12 Tea, Coffee and Cocoa Processing

Contents at a glance

Nearly three quarter of the human body consists of water. Water keeps the body hydrated, helps in digestion and absorption of our food and transport throughout the body. The body continuously losses water through sweating, urination, etc. Therefore it is very important to replace this water otherwise it will disturb the body balance. We may replace this lost water through a drink. Beverages are of utmost importance to replenish the body.

Definition: Beverage is any kind of liquid intended for human consumption. In addition to their basic function of quenching thirst, they also play an important role in social culture. These include tea, coffee, cocoa, soft drinks, shakes and alcoholic beverages.

12.1 Tea:

Tea is the second most popular beverage in the world. Only water is rated higher in world consumption than tea.

Tea ia a beverage which is made from the processed leaf of a tea plant. The botanical name of this plant is *Camellia sinensis*

Tea is a very mild stimulant, since it contains caffeine. The caffeine content is lesser than coffee but more than cocoa. It also contains small amounts of tannin compounds, vitamin A, B_2, C, D, K, some minerals and aromatic oils.

The tannin compounds and essential oils are mainly responsible for flavour of tea, colour, astringency (slightly acidic or bitter) and the delightful aroma.

Fig. 12.1 (a) *Camellia Sinensis*

Fig. 12.1 (b) Tea Plantation

12.2 Process of manufacturing of tea:

1. **Plucking:** The tea leaves (top two leaves and the bud leaf) are first plucked from the end of branchlets. They are then bought to the tea factory where they undergo the following processes.

Fig. 12.2 Tea plant

Fig. 12.3 Plucking

2. **Withering:** The plucked leaves are placed on a withering rack (drying). The first stage of withering may take 10 to 20 hours under shade so as to reduce the internal moisture of leaf. This makes the leaf ready for the next step that is grinding.

Fig. 12.4 Withering

3. **Grinding:** The machines crush the leaf so that the enzymes inside the cells are exposed and come in contact with oxygen from the air.

Fig. 12.5 Grinding

4. **Fermentation and Oxidation:** The leaves are then spread on a thin platform and allowed to ferment for 2-6 hours. During this process the colour of leaf becomes green to reddish brown. After this phase the tea leaves are kept for drying.

5. **Drying:** When fermentation is completed. to the desired degree, then tea is dried for 30 minutes to several hours in a chamber of hot air. The drying operation is exceptionally important as it "seals in" all the flavours. This creates a difference between a mediocre tea and a superb tea.

Fig. 12.6 Drying process

6. **Screening:** After drying tea is cleaned and sorted into various grades.

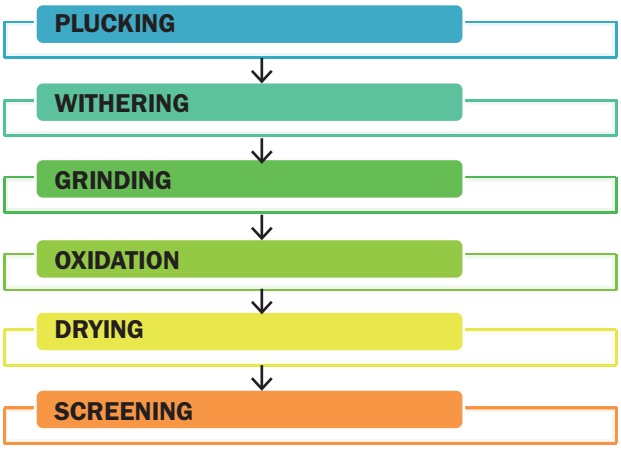

Fig. 12.7 : Steps of tea processing

12.3 Classification of tea :

a. **Green tea:** In this withering and fermentation steps are omitted. The aroma, flavour and colour of green tea is different from black tea. Green tea is a light, yellow green beverage having high number of polyphenols, caffeine content and Anti-oxidants, thus reduces the cancer risk and imparts many health benefits.

b. **Oolong tea:** Oolong tea is an intermediate between black and green tea in colour and taste characteristics. Its production method is similar to that employed for green tea, except that the leaf is slightly withered and light fermentation allowed before the leaf is dried.

c. **White tea:** It is made from young leaves that have not undergone oxidation. The buds may be shielded from sunlight to prevent formation of chlorophyll.

d. **Yellow tea:** It is high quality tea served usually to Royalty. Process similar to green tea but with a slower drying phase.

e. **Kukicha:** Also called winter tea and is made from twigs and old leaves of tea plants during its dormant season and dry roasted over a fire.

