How to brew Japanese green tea

Kawamura Suikoen (川村翠香園), founded in 1912

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1. Introduction

History of tea and drinking tea

- Any kinds of tea (green tea, black tea, oolong tea, etc.) have their roots in Yunnan (southwest China).
- ``Cha'' (in old Cantonese, 広東語) transmitted overland to other countries, ``The'' (in old Hokkien, 福建語) transmitted by sea to other countries.
- The origin of drinking tea: a Chinese myth
  - In the mythical world (about 5000 years ago), the god emperor (a Chinese god of agriculture and medicine, 神農帝) examined various wild plants and grasses by eating them and selected good ones which people can eat. It is said that he found 72 poisonous plants and grasses a day, and thus he had to be detoxified with tea leaves at each time.
  - This story is a myth, but many people agree to the fact that tea leaves were treated as a medicine (antidote); even now in Japanese, drinking tea is said to take a dose. When we drink tea, it is said to take a dose (Ippuku suru, 一服する).

The origin of Ocha (Japanese green tea)

- A record: the first tea was drunken in 815 (Kounin 6) at the beginning of the Heian era (平安時代, 794-1185) in Japan.
  - The characters representing tea were engraved in poetry collections written during the Heian era; drunk among the royal family, aristocrats, and Buddhist priests.
  - In Edo era (江戸時代, 1603-1867), green tea came to be popular among ordinary people. Technology for processing tea leaves advanced during that era.

  In 1770s, Soen Nagatani (永谷宗円) developed a method for making steamed green tea and proposed to the tea trader, Kahei Yamamoto (山本嘉兵衛), at Edo (currently, Tokyo). Yamamoto found that it was much better than roasted green tea in terms of color and aroma. Since then it spread throughout Edo.
- Due to the World War II, etc., the production of tea leaves remarkably declined, although it recovered after the War.
- Recently, Japanese green tea is drunken also overseas; export volume renews records every year.

2. Making Aracha (crude tea)

Making Aracha (crude tea, 荒茶) 1: mowing

- Seasons for mowing tea leaves
- 1st-mowed cha: late April - mid May (supreme quality)
- 2nd-mowed cha: early June - mid June
- 3rd-mowed cha: late July – early Aug
- 4th-mowed cha: mid-Sept - early Oct

Makeing Aracha 2: Steaming

- Sateaming immediately after mowing to stop fermentation (青殺)
- Time for steaming changes tastes and flavors.
  - 30 sec (light-steamed, 浅蒸し茶):

    pale golden green, fresh and crispy taste
  - 1-2 min(deep-steamed, 深蒸し茶):

    dark green, rich taste

Making Aracha 3a: Sojuu (粗揉)

- Shaking tea leaves while applying hot air
  - Steamed tea leaves have plenty of moisture; take up the moisture carefully and gradually.

Making Aracha 3b: Juunen (揉捻)

- Rolling, pressing, and rubbing tea leaves
  - Homogenizing moisture content in tea leaves.

Making Aracha 3c: Chuujuu(中揉)

- Drying moisture floating on the surface of tea leaves in a rubbing process with a direct flame drum

Making Aracha 3d: Seijuu (精揉)

- stretching rounded tea leaves, shaping, and drying up

Making Aracha 4: drying up

- Drying up to reduce the moisture content to 5% or under.
  - Tea leaf is easily degraded and spoiled when it contains more than 5% moisture.

Aracha (crude tea, 荒茶)

- Samples of completed Aracha sent to wholesalers
- Wholesalers compare Aracha made by farmers and select ones with better quality

3. Making Sencha from Aracha

1st process

- Sorting: Sencha (non-powdered tea, 煎茶) is made by sorting, separating, sieving and cutting, and roasting.
- Cut Aracha is sort by parts
  - Non-powdered leaf
  - stem
  - powder
  - Paraphyllium (hair, 毛葉)
  - Atama-yamagi (頭柳): top of the leaf?

Centrifuge (廻し)

2nd process

- Separating Aracha into large parts and small parts with a sieve which turns round (centrifuge, 廻し).
  - The larger parts enter a machine which takes hair (毛葉) away with static electricity called ``electric bar'' (電棒), and then they go to the next parallel sieve (平行篩).
- The heavy parts become part of Sencha and the light parts become powder.

Parallel Sieve (平行篩)

3rd process

- Sieving and cutting
- Large parts are cut into an appropriate size by a parallel sieve (consisting of upper sieve and lower sieve).
- The mesh of parallel sieves can be adjusted to the size.
- (See the picture, previous page!) The upper sieve has a large mesh and the lower has a small mesh; tea leaves that do not pass by the upper sieve is designed to be cut again and go back to the lower sieve.
- The size of Aracha is well-prepared in uniform size by being putted through a parallel sieve several times.

4th process

- Roasting (火入れ): The heavy parts separated with a centrifuge and qualified in color as Sencha by a color-separating machine are blended and roasted.

- In this process, moisture content which was 5% at the stage of Aracha is reduced to 3%.

- Drying is not the only purpose. Roasting brings out the rich taste and flavor that tea leaf has. It is the most important process to influence the taste and scent of tea.

Dryer 1

Dryer 2

Dryer 3

4. Area and variety

Producing area and leaf variety (2012)

Rank	Area	Share	Volume	Cultivar
1	Shizuoka	40.00%	31,800 t	Yabukita
2	Kagoshima	28.60%	22,700 t	Yutaka-Midori, Yabukita, Sae-Midori
3	Mie	8.60%	6,830 t	Yabukita, Sayama-Kaori, Oku-Midori
4	Miyazaki	4.60%	3,620 t	Yabukita, Sae-Midori
5	Kyoto	4.00%	3,190 t	Yabukita, Gokou, Ujihikari, Asahi

- 76% of tea leaves planted in Japan is Yabukita.
- Second place is given to Yutaka-Midori, 5% share of the whole, third place is given to Sayama-Kaori, 2%, and fourth place is given to Oku-Midori, 1.5%.
- In Shizuoka, more than 90% of the cultivated area is occupied by Yabukita.

Features of variety (tasting them!)

- Yobukita (place of origin is Shizuoka)
- Most popular and widely spread throughout Japan from Shizuoka, because it is more palatable than native species that had been bred since long ago, and it is strong against pests and also has cold-resistance. Bud growth is also uniform and yield is high, so it is also the most contributing product to the development of Japanese tea industry.
- It is excellent in mediocrity, suitable or either light steaming or deep steaming. It is also suitable for open field cultivation.

sweet	★★★★☆	fragrance	★★★☆☆
astringent	★★★☆☆	color (in water)	★★★☆☆
bitter	★★☆☆☆		

- Yutaka-Midori (place of origin is also Shizuoka)

- Invented in the laboratory for tea industry examination in Shizuoka, but the season for plucking is early. It is not cold-resistant and thus vulnerable to damage by freezing frost, although the yield is high.
- brought up in warmer places, e.g., Kagoshima. It is compatible with the weather conditions in Kagoshima, and now it has become a major variety there.
- necessary to cover the tea leaves to block sunlight and steam them deeply. If appropriately managed, it is not difficult to brew high-quality tea with a strongly sweet and less bitter taste

sweet	★★★★☆	fragrance	★★★☆☆
astringent	★★☆☆☆	color (in water)	★★★★☆
bitter	★★☆☆☆		

- Sae-Midori

- a multiplicative cultivar of Asatsuyu (朝露) and Yabukita. It is a cultivar for Gyokuro (玉露), which is cultivated with cover to block sunlight.
- It was named Sae (brilliant or clear) Midori (green), because of its clear color. It is characterized by strong sweetness and blue-green color. Less catechin, less astringentcy and thus easy to drink.

sweet	★★★★★	fragrance	★★☆☆☆
astringent	★☆☆☆☆	color (in water)	★★★★★
bitter	★★☆☆☆		

Judgement criteria of deep-steamed green tea

- appearance
  - Glossy and well-steamed one is good tea.
  - Those which are shattered or not steamed uniformly are not good ones.
- color (in water)
  - Rich green is good. Yellow of the mill-bud (young leave) is a proof of good quality.
  - Those which are close to red are possibly defects.
- fragrance
  - Good tea has no grassy smell. Grassy smell implies that it is not well-steamed.
  - If you feel scent of flowers, then it is possibly fermented. Truly, it is disadvantage as green tea, but in some case it is delicious.
- taste
  - Strong taste is good, but the balance between astringency and bitterness is most important
  - If you feel that acidity and bitterness is too strong, then it is never good.

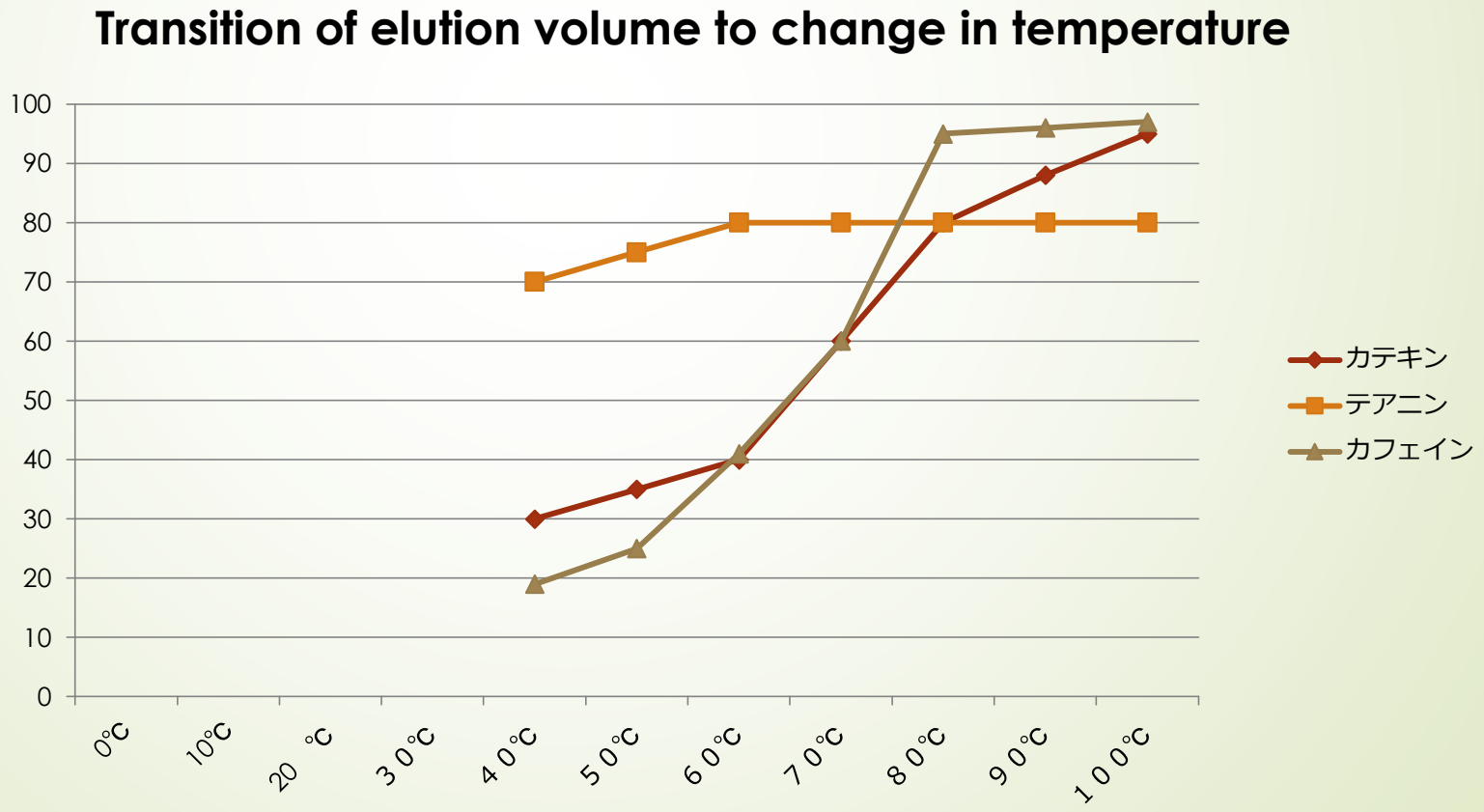
5. How to brew delicious Japanese green tea

How to brew tasty Ocha (practice)

- water…important!
- 99% is hot water, even if brewed by using a small teapot (急須) and with tea bags
- But no problem if you choose soft water (low level of calcium and magnesium), although water is basically odorless and tasteless.
- Use hot water boiled once and cool down to match the characteristics of tea.

Temperature

- Sweet taste is due to amino acid (theanine, テアニン), astringent taste is comes from to polyphenol (catechin, カテキン), and bitter taste is related to caffeine (カフェイン).
- The dissolution of these ingredients changes depending on the temperature of water. By controlling the temperature according to the type and grade of tea leaves, it is possible to brew tea that draws out various features.



- As is seen in the above graph, 70% of the ingredients begin to elute amino acids (theanine) even at 40° C, while catechin, tannin etc. are eluted only by 20% to 30%.

- Supreme-quality Sencha (高級煎茶) and Gyokuro (玉露) is delicious when brewed at low temperature. The reasons are mentioned as above.

Temperature and extraction time to make a brew tea

Remarkable Umami, essentially tasty, supreme-quality Sencha (高級煎茶) or Gyokuro (玉露)	Strong astringency and bitterness, more stimulus, full of catechin and caffeine for drowsiness and drunkenness, Bancha (番茶) or powdered tea (粉茶)
Taste and fragrance are discreet, less stimulus, for infants and the elderly	Fragrance, focusing on fragrance, heavily roasted green tea (ほうじ茶), stem tea (茎茶), brown rice green tea (玄米茶)

Lower ← Temperature → Higher

Longer ← Extraction Time → Shorter

Amount of tea leaves

- Choose as you like according to your favorite taste.
- In general, 1 cup of tea;
  3g of tea leaf per 100ml of hot water
- When serving for 3 or 4 cups, 2g per 100ml

Fluorine
Fluorine

Useful ingredients of tea and its efficacy

- Catechin: strong sterilizing power. weakening flu virus. Allergy suppression.
- Caffeine: recovery from fatigue, arousal effect, cerebral stimulation, cardiotonic action, diuretic effect.
- Theanine: mitigating the effect of caffeine, relaxing by acting on neurons of brain.
- Vitamin: Vitamin C prevents cold and keeps beautiful skin. Vitamin E has an anti-aging effect.
- Dietary fiber: prevention of colorectal cancer.
- Fluorine: strengthening the tooth surface and preventing tooth decay.
- Minerals: promoting metabolism.
- Saponin: sedation, analgesia, hypolipidemic effect, thrombotic preventive action.