
Tea Culture and Tea Industry in Japan

Kanzo SAKATA

Professor Emeritus, Kyoto University

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Tea plant (*Camellia sinensis*) is one of a very few plants containing caffeine, a kind of narcotics, originates from Yunnan in China and was utilized as a medicine at the beginning and then as a drink as well as a food. The tea was introduced to Japan from China. Japanese people well developed tea manufacturing technology to produce unique teas such as *Matcha* (抹茶) and *Sencha* (煎茶), resulting in creating a culture, Tea ceremony [Chado or Sado (茶道)].

I . Brief History/Culture of Japanese Tea

Introduction of tea to Japan mainly happened three times. In 805 during *Heian* era (平安時代; 794~1185) the first one is made by Saicho (最澄: a Zen-master of 天台宗) *et al.* who had been in China to learn Buddhism. The tea was a kind of brick tea (団茶 or 餅茶) and was enjoyed by only limited higher classes of people. Some tea seeds are said to be brought back and planted (角山榮 2003).

In 1191 Eisai (栄西: a Zen-master of 臨濟宗) brought back tea which was popular in China [Song dynasty (宋代)]. The tea was also a kind of brick tea which is powdered to produce *Matcha* (末茶), a Chinese-style powdered tea. This is the second one. In 1210 (*Kamakura* era: 鎌倉時代) he wrote a book of tea (喫茶養生記) which describes all about tea, especially good effects for health and let the people know about tea. Tea seeds he obtained were planted at the north of Kyushu and transplanted to other area of Japan. So he is recognized as a founder of tea (茶祖) in Japan. In *Muromachi* era (室町時代; 1336~1573) tea bushes were eagerly cultured to make *Matcha* mostly for the people of higher society, and *Toucha* (鬪茶: a tea party to taste teas produced at different area or different grades of tea and tell the place produced or the grades), which is latter developed to *Chanoyu* (茶の湯: Tea ceremony), attracted people. (Kumakura 2002, 石田雅彦 2003) Those days Japanese people well developed manufacturing technology to make *Matcha* (抹茶), a Japanese style powdered tea. Shading technology is said to have already been applied to produce higher quality *Matcha* when Senno Rikyu (千利休; 1522~1591) established *Chanoyu* (茶の湯) that is developed to *Chado* (茶道).

Teas for ordinary people, *Batabata Cha* [バタバタ茶, a kind of dark tea (黒茶) in Japan] is said to have been produced at this time (角山榮 2003). However, most ordinary people still drank just hot water until the end of *Edo* era (江戸時代; 1603~1867).

The third one is the introduction of the tea in Ming dynasty(明代) in China by Ingen(隱元: a Chinese Zen-master of 黃檗宗) in 1661. The tea was a pan-fired green tea(釜炒茶) and was served after brewing in a tea pot. He made efforts to teach people how to grow tea plants and how to make the tea at Uji area in Kyoto, later resulting in the invention of Sencha(煎茶) by Nagatani Sohen(永谷宗門).

Baichao(売茶翁: 高遊外), a Zen-master of 黃檗宗, is said to have learnt how to enjoy *Sencha*(煎茶) at Nagasaki(長崎) in Kyushu from Chinese people and let people know how to brew *Sencha* around 1734. He acted in opposition against the formal Way of Tea [*Chado*(茶道)] in an attempt to return to the original form of the Tea ceremony. So he is called a founder of *Senchado*(煎茶道: the Way of Green Tea)(Kumakura 2002, 熊倉功夫 2004).

II. Teas in the World

Various types of teas are now produced all over the world. A few classifications of teas have been attempted, but they are not good enough to apply for all the teas from scientific points of view. We have tried a scientific classification of tea basically based on their processing methods(Fig. 1).(郭ぶん飛 *et al.* 2005) Teas can be basically classified into unfermented tea [不発酵茶: green tea(緑茶)], weekly fermented tea [弱発酵茶: white tea(白茶)], semi-fermented tea [半発酵茶: oolong tea(烏龍茶)], and fermented tea [発酵茶: black tea(紅茶)] based on the degree of fermentation(action of the endogenous enzymes in tea leaves) applied. There are very special teas [dark tea(黒茶) and pickled tea(漬物茶)] which are produced via microbial fermentation process. Some made teas are further processed to yield roasted tea(焙じ茶), brick tea(緊圧茶), flavoring tea(着香茶), *etc.* These teas are classified into processed tea(加工茶). Then any kind of tea now can find her seat in this classification. In Japan green teas(緑茶) have been nearly exclusively produced.