Activity 1. Ice tea

Aim: To make ice tea.

Materials: water- 1 glass, tea leaves – 1 tsp., ginger (grated) – 1/2tsp., mint leaves – 6-7, sugar – 3 tsp., lemon – 1/2 -1 (according to taste)

Method :

1. Add ginger, mint and sugar to water and boil it for 3-4 minutes.
2. Now add tea leaves and let it boil for few minutes.
3. Strain it and let it cool.
4. Add lemon juice
5. Add crushed ice to it
6. Decorate the glass with lemon rind and mint leaf.
7. Serve chilled.

Fig, 12.8 Ice tea

12.4 Coffee:

Coffee is an evergreen shrub or a small tree. There are many species of coffee, but most popular coffee are : *Coffea arabica and Coffea canephora (robusta*).

Fig 12.9 Coffea Arabica

Fig. 12.10 Coffea Plantation

12.5 Coffee production:

There are following steps through which a coffee bean passes from seed to cup.

a. Harvesting of beans
b. Processing of beans
c. Drying the beans
d. Hulling
e. Polishing
f. Grading and sorting
g. Tasting
h. Roasting
i. Grinding

a. Harvesting of beans : After three to four years, when they reach maturity, coffee trees bear fruits in lines or clusters along the branches. It is also known as berry or cherry. This fruit turns red when it is ready to be harvested. Coffee beans are actually the seeds of these ripened cherries. Harvesting time varies according to geographical zone, but typically there is only one harvest in a year.

Fig. 12.11 Harvesting

Fig. 12.12 Processing

b. Processing of beans: Processing of beans, or preparing them for roasting, done in two ways:

- **Dry method:** This is the simplest, cheapest and most traditional method of processing coffee. The harvested cherries are spread over a concrete or brick surface. They are kept in sunlight and raked at regular intervals to prevent fermentation.

After 7-10 days, the cherries become dry. The dried cherries are then stored in silos, where the beans continue to lose moisture.

Do You Know?

A silo is a metalic structure for storing bulk materials, used in agriculture to store grain or fermented feed known as silage. Silos are more commonly used for bulk storage of grains, coal, cement, woodchips, food products, sawdust, etc.

Fig. 12.13 Silos

- **Wet method:** This method requires greater investment and more care than the dry method, but it causes less damage and helps to preserve the intrinsic qualities of the beans. The main difference between the two methods is that wet method uses a procedure to remove the pulp from the bean within 12-24 hours of harvesting, instead of allowing cherries to dry.

Using a pulping machine, the beans are separated from the skin and pulp, which is washed away with water. The wet method gives better quality coffee with a bluish green colour (green coffee).

Fig. 12.14 : Pulping process

Fig. 12.15 Drying

c. **Drying the beans:** The beans are then dried in sun. The beans obtained after 7-15 days of drying are known as "Parchment coffee".

d. **Hulling:** In wet processed coffee, hulling is used to remove the hull (seed coat) or dried parchment immediately surrounding the bean. Husk or whole dry outer covering is removed.

Fig. 12.16 Hulling

e. **Polishing:** Polishing beans is an optional process that is not always done. During the polishing process any silver skin that remains on the beans after hulling is removed in a polishing machine.

f. **Grading and sorting:** Coffee beans are graded according to size firstly and then density.

g. **Tasting the coffee:** The tasting of coffee is referred to as "cupping". In this process coffee is tasted and evaluated by sensory experts. The taster (also known as liquorer) assesses the green beans for appearance. Small quantity is roasted and tested for colour, flavour and aroma.

Fig. 12.17 Tasting the coffee

h. **Roasting coffee:** Raw coffee has no flavour or aroma. Roasting is the heat treatment which transforms the green beans into the aromatic brown nuggets that is available in whole or powdered form. The flavour that develops during roasting is due to the organic compounds and volatile oils present in the beans.

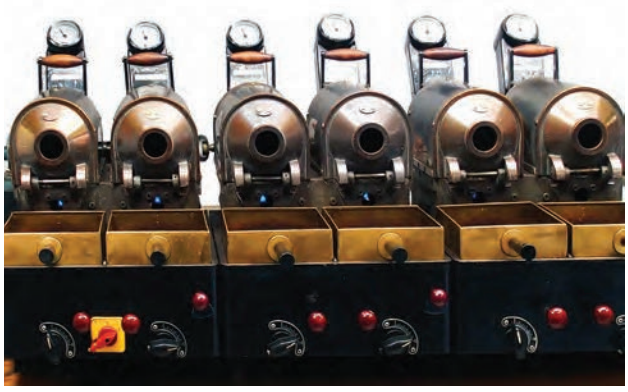

Fig. 12.18 Roasting

i. **Grinding coffee:** The objective of grinding the coffee is to get maximum flavour from the beans. Grinding is mostly done till beans turn into a fine powder, and is sold as ground coffee. Coffee grinding is of three types – fine, medium and coarse.

Fig. 12.19 Grinding

Fig. 12.20 Flow chart of coffee production

12.6 Methods of coffee making:

With the passage of time, the traditional pans used to make coffee were replaced by modern coffee making appliances. They come in variety of forms, from fully automatic to manual. Some common types of coffee making methods are:

1. Vacuum coffee
2. Drip coffee
3. Percolator coffee
4. Steeped coffee
5. Espresso coffee
6. Cappuccino coffee
7. French drip
8. French press
9. Cold water method
10. Iced coffee
11. Instant coffee
12. Filtered coffee

Activity 2 - Cold Coffee

Aim: To make cold coffee

Materials Needed :

Milk - 1 glass, Coffee – 1 tsp. (heaped), Sugar – 3 tsp., Chocolate syrup (for decoration), Chocolate powder, Chocolate sprinklers, Crushed ice

Method :

1. Take the coffee powder in a bowl and add lukewarm water to it and mix it well.
2. Now take a mixie jar, add full fat milk, coffee, sugar and ice, and if required then add some chocolate powder to it.
3. Blend it in a mixer till smooth and frothy.
4. Cold coffee is ready.
5. Spread chocolate syrup in the glass and pour coffee and froth in the decorated glass.
6. Sprinkle chocolate powder and chocolate sprinklers and garnish the coffee.

Fig. 12.21 Cold Coffee

12.7 Cocoa:

The cocoa plant is a small tree. Cocoa is made by grinding the seeds of the pods of the cacao tree (*Theobroma cacao*).

Fig. 12.22 Cocoa Tree

12.8 Production of cocoa:

The five steps involved in the manufacture of cocoa are given below:

a. **Harvesting** - Harvesting of right kind of cocoa fruit / pods is carried at yellow colour stage.

b. **Fermentation:** Generally the fruits are kept for natural fermentation. For this, they are first piled in heaps in perforated wooden boxes for 3-12 days. The time period depends on type of bean. No external heat treatment is required. A drop in temperature of the mass indicates that the fermentation is complete. Fermentation ends with the breakdown of pulp and change in colour of seeds. Seeds are removed by filteration process.

c. **Curing:** The fermented beans are now dried in sun or hot air dryers. This process changes the colour of the shell to dark brown

d. **Roasting:** Before roasting, the beans are screened for any unwanted foreign substances and sorted. After roasting the beans are passed through corrugated rollers to break the shells. The beans are baked in an oven at about 121^0 C for about 45 mins.

Fig. 12.23 Roasting

e. **Grinding and Defatting :** The roasted, dehulled bean are called “nibs”. The nibs are then put into stone mills (*chakki*) to make a fine paste. The friction between the two stones of the mill produces heat which melts the cocoa fat. The melted fat carries with it in suspension, finely ground particles of cocoa mass or chocolate liquor or bitter chocolate.

Before use, the cocoa mass is filter-pressed to separate out a major part of fat. The pressed cake is cooled, ground in special mills and passed through fine silk screens. The fine powder is mixed with flavouring materials and homogenized, which is utilised in the beverage and other products. It has characteristics flavour, taste and colour.

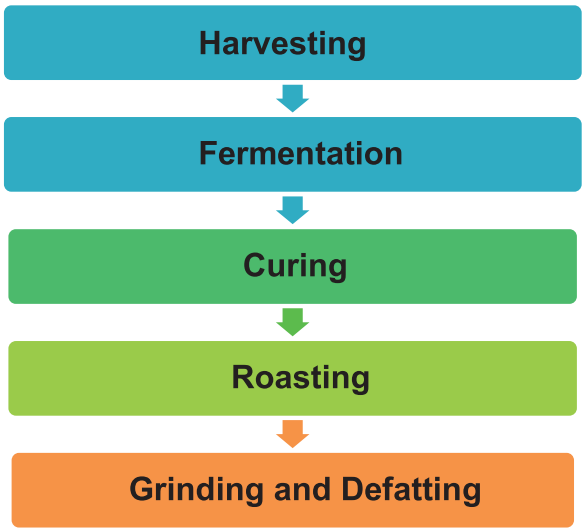

Fig. 12.24 : Steps in Cocoa production

Cocoa and chocolate, apart from their many uses in foods, find extensive use in preparation of beverages.

Points to remember

1. Tea is the second most popular beverage in the world
2. Botanical name of the tea plant is *Camellia Sinensis*.
3. Tea is classified into – Green, oolong, white, yellow tea and kukicha.
4. Most popular species of coffee are coffee arabica and coffee canephora (robusta)
5. Cocoa is made by grinding the seeds of the pods *theobroma cacao.*

Exercise

Q. 1 (a) Select the most appropriate option:

i. _____ is the second most popular beverage in the world.
(tea, coffee, cocoa)

ii. _____ is first step in process of making tea.
(grinding, plucking, withering)

iii. *Camellia sinensis* is the botanical name of _____ plant.
(coffee, tea, cocoa)

iv. The green colour of coffee changes to brown after the process of _____.
(drying, roasting, hulling)

v. Cocoa seeds after harvesting are left for natural _____.
(fermentation, curing, defatting)

(b) Match the following :

A		B	
i.	Tea	a.	*Theobroma cacao*
ii.	Coffee	b.	Health benefits
iii.	Cocoa	c.	Roasted dehulled beans
iv.	Green tea	d.	*Coffee arabica*
v.	Nibs	e.	*Camellia sinensis*
		f.	Fermentation

(c) State whether the following statements are true and false:

i. While plucking leaves for tea production top two leaves and the bud leaf are not most appropriate.

ii. Yellow tea is a high quantity tea.

iii. Vaccum coffee is a step in coffee production.

iv. The roasted dehulled beans (cocoa) are called nibs.

Q. 2 Write in short

i. Define beverage.

ii. Botanical name of tea.

iii. Steps of tea processing.

iv. Give the names of two species of coffee.

v. How many types of coffee are there after grinding?

vi. Give flow chart of coffee production.

vii. Name the methods of coffee making.

Q. 3 Write short note on the following

i. Roasting of coffee.

ii. Steps in cocoa manufacturing.

iii. Process of grinding and defatting in cocoa manufacture.

Q. 4 Long answer questions

i. Explain in detail the process of tea manufacturing.

ii. Give the classification of tea.

iii. Explain in detail the process of coffee production.

iv. Describe all the steps of cocoa production.

❖ Project:

Prepare an album of ten recipes each of tea, coffee and cocoa.