Script

Title:TEA LEAF PROCESSING

This episode deals with classification of tea., Protective compounds & Nutrition facts and processing,ect. The following topics are highlighted

1. **Introduction**
2. **Classification of tea**.
3. **Methods of Tea Production.**
4. **Preservation of tea.**
5. **Protective compounds & Nutrition facts in tea.**

1. Introduction

Tea is one of the most popular and lowest cost beverages in the world, next only to water. Tea is consumed by a wide range of age groups in all levels of society as well as one of the healthiest. Since tea was first discovered in China, it has traveled the world conquering the thirsts of virtually every country on the planet.

The discovery of tea occurred in 2737 BC by the Emperor of China. For many years, people drank tea because of its herbal medicinal qualities. During the time of the Western Zhou Dynasty, tea was used as a religious offering. Further to the Han Dynasty (202 BC – 220 AD), tea plants were quite limited and only royalty and the rich drank tea not only for their health but also for the taste. In the period of Tang Dynasty (618 – 907), drinking of tea became more common among lower classes and spread to Japan by Japanese priests studying in China. Similar to the Chinese

adoption of tea, tea was first consumed by priests and the rich for its medicinal properties.

The Emperor of Japan enjoyed tea very much and imported tea seeds from China to be planted in Japan, making tea available to more people. Tea is often associated with Zen Buddhism in Japan because priests drank tea to stay awake and meditate. Soon, the Buddhists developed the Japanese Tea Ceremony for sharing tea in a sacred, spiritual manner.

During the 17th century tea was import to Britain via the East India Company. In the aristocratic society tea was used in the parties and soon it became a common way for to drink tea. Due to heavy import of tea by Britain, the taxes were so high that smugglers would get and sell tea illegally for those that could not afford it. In attempts to turn profits during the tea smuggling period, the East India Company began exporting the tea to America. The American tea was also taxed heavily and contributed to the cause of the Boston Tea.

Finally tea arrived in India and plantation was started in 1823, when wild tea plants were discovered by the British in the forest of Assam. Now, India is the second largest tea producing country in the world. The world's largest tea plantation is found on the foot-hill regions of the Eastern Himalayas and the Brahmaputra valley.

2. **Classification of tea**. Tea is traditionally classified based on the degree or period of "fermentation" the leaves have undergone. The different types of tea are given below: -

(a) Green Tea
(b) Yellow and fermented Tea
(c) Oolong and white Tea
(d) Black Tea

(a) Green Tea. The ancient Chinese society (now southern China) first encountered the tea plant and processed it as another medicinal herb for use in Chinese herbology. The technique used for processing the fresh tea leaves was to immediately steam the fresh tea leaves and dry them for preservation, which is likely the most ancient Chinese form of tea leaf processing. This processing method was perfected near the end of the Han Dynasty (202 BC – 220 AD) and produced a dried tea that would be classified today as "green tea" and quite similar to modern Japanese sencha.

This type of tea has undergone the least amount of oxidation. The oxidation process is halted by the quick application of heat after tea picking, either with steam, the Japanese method, or by dry cooking in hot pans, the traditional Chinese method. The tea is processed within one to two days of harvesting.

(b) Yellow and fermented Tea. This use of steam in fixation for tea leaf enzymes is an important step in processing tea, with the leaves to be quickly cooled down and undergo further processing. This initiates oxidation in the chlorophyll of the leaves through non-enzymatic and non-microbial means, which results in a yellowish or greenish-yellow colour. The less tightly controlled methods of it in the past resulted in the creation of "yellow tea" when the tea leaves were over-steamed for fixation or were not quickly spread out, doused with water and cooled.

(c) Oolong Tea. This tea's oxidation is stopped somewhere between the standards for green tea and black tea. The processing typically takes two to three days from withering to drying with a relatively short oxidation period of several hours. The term "Oolong" is used specifically as a name for certain semi-oxidized teas. in Taiwan is the large producer of Oolong.