III. Overview of Tea Production in Japan

Tea seeds were brought back to Japan from China more than 1000 years ago. However, *Sencha*(煎茶)

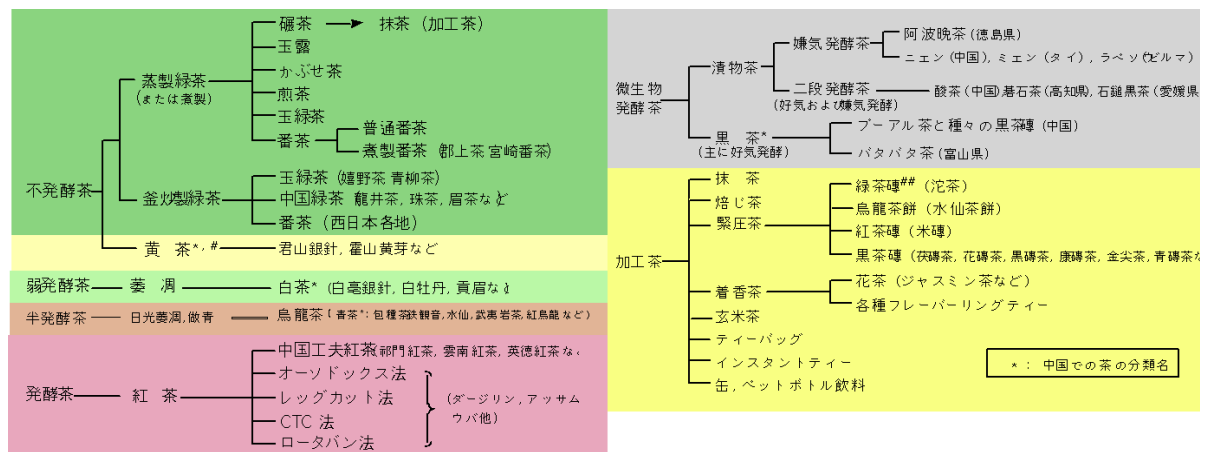


Fig. 1. Classification of tea in the world.

that is the most popular tea and known as Japanese green tea now in the world was invented by Nagatani Soen(永谷宗円) at Ujidawara(Kyoto) in 1738(only 270 years ago) after the third introduction of tea to Japan by the Zen-master Ingen(隠元). Before then tea was drunk after boiling with hot water(熊倉功夫 2002). Several types of *Bancha*(番茶) were produced as local tea drinks by applying the very primitive method here and there(中村羊一郎 2002).

1. Teas Produced in Japan

Table 1 shows recent tea production in Japan. Total tea production has been remaining at the same level (86,000~100,000 t) for recent 40 years, but recently it has been growing gradually and reached 100,000 t again in 2006. Most of the teas produced in Japan are green tea(unfermented tea)(Fig. 2). Fig. 3 shows the ratio of each tea production in 1987 and 2006 in Japan. Twenty years ago *Sencha*(煎茶) production was 80%, showing that Japanese tea is *Sencha*. *Bancha*(番茶), *Tamaryokucha*(玉緑茶), *Kabusecha*(かぶせ茶), and *Gyokuro*(玉露) are classified into green tea, and you can say green tea are exclusively produced in Japan.



Fig. 2. Classification of Japanese green tea.

Table 1. Recent tea production in Japan

(t)

Year	Total	玉露	碾茶	かぶせ茶	煎茶	玉緑茶	番茶	紅茶	Other
1987	96,300	390	667	3,130	76,400	5,310	10,400	1	228
1989	90,500	339	796	2,510	71,800	5,000	10,000	1	31
1991	87,800	384	811	3,100	69,400	4,640	9,500	3	29
1993	92,100	326	820	3,250	72,200	4,510	11,100	3	44
1995	80,400	305	820	3,080	63,900	3,840	8,020	4	544
1997	87,100	254	1,100	4,090	66,600	4,250	9,710	11	1,140
1999	88,500	236	925	3,920	65,800	3,870	12,600	12	1,230
2001	84,500	208	1,120	3,540	62,500	3,690	12,300		1,270
2003	91,900	208	1,420	3,910	67,100	3,490	14,500		1,240
2005	97,800	223	1,600	3,950	68,700	3,580	17,900		1,810
2006	100,000	227	1,630	4,040	70,200	3,720	18,200		1,850

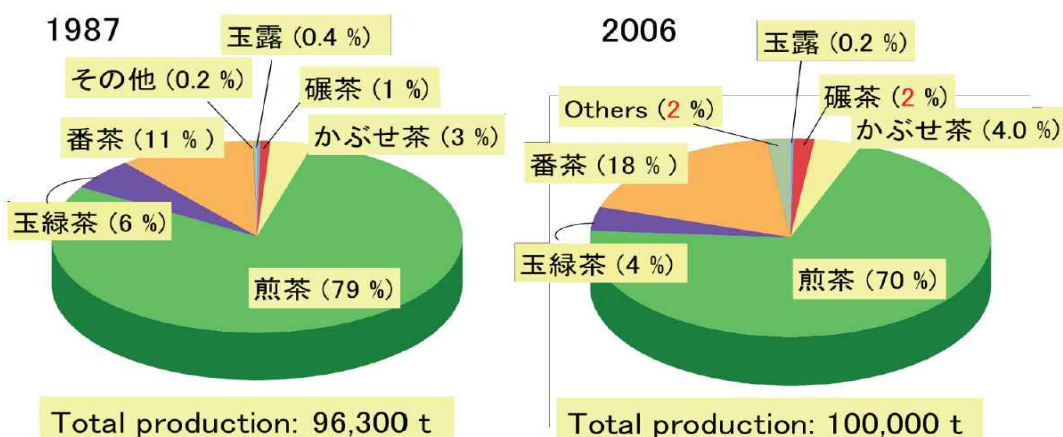


Fig. 3. Ratio of each tea production in Japan in 1987 and 2006.

IV. New Development of Tea Industries in Japan

Tea is said to be first taken as a medicine at the beginning. The history of tea drinking is ancient, but investigation into the chemical components of tea is quite recent. Caffeine was discovered in tea in 1827, and then Vitamin C in 1924, and epicatechin and epicatechin gallate in 1927 and 1935, respectively (伊奈和夫 *et al.* 2007). Since the concept of “Functional foods” has been developed in 1970s, people began to pay attention so much on any foods that are good for health from the functional food points of view. Among functional foods tea is the best known. Since the late Dr. T. Kada of National Institute of Genetics for the first time reported the effect of tea catechins on bioantimutagenicity by Spore rec-assay, tea catechins withdrew attention of researchers in the world. But purification of polyphenolics was so difficult in those days that pure tea catechin was very difficult to obtain. Dr. Y. Hara of Mitsuinorin Co. Ltd. has succeeded in isolation of each catechin by HPLC in considerably large scale and delivered voluntarily the valuable catechin samples to researchers who want them for study all over the world. These efforts were fully rewarded in the following 10-years-time. Many scientific studies revealed good effects of catechins for our health in substance level or molecular level such as antioxidative, radical scavenging, antibacterial, anti-carcinogenic, antiviral, hypoglycemic, and hypotensive actions as well as cancer prevention, lipid lowering effects, *etc.* (Yamamoto *et al.* 1997, Hara 2001, 村松敬一郎 *et al.* 2002). These news were reported in the papers, magazines, TV, radios, *etc.* and now even housewives know the name of catechin in Japan.

Recently theanine, one of main constituents of tea leaves, also has been reported to show many kinds of beneficial effects for our health. Theanine is now enzymatically synthesized in industrial scale and used for supplemental tablets to reduce stresses (Chu *et al.* 1997).

