden in Guangdong province

A red leaf cultivar of black tea-Zijuan

Nursery for raising clonal plants

Clonal tea garden (Yunnan province)

Cultivated Fenghuang Dancong tea plant, aged more than 700 years in Guangdong

A Yinghong No. 9 tea plant

Clonal tea garden in Yunnan

Sprinkler irrigation system in Yunnan Tea garden

Clonal tea garden in Yunnan

Tea garden in Guangdong Yinde Tea Research Institute

Tea garden in Guangxi