

# Types of tea, value addition and product diversification of Indian tea

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The great Chinese Sage of Tea, Lu Yu, aptly observed, “*There are a thousand and ten thousand tea.*”<sup>1</sup>

## INTRODUCTION

Tea can be classified in many ways. According to most commonly used classification, basically four types of tea are manufactured (based on manufacturing process) in the world, viz. black tea, green tea, oolong tea and instant tea. Another type of tea, legg cut, has become obsolete now. The black and green tea are further divided into many grades, each representing a distinct size, style and density. Although there is no uniform or exact system of grading, the grades of tea vary considerably from one country of origin to another. The way tea is manufactured gives the different characteristics of tea. The central theme of manufacture is popularly known as ‘fermentation’ since long, which is actually the process of oxidation and condensation of tea catechins or tannins. In case of black tea oxidation of the processed leaf is allowed to attain an optimum level and then stopped, while in green tea manufacturing oxidation (during manufacturing) is prevented altogether. So, the enzymes are destroyed as soon as possible after leaf is plucked, generally by passing steam through leaves or putting them in boiling water.<sup>2</sup> Green tea may also be produced by pan frying technique.

Interestingly, the present popular form of tea in India and elsewhere-CTC (crush, tear, curl) was invented in Assam only in 1930.<sup>3</sup> Black tea is of three types-orthodox, CTC and legg-cut (obsolete now). The process of manufacturing of orthodox tea is traditional where rollers are used to roll and twist the plucked leaves after withering. In CTC manufacturing, the plucked leaves are put in to a CTC machine after withering where they are turned to small crushed bits by sharp teeth of roller machine. Green tea though mainly is of orthodox type, CTC type is also available. In the popular form of black tea, one kilogram of orthodox tea normally gives 275 cups, whereas it yields 550 cups (double) in case of CTC. In 1896, the first individual tea bag patent was issued to A.V. Smith of London. Oolong tea is an intermediate between black and green tea with regard to fermentation. Instant tea is manufactured in like black tea, in a way that it is soluble in water for instant use.

An interesting form of tea is ‘leppet tea’, originally known to be prepared by the Shan tribes of Burma (present Myanmar) who pickle the leaf. Scented Tea using various full blown flowers had been a practice in China since long. However, manufacturing of another form of tea, ‘brick tea’, was known to the Sung dynasty (966-1276 A.D.). Brick tea began to appear in Siberia in the 17C. Later, it was a practice to make brick tea (consisting of leaf, stalk, twigs, and dust siftings) in China for export to Mongolia, Tibet and Russia. Both black and green Tea were compressed into bricks and tablets.<sup>4</sup> Considerable quantity of brick tea was also produced in North-East India in 1950s and 1960s (1955: 176,892 kg, 1960: 72,346 kg). Another form of tea, legg-cut (26.2 million kg, that is, 7.4% of total production was produced in 1961 in India) had ceased to be produced since 1976 (approx.).

In general, there are four forms in which values are added to tea. They are: (i) breaking bulk tea and then blending which involves no technology, (ii) consumer packing in packets, tin or bags involving modern packing materials and sold in own or other brands, (iii) product processing and improvements extracting tea soluble, the solids and, (iv) the flavour and addition of flavouring materials, for instance, various types of spice, rose, as well as medicinal plants such as ginseng and various herbs. The value added items of tea are sold in the retail market in the form of consumer packets and tea bags. Blending is a popular form of retail marketing of tea. In blended tea packets, the tea is not sold to the consumers as such in the grades into which it is primarily sorted in producers' factories. It is invariably a blend of different grades derived from a variety of tea of estates. The blend may contain in various proportions several different components.<sup>5</sup>

Product diversification of tea holds immense possibilities for the future and is an important area of research. Tea contains numerous chemical constituents having diverse chemical properties. Some of these are having pharmaceutical and therapeutic values and some of them are having nutraceutical value. These chemical components are being attempted to be exploited to produce different categories of products to target various groups of consumers according to their choice. The various diversified products developed are tea tablet, tea cola, tea toffee and confectionary products of tea such as tea biscuit and tea cake.<sup>6</sup>

The premium segment of tea drinkers in the world still prefer the traditional orthodox type of tea, which contains the original characteristics of distinct liquor and flavour. But the popularity of the CTC type had risen many times over the years, mainly due to more cuppage obtained from it, mostly in the Indian sub-continent and the neighbouring countries. The change in consumer preference resulted in shift of manufacturing process from orthodox to CTC type, which had shown impact on plucking standard and other field management practices as well.<sup>7</sup>

## **SORTING AND GRADING OF TEA IN PRODUCING FACTORIES**

Tea is sorted into various grades in the producing factory according to size for trade and sold in different modes such as auction, ex-garden private sale, and forward contract sale. This classification into grades gives identity to the tea for the convenience of marketing and the subsequent operations of blending. The final product of tea after drying ranges in size from that of a speck of dust to a leaf approximately 4 cm long and 1 cm wide. The fractions are to be brought to desired size and forms with adequate uniformity and cleanliness conforming to trade requirement. Tea is, therefore, sorted into bulk grades of roughly equal size using machine and hand sieves by winnowing and stalks picking in the factory after the final "made tea" is produced. According to the sizes, four main kinds of tea are produced: Whole leaf grades, Broken, Fannings and Dust. Each of them is further split up into grades of varying qualities.<sup>8</sup> They are as follows:

### **Whole leaf grades**

Whole leaf grades are the largest sizes produced and may range from a long and wiry stem, 1 cm to 2 cm in length, to a round and knobby twisted leaf similar in size and shape to that of a small garden pea. Broken grades consist of smaller than the Whole Leaf Grades and are generally about 1 cm in length and are made up of leaf largely as opposed to stem. Fannings grades are further smaller in size. However, sizes of more than 1/8 of an inch are rare. Fannings contain small parts of the leaf which have broken off either during rolling or sorting. Dust grades are the smallest in size of the tea made as the name indicates. The term "pekoe" used in sub grades is derived from Chinese meaning "white hair". Other terms used, viz., orange, flowery, and golden indicate tea made from tender parts of the tea shoot containing a quantity of tip.<sup>9</sup> "Souchong" in Chinese means small sort which is bolder type of leaf or large leaf grade.<sup>10</sup> "Hyson" used for green tea means flourishing spring in Chinese.

## **Orthodox tea**

The various grades and sub-grades of orthodox tea are: (i) **Whole Leaf**-Fine tippy golden flowery orange pekoe (FTGFOP), Tippy golden flowery orange pekoe (TGfOP), Tippy golden flowery orange pekoe one (TGfOP1), Golden flowery orange pekoe (GFOP), Flowery orange pekoe (FOP), and Orange pekoe (OP); (ii) **Brokens**-Golden flowery broken orange pekoe (GFBOP), Flowery broken orange pekoe (FBOP), Golden broken orange pekoe (GBOP), Broken orange pekoe (BOP1), and Broken pekoe souchang (BPS); (iii) **Fannings**-Golden orange fannings (GOF), Flowery orange fannings (FOF), Broken orange pekoe fannings (BOPF), Orange fannings (OF); (iv) **Dust**-Orthodox pekoe dust (OPD), Orthodox dust (OD), Orthodox churamoni dust (OCD) and, Fine dust (FD).<sup>11</sup>

## **Crush, tear, curl tea**

The grades and sub-grades of CTC tea are: (i) **Brokens**-Broken orange pekoe (BOP), Broken pekoe (BP), and Broken pekoe souchang (BPS); (ii) **Fannings**-Orange fannings (OF), Pekoe fannings (PF), and Pekoe fannings one (PF 1); (iii) **Dust**-Pekoe dust (PD), Dust (D), Churamoni dust (CD), Pekoe dust one (PD 1), Dust one (D 1), Red dust (RD) and, Fine dust (FD).<sup>12</sup>

## **Green tea**

The grades and sub-grades of green tea are: Whole Leaf-Young hyson (YH), Fine young hyson (FYH), Brokens-Gun powder (GP), Hyson (H), Fannings-Fine hyson (FH) and, Soumea Dust.<sup>13</sup>

## **CLASSIFICATION OF INDIAN TEA**

As already mentioned, tea can be classified in many ways. Classification based on the technique used in manufacturing include: traditional, handmade or handcrafted, and conventional. “Phalap” prepared by the Singphos of Assam and “leppet tea” of the Shan tribes of Burma are the traditional forms of tea. The conventional classification of tea based on manufacturing method is of four types: black tea, green tea, oolong tea and instant tea. Black tea and green tea are further divided into several types. Handcrafted or handmade tea is made in smaller quantities meticulously at the garden level generally for exclusive marketing.<sup>14</sup>

An analysis of the types of Indian tea reveals a broad range of various types of tea and tea products available at market level. Through an exhaustive classification, Indian tea can be put into the following broad categories: i) Conventional; ii) Traditional; iii) Indigenous handmade or handcrafted; iv) Specialty tea; v) Organic; vi) Ready to use; vii) Flavoured tea; viii) Special health tea; ix) Special blend; x) Special single manufacture xi) Diversified products

## **Conventional**

This category represents tea through normal production and manufacturing process with use of Government of India approved agro-inputs of fertilizer, pesticides, and weedicides, among others. This tea can be from any of the 16 tea growing districts of India. However, the areas with special characteristics are Assam, Darjeeling, Kangra Valley and Nilgiris. The quality of a particular region is also specific to the area; Darjeeling tea and Assam orthodox tea is protected under Geographical Indication (GI). The tea quality also varies depending on season of the year, and the main seasonal variations are first flush, second flush, rains and autumn. The various conventional types of tea based on manufacturing process are black, green and oolong.

Both black tea and green tea are conventionally sorted into various grades for trade, primarily based on size (discussed earlier). The tea is available to the consumers in loose form or blended in packets.

## **Traditional**

India had a practice of manufacturing tea in traditional ways for domestic consumption particularly with the Singpho tribe of Upper Assam. Such tea known as “phalap” is still manufactured in traditional system, stuffed in bamboos after partially frying in pan. Some recent innovation of such tea is the form of Phalap Tea Coin.

## **Indigenous handmade or handcrafted**

The indigenous people of the tea growing areas of Assam who are mostly small tea growers and also some commercial tea gardens of Darjeeling produce meticulously handmade or handcrafted varieties of tea which have a niche segment of the market. Such tea is also mostly organic in nature. This handmade tea is categorized as: Assam orthodox black tea, Assam orthodox green tea, and Singpho/Darjeeling handcrafted designer tea in form of flowers, balls, and many other shapes.

## **Specialty tea**

There are some very special grades of orthodox tea named as Silver Tips and White varieties of tea, among others, which are specially manufactured with buds of leaf which produces tips only. There is scope for producing unique purple tea also in Assam as tea plants with purplish pigmentation of leaves due to presence of anthocyanin is also available here and such wild types exist in large number in the Karbi Anglong District of the state. With the concept, initiative and support of the author of this article, handmade purple tea from wild tea plants of Karbi Anglong forests made by a young entrepreneur is already being test marketed in London and Singapore, though commercial production is yet to start.

## **Organic**

The organic tea is produced by cultivation practices which preclude use of synthetic agro-chemicals in tea, including: fertilizers, pesticides and weedicides. Naturally products of biological origin, minerals and composts/vermi-composts are used in cultivation. Bio-dynamic concept is also adopted which is based on natural influence of stars, planets and heavenly bodies and their rhythms. All types of black, green, orthodox and CTC tea is manufactured in this process. Demand for such varieties of tea is increasing globally and internally.

## **Ready to use**

Instant tea and commonly used tea bags are in this segment of ready to use tea.

## **Flavoured tea**

Flavoured tea and special health tea is tea with value addition. Flavoured tea is enriched with addition of various flavour ingredients and include, among others, masala tea (spicy mixture tea), cardamom tea, clove tea, rose tea, jasmine tea, pomegranate tea, wild flowers tea, earl grey with bergamot, vanilla and black currant.

## **Special health tea**

Both green tea and black tea contain numerous health beneficial properties, though medicinal properties of green tea is more commonly known to majority of the people. One of the reasons for popularity of tea is its medicinal properties. In fact, tea is not only medicinal and rich in anti-oxidants; it is a beverage of general wellbeing of entire physiological system of humans. To enhance such unique properties of tea, certain specific plants and natural health products are value added and marketed, some of which are: green tea with *tulsi* (basil), green tea with gin seng, green tea with *kesar*, green tea with *aswagandha* (*Withania somnifera*, family: *Solanaceae*), green/ black tea with fennel seeds and peppermint, green tea kehwa (special green tea preparation

popular in Kashmir, green tea *kehwa* with *kesar* (saffron), green/black tea with lemon, green/black tea with lemon and mint, green/black tea with mint, green/black tea with orange, green/black tea with ginger, and so on.

### **Special blends**

Blending is an art and most of the blended packets which are marketed by tea companies are blends of various types and grades of Assam, Darjeeling, Dooars, Cachar, South Indian Tea made by expert tea tasters. A few of the blends based on original of tea are: Assam Darjeeling Orthodox: Assam 70%+ Darjeeling 30%, Assam Darjeeling Premium: Assam 50%+ Darjeeling 50%, and so on. The packaging companies make own specific blends based on consumers' taste and preference.

### **Special single manufacture**

The various planting materials (seed jats and clones) used in the cultivation have distinct intrinsic, unique quality of taste and flavour. The final product of tea in a tea estate is a mixture from the various kinds of planting materials planted in the plantation. However, special manufacture of quality planting materials is also available on demand, which could be black or green and orthodox/CTC type. Some of such exclusive single planting materials are TV (Tocklai Vegetative) 1, T3 E3, P 126, S3A3 of Assam, and Darjeeling flavoury-B 157, AV 2, K 1/1, and so on.

### **Diversified products**

Diversified products of tea are available which are mostly from extracts of bio-chemical constituents of tea and it is also an area of future research. Tea contains a number of coloured components and more than 800 flavoury components, which are responsible for colour and flavour quality of tea. It also contains different types of amino acids and phenolic compounds, which are responsible for the taste/flavour of the liquor.<sup>15</sup> The components responsible for colour, flavour and taste are extracted and used in preparation of tea based bakery items like tea biscuits and tea cakes.<sup>16</sup> Experimentally the antioxidant properties of green and black tea are also being utilized in preparing value-added ice cream.<sup>17</sup> Bottled or canned tea soft drink, tea tablet, tea candy or tea toffee are some of the diversified products of tea attempted. Decaffeinated tea is another form of diversified product.

Some other diversified products of tea though not popular in India are tea shoots pickle and tea shoots pickle with bamboo shoots. There is a practice of taking bason (grounded chick pea) fried tea shoots with mint and chilly chutney (seasoned paste), tea flower fried with bamboo shoots with mint and chilly chutney (seasonally).

Interestingly, "herbal tea", the name many people come across frequently is not tea at all, that is, made from tea plant (*Camellia sinensis*). The herbal tea date back to medieval period medicine and have therapeutic value some of which are from peppermint, chamomile, strawberry, fennel, matte, lemon, black currant, among other products.

## **TYPES OF TEA IN INDIA: PRODUCTION, MARKETING AND CONSUMPTION**

Statistics of various types of tea produced in India, as available from Tea Board of India, classifies them into four broad categories, viz. CTC, orthodox, Darjeeling and green tea.

Table 1 shows the various types of tea manufactured in India at present (year: 2005, 2007).

**Table 1: Types of tea manufactured in India (2005, 2007) (Quantity in million kilograms).**

Year	CTC	Orthodox	Darjeeling	Green	Total
2005	849.6 (89.81%)	75.6 (7.99%)	11.3 (1.19%)	9.4 (0.99%)	946.0
2007	887.9 (90.01%)	78.6 (7.97%)	10.0 (1.01%)	9.9 (1.0%)	986.4

Source: Tea Statistics, Tea Board of India, 2004-2005, 2010-2011

The majority of tea manufactured in India consists of CTC type (90.01% in 2007). Of the remaining, approximately 10%, is of orthodox, Darjeeling and green tea, and most of it is exported, along with tea bags, instant tea and other value added forms.

The changing consumption pattern of tea from traditional orthodox type to CTC resulted in change in production form which is evident from the data available and presented in Table 2.

**Table 2: Changing pattern of tea manufacture in India (1961-2005) (Quantity in million kilograms).**

Year	CTC	Orthodox	Darjeeling	Green	Total
1961	122.1	191.3	10.1	30.9	354.4
1971	240.0	164.6	10.3	20.6	435.5
1981	357.5	183.1	12.2	7.6	560.4
1991	603.6	136.9	13.9	9.8	754.2
2000	760.4	71.0	9.3	6.2	846.9
2001	759.4	79.2	9.8	5.4	853.9
2005	849.4	75.9	11.3	9.4	946.0
2006	893.4	66.3	10.9	11.2	981.8
2007	887.9	78.6	10.0	9.9	986.4

Source: Tea Statistics, Tea Board of India, 2004-2005, 2010-2011

It is clearly evident that CTC tea production and consumption has overwhelmingly taken over from orthodox tea. It has been a gradual but steep decline over the years for orthodox tea depicting the changing consumer behaviour. Production of orthodox black tea was as high as 54% of India's production in 1961, which had come down to mere 8% to 10% in 2005-2007. Moreover, this production of orthodox tea is also mostly exported.

Statistics on export of value added tea from India are available in three types, viz. packet tea, tea bags and instant tea. Instant tea produced in India is almost entirely exported. The quantity and income from value added tea exported from India are presented in Table 3.

**Table 3: Export of value added tea from India (Quantity in million kilograms, value in INR Crores, share in percentage).**

Year	Total tea export	Value added tea	Share to total export			
	Quantity	Value	Quantity	Value	Quantity	Value
1992-93	180.69	1058.70	67.51	438.34	37.36	41.40
1995-96	167.47	1246.53	86.06	654.91	51.39	52.54
2000-01	190.00	1695.79	47.85	655.05	25.18	38.62
2004-05	205.81	1924.71	46.78	611.85	22.73	31.79
2007-08	185.32	1888.68	21.84	421.60	11.79	22.32
2008-09	190.64	2381.79	21.71	505.76	11.39	21.23

Source: *Tea Digest*, 2008 & 2009, Tea Board of India, Kolkata.

The above data clearly shows that the quantum of export of packet tea, tea bags and instant tea has declined in India over the years both in terms of quantity and value. They constituted 11.39% of quantity and 21.23% of the total value of export in 2008-2009. Out of total 190.64 million kilograms export of Indian tea in 2008-2009, value added tea constituted 21.71 million kilograms out of which packet tea, tea bags and instant tea were 10.26 million kilograms, 8.64 million kilograms and 2.81 million kilograms respectively. In contrast, in 1995-1996, 86.06 million kilograms of value added tea was exported out of total 167.47 million kilograms export of India tea which constituted 51.39% share in quantity and 52.54% in value of export.

The demand for Indian tea is increasing both domestically and globally. The domestic market of India is huge. The total volume of internal consumption in India is the highest in the world surpassing even China, but the per capita consumption comes down because of its large population. In India, tea is the cheapest and the most popular beverage with the common mass. Almost the entire produce of the country was exported earlier in the beginning of the 20 century. The growth of domestic consumption of tea, thereafter, is huge (Table 4).

**Table 4: Internal consumption of tea in India (estimated 1953-1954, 2008) (Figures in million kilograms).**

Year	Internal consumption	% total production
1953-54	82.67	29.65
1960-61	124.50	38.62
1971	221	50.75
1981	360	64.24
1991	511	67.75
2000	653	77.10
2005	757	80.02
2007	786	79.68
2008	802	81.77

Source: Tea Statistics, Tea Board of India, 1960, 2004-2005, 2010-2011

The internal consumption of tea in India to the total production of the country (import for domestic consumption is nominal), which was less than 30% in 1953-1954 (82.67 m kg) had risen to over 802 million kilograms which is about 82% of its total production in 2008. It signifies

the ever increasing popularity of tea as a beverage among the Indian mass and also the over dependence of the Indian tea industry on the domestic market and percentage decline on export front. The domestic consumption in India comes to about 22% of the total tea production in the world (2005). Tea is truly the national drink of India. The popularity and acceptance of tea as a beverage had received further momentum with scientific discovery of various important health benefiting properties of tea, particularly anti-carcinogenic and anti-oxidant, to name a few. It is perceived as a health drink too by the present health conscious generation.<sup>18</sup>

Tea is now considered to be not only pleasurable and appealing to the consumers due to its inherent characteristics and medicinal properties, but it is also considered to be a safe drink from the point of view of consumers. It is particularly important because tea is largely being marketed and consumed on the basis of its contributions to health. The presence of agro-chemical residues in the end product is a matter of concern to consumers. Now all exports have to conform to MRL (maximum residue limit) levels set by various tea consuming countries. Carefully managing the presence of agricultural chemicals used on tea growing, processing and storage of tea, other consumer considerations like moisture level (higher residual moisture leading to growth of harmful bacteria), presence of extraneous materials like traces of insect fragments or other contaminants, all make up the concept of a safe tea, to consumers.<sup>19</sup>

Tea, thus, has a widespread variability. There are many varieties of tea to choose from: traditional to conventional and diversified products. This range of various types of tea and special stamp of quality of a particular geographic region (GI) along with the various value added forms make tea the unique drink of the present and the future all over the globe.

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## REFERENCES

1. