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Coffee Beans and Coco Beans Processing

Hello,,,,,,,,,, welcome you all for the presentation, I am going to deliver the presentation on the topic entitled Coffee and coco beans processing.

Actually, the topic divided in to two sections as follows,

1. Coffee beans processing and
2. Coco beans Processing

Further each section is subdivided in to the following five sections

1. Introduction
2. History
3. Benefits on health
4. Processing steps
5. Conclusion

Let us see on Coffee Beans,

1. Introduction

Coffee trees grow in tropical regions. The beans grow in pairs of seeds in cherries. The seeds are removed from the cherries and are dried and hulled to remove the protective skin called parchment. The coffee beans are greenish in color and are subsequently roasted to various shades of brown depending on the roast style. The roasted beans are ground and brewed with hot water to make the coffee drink.

Each coffee seed contains over 800 natural chemicals. Every step in the process from climate and growing conditions, genetics of the tree, to the final brewing methods affect these natural chemicals. Each of these factors affects the distinct taste of the final brew.

2. History of the Propagation of the Coffee Plant

Coffee was first discovered in Ethiopia around 575 AD, though coffee was cultivated as early as the sixth century A.D. in Yemen, it did not gain popularity until the 15th and 16th Centuries when it was cultivated extensively in Yemen, district of Arabia. The Arabians jealously guarded their coffee plants by making sure that no coffee beans were taken out of Arabia without first being roasted or boiled to destroy its germination power. In the 1600s, Baba Budan, a Moslem pilgrim from India, smuggled some fertile seeds from

Mecca and planted them in the mountains of Mysore in India. In 1699 a Dutchman named Henricus imported seeds to Java from India. This started coffee production in the Dutch Colonies. From here coffee seeds and plants were sent to the botanical conservatory in Amsterdam. These seeds were cultivated at the conservatory and were propagated and sent to many conservatories throughout Europe. Thus the Dutch took the lead in propagating coffee in their colonies of Java, Sumatra, and Bali.

The first coffee in Brazil was planted in 1727 from plants brought from French Guiana. However, significant coffee production in Brazil started after 1760 when Joo Alberto Castello Branco brought plants from Portuguese Goa in India to Rio de Janeiro.

Coffee was introduced to Costa Rica from Cuba by Don Francisco Xavier Navarro in 1779. The English brought coffee to Jamaica in 1730.

Coffee did not become a major crop in India until the British started emphasizing its production in the 1840s. However, it is said that the coffee seeds that Baba Budan brought from Yemen to India in the 1600s are responsible for the propagation of coffee throughout the world.

3. Coffee and Health

The controversy over the effect of coffee (mainly its caffeine) is not new. There are those who claim coffee to be a cure all and those who condemn coffee as monstrous carcinogen. Consumption of coffee has gone up and down depending on which side has more influence at the time.

As early as the beginning of the 11th century, Arabian philosopher Avicenna wrote about the medicinal benefits of the drink Bunchum, believed to be coffee. Ever since the 17th century when coffee started to penetrate the European market the businesses promoting coffee, and those that were losing business to coffee were engaged in propaganda for and against the health effects of coffee. Even today scientific researchers are coming up with beneficial or harmful effects of drinking coffee. For example, studies have looked at heart disease, cancer, Parkinsons disease, miscarriages. Some of the researchers are supported by coffee businesses, others by competitive industries like bottled water.

Some scientific reports are proved as follows,

1. Coffee is loaded with antioxidants and beneficial nutrients that can improve your health.

2. Coffee Can Improve Energy Levels and Make You Smarter

3. Coffee Can Help You Burn Fat

3. The Caffeine Can Drastically Improve Physical Performance

4. There Are Essential Nutrients in Coffee for example

- **Riboflavin** (Vitamin B2)
- **Pantothenic Acid** (Vitamin B5)
- **Manganese** and **Potassium**
- **Magnesium** and **Niacin** (B3)

5. Coffee May Lower Your Risk of Type II Diabetes

6. Coffee May Protect You From Alzheimer's Disease and Dementia

7. Caffeine May Lower The Risk of Parkinson's

8. Coffee Can Fight Depression and Make You Happier

4. Coffee Processing

Irrespective of the harvesting method, green coffee beans and overripe coffee cherries inevitably end up mixed with the perfectly ripe cherries and must be separated during coffee processing. Overripe coffee cherries, undeveloped coffee cherries, sticks and leaves float in water. Ripe coffee beans and green coffee cherries are dense and sink. Therefore, the first step in coffee production consists of separating the "floaters" from the "sinkers." The coffee floaters are usually sent directly to the patio to be dried and are often slated for internal consumption. The ripe and green cherries can be sent to the patios to be dried using the natural process of preparing coffee or can be sent to the coffee pulping machines.

Coffee Processing Equipment

The first stage of coffee pulping is used to remove the green coffee cherries from the ripe cherries. In the coffee pulping machinery, the internal pressure is monitored to push the coffee against a screen with holes only large enough for a coffee bean (not cherry) to pass through. Since the ripe cherries are soft, they break and the coffee seed is released through the screen.

Pulping Coffee

The green cherries are hard and cannot be pulped. Instead of passing through the screen, the green coffee beans pass to the end of the barrel system and are separated from the ripe coffee beans. The pressure inside the barrel controls how many cherries will be pulped. A very high pressure will cause all of the cherries including the green beans to be pulped. It is necessary to continuously monitor the pressure so that about 3% of ripe cherries are not pulped and are removed with the green cherries. This margin of error ensures that no green cherries are mistakenly pulped. The pulp and coffee beans are then separated by centrifugal force and a barrel screen system.

Coffee Fermentation

The coffee beans covered in the slippery mucilage can be sent to the patios to dry as pulped natural coffees or can be sent to coffee fermentation tanks. The coffee fermentation tanks are used to remove the mucilage before drying. The pulped coffee beans are put into cement tanks with water and are allowed to ferment for 16-36 hours. On the way to the fermentation tanks, another density separation can occur. The highest quality coffees are the densest and should be separated and fermented in a different tank.

The coffee fermentation time depends on a number of factors including the amount of coffee fermenting, water temperature, and humidity. The mucilage is made up of pectin materials including protopectin (33%), reducing sugars including glucose and fructose (30%), non-reducing sugars such as sucrose (20%), and cellulose and ash (17%). Protopectin is not water soluble and will hydrolyze to pectinic acid in the fermentation tanks. Hydrolysis of the protopectin and degradation of the pectin by enzymes is the process that occurs to remove the mucilage during fermentation. Currently, the best way of determining the end of coffee fermentation is to feel the coffee beans to determine if they are still encased in mucilage. If the coffee beans are fermented for 36-72 hours, stinker beans develop. Lactic, acetic, and propionic acids are produced in this process and are believed to prevent the traditional fermentation taste by inhibiting mold growth that regularly occurs during drying on a patio in humid conditions.

Coffee Drying

From the coffee fermentation tanks, the beans are moved to drying patios and dried to 11-12% moisture content. A small portion of the lot is hulled and milled by a mini-huller. Three hundred grams of coffee is classified for defects (100 grams is often used), and the percentage of each screen size is determined. Then, 200-300 grams of coffee is roasted in a sample roaster and cupped to determine coffee quality. Ideally no lots will

be mixed until the coffee has been classified and cupped. The coffee remains in pergamino until shipment time to help protect the flavor and aroma of the coffee.

So, let us see the next section on Coco Beans

1. Introduction

   The botanical name for Cacao is Theobroma Cacao. These tropical trees produce white and pink blossoms right from the trunk or main branches. The white flowers are female and the pink are male. The blossoms are pollinated by insects called midges. Cacao trees flourish under shade trees because the shade trees help form the habitat for the midges.

2. History of Coco Beans

   Cacao is indigenous to Mexico and Central America. The first civilization of the Americas, Olmecs of Mexico (1400 BC - 400 BC) used cacao for chocolate drinks. It was highly regarded, a drink for the elite only. The word cacao, originally pronounced kakawa was reconstructed by linguists as a vocabulary item in proto Mixe-Zoquean family of languages, by about 1000 BC, at the very height of Olmec civilization.

   The first European encounter with cacao took place during Columbus' voyage. On August 15, 1502 he came across a Mayan trading canoe with cacao beans on the island of Guanja, now known as Bay Island, 30 miles north of mainland Honduras.

   Columbus knew the cacao beans he encountered to be sort of almonds and that the Mayan people treated them as precious things, he had no idea of their use in the preparation of the revered chocolate drink. Though there may have been an early introduction of cacao on European soil, the first written account suggests that in 1544 Dominican Friars took a delegation of Mayan nobles from Alta Verapaz in Guatemala to visit Prince Philip in Spain. These noblemen took some beaten chocolate along with many other items as gifts for Prince Philip. It was not until 1585 that the first official shipment of the beans reached Spain from Veracruz. By the first half of the 17th century recipes for hot chocolate with various spices like sugar, cinnamon, vanilla, red chili, achiote, etc. were used among the Spanish elite, and sweet, solid chocolate preparations were also documented. Later on, English travelers introduced cacao in England. It is easy to imagine that convents and friars must have played an important role in propagating the product throughout Europe. Like coffee, chocolate also underwent scrutiny regarding its pros and cons associated with health. Eventually it survived all that to become king of the universal palate.

3. Processing of Cocoa Beans

There has been no change of processing of cacao beans from harvesting through drying. This is done in the producing countries.

Harvesting

Once the flowers are pollinated the pods take 5-6 months to grow and mature to the yellowish red color of the ripened pod. The pods are harvested manually. Once harvested, they may keep for about a week before spoiling. After harvesting the pods are carefully cut open with machetes and the beans with the pulp are removed. These are then placed in large boxes, or just in heaps, covered with banana leaves and left to ferment. The fermentation process gives flavor to the beans and the pulp slowly liquefies and runs off as the temperature rises. This takes up to a week. The beans start to germinate in the first couple of days of fermentation, soon to be killed by the high heat produced by the fermentation. This stage is important since ungerminated beans lack flavor. The mass is turned from time to time so hot spots don't develop and the temperature is maintained at around 110 F to 120 F.

Roasting

When the dried beans are received at the factory they are artfully roasted at 200 F to 250 F for one to two hours in order to develop the flavor of the beans. The beans become brown in color and friable (brittle).

Next, the roasted beans are broken down and the thin shell (chaff) is removed in the process called winnowing. The remaining pieces of kernel are called cacao nibs, which have the final chocolate flavor as we know it. Nibs contain about 400 different chemicals responsible for the flavor of the final products.

Grinding

The nibs are ground under heavy steel rollers with some heat. The grinding process also produces its own heat. The nibs change into a thick paste called cacao liquor and contain about 50-55% cacao butter.

Filtering the Butter

Next, the liquor is filtered using hydraulic presses to remove the colorless cacao butter, which is a liquid. The cacao in the form of a cake remaining is used for further processing into cocoa, hot chocolate and cheap commercial chocolates. The cake

contains about 10-20% butter. The high quality gourmet chocolates are made from cacao liquore.

Making Hot Chocolate Mix

The cacao cake is pulverized by grinding, then mixed with ground sugar and milk powder, artificial shortening agents and lecithin are added, to make it easily mixed in water to form the drink. This is the typical commercial hot chocolate mix.

The high quality gourmet hot chocolate like ours is made by pulverizing the cake, adding some cacao butter and evaporated sugarcane juice and also bits of dark chocolate. There is no dairy product or other additives. The prepared drink can be made using milk, rice milk, soymilk or water and spicing if desired.

The beans are then dried either on patios for a couple of weeks, or in an oven with continuous turning in order to reduce the moisture content to about 7%. Then the beans are packed to be sent to chocolate factories, mostly overseas.

Refining

The above mixture is refined through a series of rollers to give the chocolate its consistency by reducing the particle size of the mixture so that they cannot be felt on the tongue. The size is generally reduced to 20 millionth of a meter, smaller than the distance between two sensory taste buds in the mouth. The process also creates its own heat, which develops the flavor of the chocolate.

Conching

The refined chocolate is further improved by grinding under rollers of machines called conch because the resemblance of its shape to a conch (shell). Here the refined chocolate is ground under granite rollers, which goes back and forth on a flat granite table with curved lips. When the rollers go back and forth on the lip, the mass splashes on to the roller towards the main body of the machine. This friction produces heat, develops the flavor and drives out volatile acids while masticating the material. The process takes 1 to 3 days.

High quality gourmet chocolates are still manufactured using similarly designed equipments but the cheap commercial chocolate is produced on equipments using heat and paddles to stir the mass to remove the volatile acids and develop flavor.

Tempering

The final step before molding into bars and other shapes is tempering. The cacao butter when cooled forms two kinds of crystals, stable and unstable. Unstable crystals form gray streaks, known as bloom, in the final chocolate. Also, the chocolate should have mostly stable crystals so it does not melt in the hand. To remove the unstable crystals the chocolate is slowly heated to 118F (48C) to melt all the fat crystals. Then it is cooled to 81F (27C) to set the correct amount of stable fat crystals to provide the beginning of a structure (seed crystals). Unfortunately, some unstable crystals are formed. To remove these the chocolate's temperature is again increased to 90F (32C), which is warm enough to melt the unstable crystals but not the stable crystals. In the final molded chocolate the stable crystals give the bases to form the entire chocolate with stable crystals.

4. Health Benefits of cocoa food consumption

Cocoa contains over 700 known compounds. And for all we know, there may be many more that remain undiscovered. Of particular interest to scientists are the antioxidant compounds in cocoa. Antioxidants are compounds that plants manufacture to prevent their own cells from premature destruction due to exposure to heat, light, air, moisture and time. In the human body, many of these compounds prevent reactive oxygen species (ROS) from destroying cells and causing premature aging and disease. Cocoa is especially rich in polyphenols, a group of protective antioxidant compounds found in many plant foods such as red wine and tea, and which are the subjects of scientific investigation for their beneficial influence on cardiovascular health. The polyphenols include anthocyanins, isoflavones, flavanones, flavonols, flavanols, and flavones. Of special interest to health researchers are flavanols in cocoa, including flavan-3-ols, catechins, epicatechins and proanthocyanidins. These naturally-occurring substances not only protect the cells of our bodies from premature destruction, but they also help to reduce the risk of killer diseases.

Cardiovascular disease is the primary killer of adults. The polyphenols in cocoa are cardio-protective in two ways. They help to reduce the oxidation of low-density lipoproteins (LDL), or so-called ‘bad cholesterol.” Oxidation of LDL is considered a major factor in the promotion of coronary disease, most notably heart attack and stroke. Additionally, polyphenols inhibit blood platelets from clumping together. This clumping process, called aggregation, leads to atherosclerosis, hardening of the arteries. By inhibiting aggregation, polyphenols reduce the risk of atherosclerosis. Since atherosclerosis is a major killer of American adults, the protection provided by the polyphenols in cocoa is of real value. It can literally mean the difference between life and death

5. Conclusion

Coffee and Cocoa beans are one of nature's many miracles, is in fact the great super-food that many people seek. The beverages of these beans are is a titan of health benefits, the likes of which humanity has never known. Both coffee and cocoa beans are enriched with antioxidant polyphenols, terpenoids. Therefore, the consumption of coffee and cocoa is an important dietary food in daily life.

Thanking you