

INFLUENCING THE QUALITY AND PROCESSING TECHNIQUES OF SPECIALTY TEA PRODUCTION, CEYLON CERTIFIED (CCT) AND CEYLON ACCREDITED TEAS (CAT) PLAY A SIGNIFICANT ROLE.

This executive summary highlights the pivotal role of input material quality in tea production. Emphasizing factors such as altitude, seasonal dynamics, and harvesting standards, the study explores the impact on polyphenol and caffeine content. Detailed analyses of withering, rolling, fermentation, and drying processes underscore their influence on tea quality, culminating in insights for producing specialty teas.

Gerry Galahitiyawa

www.vivonta.lk

In homage to the esteemed Hon. Ranil Wickremasinghe, His Excellency, the President of the Socialist Democratic Republic of Sri Lanka, conveyed with utmost reverence through Hon. Mahinda Amaraweera, the Minister of Plantations Industries and Agriculture. This creative endeavor unfolds under the adept leadership of Mr. Niraj De Mel, the venerable chairman of the Sri Lanka Tea Board.

Crafted by the visionary minds at Vivonta Green Teach Consultants on the 27th of January, 2024.

The Team:

Ms. Pabasara Manatunge – Samanala Tea

Mr. Chula De Alwis – Qualitea Ceylon Pvt Ltd

Mr. Niroshan Illangarathne – Virgin Hills

Mr. S.M.P. Jayantha – Low Country Planters

Mr. Gerry Galahitiyawa – Tea Processing Advisor Global
Citification partner – Prof Sirimal Premakumara – ITI

SLSI

Brig Dr Thiran De Silva – MD CelaTa (USA)

Blockchain and QR codes

Product diversification:

Mr. Luxman Kannangara

Consultants of www.vivonta.lk

27th January, 2024

Justification:

In the dynamic world of Sri Lanka's tea sector, a transformative solution awaits—one that could make the challenges vanish into thin air with the right pricing strategy. Tea, a global commodity, has been unfairly confined to developing countries by the limited scope of the commodity market. However, some visionary tea entrepreneurs have identified a winning product with immense potential. Our collective goal is to enhance their system and explore avenues for marketing Ceylon tea with a distinctive focus on improving immunity.

To embark on this journey, we first delved into the root causes of the current challenges faced by Ceylon Tea. Subsequently, we assessed competitive strengths that could be strategically harnessed to secure both competitive and comparative advantages.

The issue of adulteration extends beyond Sri Lanka, impacting the national tea crop and intensifying competition among bought leaf factory owners. This heightened competition has led to unethical practices, negatively affecting the quality of procured green leaves.

The decline in green leaf quality contributes to a reduction in the made tea to green leaf ratio, known as the made tea outturn. Various factors, such as adverse weather patterns, shortages of skilled workers, and senile debility of tea bushes, hinder achieving the required outturn percentage of 21.5%.

In pursuit of higher payment rates for green leaf suppliers, some factory owners resort to introducing foreign compounds to improve the weight and appearance of the made tea, potentially jeopardizing consumer health.

Recognizing these challenges, Vivonta value chain consultants propose the implementation of two tea marketing standards: Ceylon Certified Teas (CCT) and Ceylon Accredited Tea (CAT). These standards prioritize nutrient density, distinct characteristics, limited production for health-conscious markets, traceability, labeling, and ethical marketing practices.

The aim is to build consumer trust by offering a premium tea product with tested and labeled medicinal properties. Both standards ensure the supreme quality of pure Ceylon tea, providing value for money and commanding premium prices in niche markets with limited editions.

To succeed, the system relies on nutrient-rich soil and climate conditions, well-remunerated harvesters, closely monitored processes, real-time data, QR and Blockchain technologies, and a high level of entrepreneurship.

Addressing the myriad issues affecting national tea production requires a transparent marketing approach that leverages the competitive and comparative advantages of pure Ceylon Certified Teas. Seeking government support is crucial to enhancing this process and ensuring the sustainability of Ceylon Tea. The initiative could gradually extend to national tea production, establishing a justifiable value proposition based on the nutrient content of green leaves. Together, we can elevate the status of Ceylon Tea to new heights.

Introduction:

This scientific inquiry elucidates the pivotal role of input material quality in the comprehensive tea production process, with a specific focus on the impact of factors such as altitude, seasonal variations, plant variety, plucking standards, growing environment, and agricultural practices. Emphasizing the importance of selective harvesting, particularly of the Bud and 1st Leaf due to their heightened polyphenol and caffeine content, the study delves into the intricate aspects of the withering process, mild rolling operation, fermentation, and tea drying stages. A meticulous examination of these stages aims to unravel their influence on chemical transformations and the ultimate quality of tea. The document culminates with insights into the production of specialty teas, underscoring the significance of high-quality input material and precise processing techniques.

Objective:

Vivonta Management Consultants introduce an initiative with the primary goal of providing a consistent supply of premium Ceylon tea to the global market at an affordable rate. We ensure complete process traceability, from the tea's origin, environmental conditions, and soil quality to the meticulous steps in the production process. Our commitment extends to the people involved, rigorous testing, credible labelling, and swift, secure delivery to customers. Harvested as a medicinal herbal beverage for improved overall health, our tea embodies quality and transparency

Input Material:

In any food production procedure, the ultimate product's quality is intrinsically linked to the caliber of the input material. Tea is no exception. The composition and quality of the fresh green leaf are contingent upon various factors such as altitude, seasonal dynamics, plant variety, plucking standards, growing environment (comprising temperature, rainfall, and sunshine), and agricultural practices like fertilizer application and shade provision. Notably, the tender flush, through careful and selective harvesting, yields green leaves with superior polyphenol and caffeine content, essential for the production of premium teas.