(d) Black Tea. In this process, the tea leaves are allowed to completely oxidize. Black tea is first withered to induce protein breakdown and reduce

water content (68-77% of original). The oxidation process takes between 45–90 minutes to 3 hours and is done at high humidity between 20-30 degrees Celsius, transforming much of the leaves into complex tannin. Orthodox processed black teas are further graded according to the post-production leaf quality by the Orange Pekoe system, while *Crush, Tear, Curl* (CTC; or "Cut, tear, curl") teas use a different grading system. Orthodox tea leaves are heavily rolled either by hand or mechanically on a cylindrical rolling table or a rotorvane. The rolling table consists of a ridged table-top moving in an eccentric manner to a large hopper of tea leaves, of which the leaves are pressed down onto the table-top. The process produces a mixture of whole and broken leaves, and particles which are then sorted, oxidized, and dried. The rot vane consisted of an auger pushing withered tea leaves through a vane cylinder which crushes and evenly cuts the leaves. CTC black teas is a production method developed by William McKercher in 1930 and consist of machines with contra-rotation rotors with surfaces patterning that cut and tear the leaves producing a product popular for use in tea bags. The rotovane to often use to precut the withered tea prior to the CTC and to create broken orthodox processed black tea.

During the Qing Dynasty, both lapsang souchong and gongfu black tea were well recognized in China and noted in "Records on Yiwu mountain" by the scholar Dong Tiangong.

3. **Methods of Tea Production.**

In ancient days the production of tea was a time being process, nowadays the same has been made simple by adopting scientific and technical procedures. Tea production has been divided into two types: -

(a) **Orthodox Production**. This is one type of common tea production. The following five basic steps are being followed in this tea production: -

Step 1. Plucking: In this process, the leaves are harvested by hand. There are mainly three types of plucking systems, they are scale leaf plucking, fish leaf plucking & mother leaf plucking.

It is usually ranging between just the unopened bud to the top three leaves and the bud, depending on the tea being created. In order to make hand plucking possible, the tea "trees" are trimmed into waist-high bushes. After completion of plucking, the leaves are arranged for uniformity and any stems, twigs, broken leaves, etc. are removed.

Step 2. Withering: The leaves are placed to wilt and wither for many hours to prepare them for further processing. Tea leaves, even fresh tender ones, aren't very flexible. Without withering, they would shatter and crumble when rolled and shaped. During withering, the leaves are gently mess up, rotated and monitored to ensure even exposure to the air.

Step 3. Rolling: In this method many varieties in tea appearance are created, and also where the process of developing flavor is started. When the tea leaves softened they are rolled, pressed or twisted to break the cell walls of the leaf, wringing out the juices inside. This exposes enzymes and essential oils in the leaf to oxygen in the air as to create oxidation.

Step 4. Oxidation: After rolling, the leaves are placed out to rest for many hours, allowing oxidation to take place. Oxidation is the process in which the oxygen in the air interacts with the exposed enzymes in the leaf, turning it a reddish-brown color by changing the chemical composition. This step helps to create many wonderful and complex flavors in tea. The length of this process depends on the type of tea

being produced and the ambient conditions at the time. Depending on the kind of tea, from here the leaves could be rolled again and oxidized further, or not.

Step 5. Firing: The final step in the production process is to "fire" or heat the leaves rapidly to dry them to below 3% moisture content and stop the oxidation process. A good, even drying with very little residual moisture also make sure the tea will keep well.

(b) **CTC Production**.

CTC, or Crush-Tear-Curl production is a very different process. All five steps of Orthodox processing are performed, but much more rapidly and in a limited fashion. CTC was invented specifically for the black tea industry,

in an effort to save time (a single batch of tea otherwise can take over a day to produce) and money.

The three basic differences between Orthodox and CTC teas are:

(a) The appearance of the leaf. Orthodox production, whether totally hand-made or with assistance from rolling machines and such, seeks to maintain the reliability of the leaf. The tea leaves are not cut, worn, minced, etc. The shapes produced vary tremendously, but no matter whether it's green tea, oolong or black, Orthodox processing uses the entirety of the leaf itself to create a different range of flavors in the cup. By contrast, CTC teas do not rely on the wholeness of the leaf.

(b) The machinery involved. CTC is produced on a machine which takes fresh, whole leaves and macerates them (crushing, tearing and curling them, hence the name). The ground up leaf is rolled into small pellets and oxidized. The tea produced visually be similar to grape nuts cereal or large coffee grounds. Because the leaf is totally broken up, every part of the process moves very rapidly. A whole batch can take just two hours. In Orthodox processing, while some tea leaves can look very small at the end, the leaves are never deliberately cut or torn apart. They are carefully rolled and handled to produce a certain flavor, and their production relies on accurate tea artisans who have trained for years - in many cases, generation - to make that exact tea.

(c) The flavor profile. As mentioned, CTC was invented specifically for black tea production. These fast-infusing teas are ideal for the tea bag industry, as well as for use in spicy chai blends and iced tea (because of the color). Their flavor is very one-dimensional: bold, powerful and brightly coloring with a strong astringency. Orthodox teas - because the leaf is not treated the same way - don't produce this type of color and body. However, CTC cannot produce the tremendous range of flavor and aroma which Orthodox teas are loved for. The CTC method can't be used to make white

teas, oolongs, etc. The shredded leaf oxidizes too quickly. There are a few CTC green teas, but this is accomplished by steaming the leaves to prevent oxidation. That's about as elaborate as it gets. Secondly, because Orthodox production requires so much time, the tea maker is able to draw out and develop very fine distinction flavors. Everything done to the leaf will alter the flavor of the tea.

4. **Preservation of tea.**

The proper storage of tea is of the utmost importance, as tea which is improperly stored will go stale or rancid much faster, or can collect impurities that both alter the flavor and aroma and can also harm the body. Therefore it is very important to learn how to properly store your teas so that they remain as fresh, clean and flavorful as possible.

There are five things which teas are vulnerable to ; light, air, heat, odors and moisture. These five things will rapidly make your stored teas go bad.

5. **Protective compounds & Nutrition facts in tea.**

Polyphenols including flavonoids are naturally occurring plant chemicals (called phytochemicals) that are found in tea and have strong antioxidant properties. Antioxidants are agents that protect cells against damage caused by free radicals and reduce the damage caused by low density lipoprotein (LDL) or 'bad' cholesterol in the blood.

Tea contains a particular variety of polyphenols known as catechins. Catechins are considered to have properties that protect or act against cancer (anticarcinogenic), tumours (antitumorigenic) and unwanted genetic changes (anti-mutagenic).

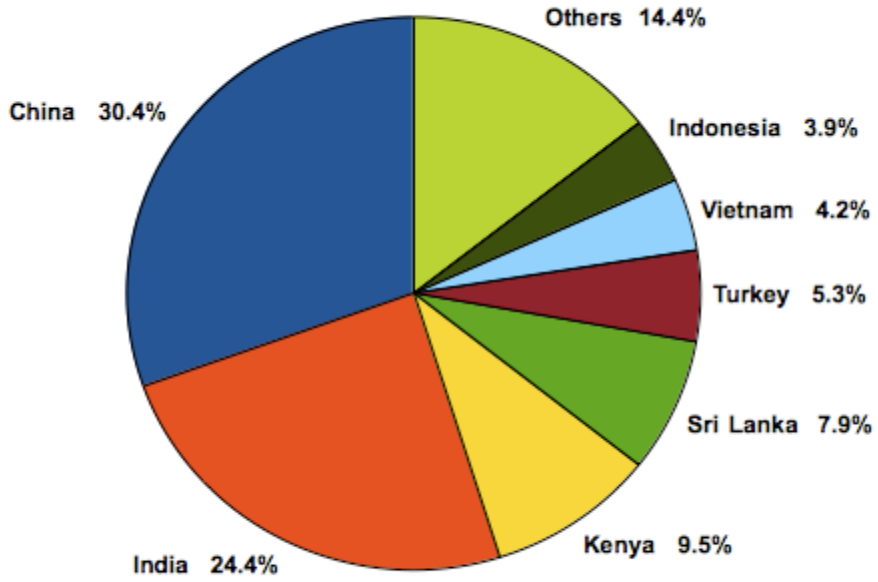
Nutrition facts

Amount Per 100 grams		
Calories 1		
Total Fat	-	0 g
Saturated fat	-	0 g
Polyunsaturated fat	-	0 g
Monounsaturated fat	-	0 g
Cholesterol	-	0 mg
Sodium	-	4 mg
Potassium	-	18 mg
Total Carbohydrate	-	0.2 g
Dietary fiber	-	0 g
Sugar	-	0 g
Protein	-	0.1 g
Caffeine	-	11 mg

Loose tea

The tea leaves are packaged loosely in a canister, paper bag, or other container such as a tea chest. Some whole teas, called gun powder tea leaves, which resist crumbling, are sometimes vacuum packed for freshness in aluminised packaging for storage and retail. The loose tea must be individually measured for use, allowing for flexibility and flavor control at the expense of convenience. Strainers, tea presses, filtered teapots, and infusion bags prevent loose leaves from floating in the tea and over-brewing. A traditional method uses a three-piece lidded teacup called a gaiwan, the lid of which is tilted to decant the tea into a different cup for consumption.

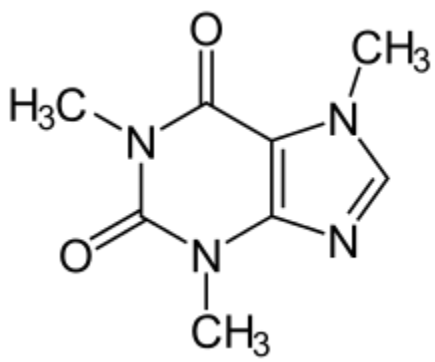
6. **Major Contribution of tea in the world.** The graph shows the production of tea from 2006 to 2014, by major producing countries. China produced approximately 1.9 million metric tons of tea in 2012, up from about 1.02 billion metric tons in 2006.



Caffeine is a central nerous system (CNS) stimulant of the methylxanthin class of psychoactive drugs. It is found in the seeds, nuts, or leaves of a number of plants native to South America and East Asia. The most well known source of caffeine is the seed (commonly incorrectly referred to as the "bean") ofCoffea plants. Beverages containing caffeine are ingested to relieve or prevent drowsiness and to increase one's energy level. These beverages are very popular; in North America, 90% of adults consume caffeine daily.

Caffeine is classified by the FDA , as GRAS. Toxic doses, over 10 grams per day for an adult, are much higher than typical dose of under 500 milligrams per day. A cup of coffee contains 80–175 mg of caffeine, depending on what "bean" (seed) is used and how it is prepared .Thus it requires roughly 50–100 ordinary cups of coffee to reach a lethal dose. However pure powdered caffeine, which is available as a dietary supplement, can be lethal in tablespoon-sized amounts. There are several known mechanisms of action to explain the effects of caffeine. The most prominent is to reversibly block the action of adenosine on its receptor, which blocks the onset of

drowsiness induced by adenosine. Caffeine also stimulates certain portions of the autonomic nervous system



Caffeine (INN)

Caffeine is used in:

- Bronchopulmonary dysplasia in premature infants for both prevention and treatment. It may improve weight gain during therapy and reduce the incidence of cerebral palsy as well as reduce language and cognitive delay. On the other hand, subtle long-term side effects are possible.
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Conclusion.

- The word "tea", normally people think it as a kind of beverage drunk by elderly, or perhaps, it may be a source of inspiration to those poets as well. It is an helpful drink for our digestive after meals, apart the tastiness of the tea food. It is also used to clear away the grease in meat and get away the fishy smell of the sea food, too with its unique fragrance.
- Tea may reduce some cancer and risk of heart disesases but the research is not conclusive. The protective agent in tea seem to be a group of polyphenols and known as catechins. White tea, grean tea, black tea & Oolong tea all contains catechins.
- The process in tea manufacture is to minimise the transformation occuring in processing procedure so as to preserve and the positive substances possible while destroying negative substances and producing catechine rich tea. The

composition of tea contents such as caffeine, theopronime, theophyline, catechins, essential oils, aldehydes, various vitamins are found to be rare and valuable compounds and makes it a nutritionally valuable product.

- In developing countries, tea production is helpful for farmers to move out of poverty and transform their operations into viable businesses, reduce the environmental impact, and stimulate local economies.

Reference:

1. Hilal and, Y.; Engelhardt, U. (2007), "Characterisation of white tea – Comparison to green and black tea" (PDF), *J. Verbr. Lebensm.* (2): 414–421
2. Hoh, Erling; Mair, Victor H. (2009), *The True History of Tea, Thames & Hudson*, Thames & Hudson, ISBN 978-0-500-25146-1
3. Bokuchava, Mikhail A., and Nina I. Skobeleva. "The chemistry and biochemistry of tea and tea manufacture." *Adv. Food Res* 17 (1969): 215-292.