Recent studies have revealed that methylcatechin [epigallocatechin-3-*O*-(3'-*O*-methyl) gallate (EGCG3''Me) and epigallocatechin-3-*O*-(4'-*O*-methyl) gallate (EGCG4''Me)] shows antiargenic effects (村松敬一郎 *et al.* 2002). The methylcatechins are not contained in the tea leaves of cv. Yabukita that is the most popular cultivar (76% in 2000) in Japan, but in cvs. Benifuji, Benifuhki, Benihomare, *etc.* which are suitable for black tea production. So these species of cultivar are now increasing the area to make new tea products from these species. Because there are a big demand for such goods containing functional compounds effective for an-

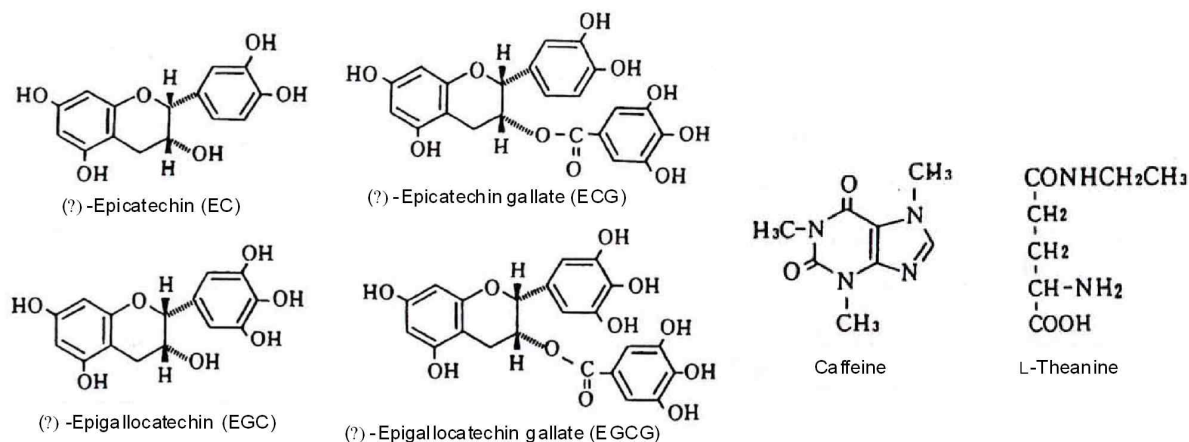


Fig. 4. Structures of main tea constituents (tea catechins, caffeine and theanine).

tiargenic effects. These are new trends recently developed in tea industries.

As shown above tea leaves have been demonstrated to contain many kinds of bioactive constituents. So not only catechins but also powdered tea are now industrially used in various fields as shown below (Hara 2001, 村松敬一郎 *et al.* 2002). Industrial utilization of tea constituents as well as tea leaves are now extensively applied in various area.

- a) Based on the biological activities of catechins
 - 1) Utilization of various functions of catechins
 - 1-1. Supplements in capsules or as pellets

Crude catechins together with other functional compounds such as Vitamins, oligosaccharides, *etc.*
 - 1-2. Drinks fortified with catechins
 - 1-3. Eggs with low content of fat
 - 1-4. Application for animal husbandry
 - 2) Utilization of antimicrobial and antiviral activities of catechins
 - 2-1. Candies for curing throat-ache
 - 2-2. Air-filters for air-conditioners
 - 2-3. Antiviral masks
 - 2-4. Clothes dyed with green tea infusion
 - 2-5. Bacteriostatic uses for foods
 - 3) Utilization of antioxidative activities of catechins
 - 3-1. Crude catechins to preserve the freshness of salted or dried-fish and to suppress natural food colors
 - 3-2. For cosmetics
 - 4) Utilization of deodorant activity of catechins
 - 4-1. Mouse deodorizing tablet and chewing gum
 - 4-2. Deodorants for kitchen use, refrigerator, freezer, paper diaper, *etc.*
 - 5) Utilization other activities of tea catechins
 - 5-1. Slug and snail spray
 - 5-2. Building materials containing catechins with the ability to absorb formaldehyde

- 6) Utilization of pure catechins
 - 6-1. Cataloged compounds for research
 - 6-2. The first medicine from tea(an ointment for external genital warts)
- b) Based on the activities of theanine
 - 1. Theanine tablets to reduce stresses
- c) Utilization of total function of tea leaves
 - 1. *Matcha* or Powdered tea for confectionary, cakes, ice cream, noodles, *etc.*
 - 2. Green tea for eating is also in the market.

V. Production of Tea Drinks

As tea is gaining reputation of goodness for your health based on the recent scientific studies, tea products especially canned or pet-bottled tea drinks have withdrawn people's attention so much. Fig. 5 shows recent annual production of soft drinks and tea drinks in Japan(伊奈和夫 *et al.* 1997). Black tea drinks were in the market since a long time ago. Oolong tea drinks appeared in the market in 1981 and green tea one followed. In 1985 production of tea drinks was only about 120×10^3 kL, but it dramatically increased upto $5,449 \times 10^3$ kL(30% of soft drinks) in 2005. As Fig. 5 tells you, the main reason is the incredible increase of bottled green tea.

Tea manufacturers and traders in Japan complain that so much green tea drinks are sold, but green teas themselves are not sold so much. But I think this trend will soon give big effects on tea markets. Because younger generations used to prefer coffee drinks, sports drinks, and so on. They drank little of tea, but now they began to drink tea. They are learning the taste of tea and will never forget the tats and flavor of tea. The green tea drink market has grown so much and competition in the market is getting serious. The manufacturers are sending tea drinks with better quality than before to win the competition. Actually the quality of tea drinks is getting better year and year. At the beginning tea drinks were produced from low quality green tea produce outside of Japan. However, some manufacturers have made contract with tea farmers to have material green tea for drinks. Actually production of the second flush green tea is gradually increasing

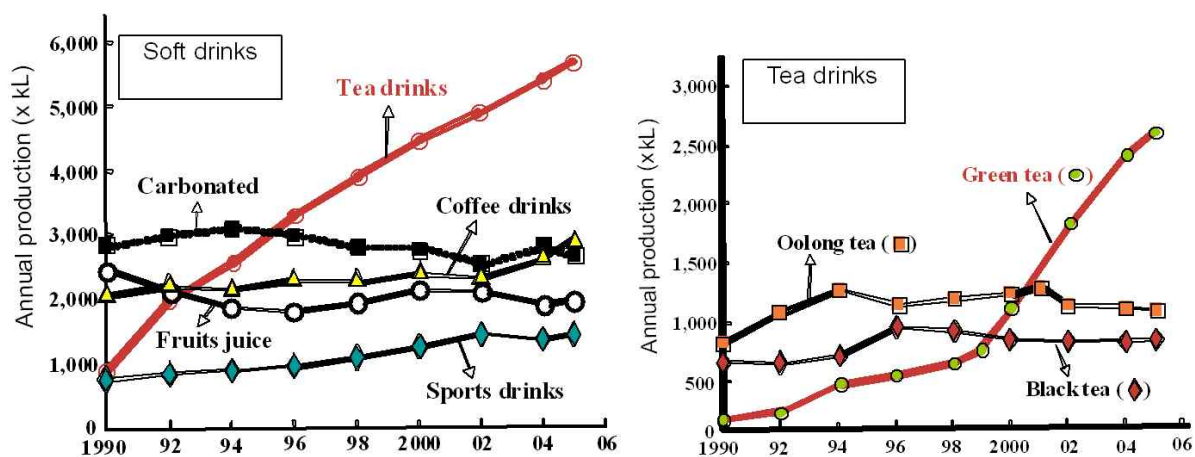


Fig. 5. Annual production of soft drinks and tea drinks in Japan(伊奈和夫 *et al.* 2007).

recently. This is one of the effects by the trend. The people who learnt the flavor and taste of tea want to drink tea with better quality. The tea producers, especially tea traders do their best to create something to attract the younger people who began to take tea drinks and let them to enjoy brewed tea of better quality of tea.

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