Polyphenol Content in Tea:

The composition of green tea leaves is contingent upon altitude, seasonal influences, variety, and agricultural practices. Rapid growth at lower altitudes under elevated temperatures and humidity results in coarser leaves, while slower growth at higher altitudes under cooler and drier conditions produces finer leaves. The tender flush, characterized by a higher concentration of desirable chemical constituents, underscores the imperative of precise and selective harvesting.

Caffeine Content in Tea:

Tea with elevated caffeine content, particularly in the Bud and 1st Leaf, offers advantages such as heightened alertness and improved mental focus. Table 3 elucidates the caffeine content, emphasizing the potential benefits associated with moderate caffeine consumption.

<u>Part of the Flush</u>	<u>Flavonoid content % of dry weight</u>
Bud	35.8
1 st Leaf	35.0
2 nd Leaf	27.9
3 rd Leaf	23.1
Stalk (stem)	15.0

Table 1: Flavonoid Content

<u>Flavanols</u>	<u>g/100 g dry weight</u>
Epigallocatechin gallate (EGCG)	9 - 13
Epigallocatechin (EGC)	3 - 6
Epicatechin gallate (ECG)	3 - 6
Epicatechin (EC)	1 - 3
Gallocatechin (GC)	1 - 2
Catechin (C)	1 - 2
Flavanols and their glycosides	3 - 4
Leucoanthocyanins	2 - 4
Phenolic acids	4
Total polyphenols	27 - 40

Table 2: Total Polyphenols (Cold Water soluble)

Scrutinizing the data in Table 1 and Table 2, it is obvious that Bud and 1st Leaf contain a high percentage of Polyphenols (Flavonoids).

High Caffeine Content

Tea with high Caffeine content can offer advantages such as increased alertness and improved mental focus. Caffeine is a natural stimulant that can enhance cognitive function and temporarily alleviate fatigue. Additionally, moderate caffeine consumption is linked to potential benefits like enhanced mood and increased metabolism. Table 3 shows that the Caffeine content is high in Bud and 1st Leaf.

Part of the Flush	Caffeine content % on a dry-wet basis
Bud	5.8
1 st Leaf	4.9
2 nd Leaf	4.1
3 rd Leaf	3.8
Stalk (stem)	3.1

Table 3: Caffeine Content

Withering Process:

Apart from the apparent moisture loss, the withering process induces numerous chemical changes. Experimental evidence suggests a minimum duration of six hours for these beneficial changes, with adjustments based on weather conditions. Proper withering ensures a rubbery leaf condition, allowing for hand rolling without tea juice leakage or premature leaf breakage. Chemical changes during withering directly contribute to the enhancement of final product quality.

During the process of withering the following Chemical changes are occurred.

1. Increase in polyphenol oxidase (PPO) activity
2. Breakdown of proteins into amino acids
3. Breakdown of chlorophyll
4. Increase in caffeine
5. Increase in simple carbohydrates
6. Increase in carotenoids
7. Increase in the permeability of cell membranes.

Mild Rolling Operation:

The primary objective of the rolling process is to make the chemical substances in different layers of the withered leaf physically accessible for contact and chemical reaction. Gentle rolling actions produce a considerably rolled-up appearance with minimal leaf breakage, emphasizing the importance of specially designed equipment for hand rolling.

Fermentation (Oxidation):

Fermentation reactions commence during the hand-rolling process, influencing liquor character through enzyme mixing and chemical interactions. Temperature-dependent oxidation of polyphenols significantly shapes the tea's final characteristics, necessitating precise temperature control and oxygen supply during fermentation.

Tea Drying:

Drying, a stage arresting most chemical reactions, yields a stable and storable product. Initial drying stages witness heightened chemical reactions, requiring careful temperature control to prevent case hardening. The drying process, albeit expensive, plays a crucial role in preserving tea quality. Specialty teas, including Black, Green, White, Purple, and Scented teas, benefit from high polyphenol content derived from superior input material and meticulous processing techniques.

Producing Specialty Teas:

The technology for producing various tea types is available, each characterized by high polyphenol content resulting from superior input material quality and precise processing steps. The possibility of producing these teas as "Hand Made Tea" is feasible with the design of small-scale dryers, emphasizing the importance of quality input material and stringent monitoring during processing.

Currently, Sri Lanka boasts the production of approximately 40 varieties of tea, each yielding a distinct 'kahata' when subjected to optimal brewing techniques with the appropriate quality of natural water. In addition to tea, our blessed soils nurture a variety of herbs that contribute to overall human health—a contrast to volcanic soils in this regard. The implementation of Ceylon Certified Teas (CCT) in powder form, as observed in technologically advanced countries, holds the potential to incorporate various such herbs, catering specifically to colder regions.

Keywords: Tea processing, input material, polyphenols, caffeine, withering process, rolling operation, fermentation, drying, specialty teas.

Gerry Galahitiyawa

Vivonta Green Tech Consultants Pvt Ltd.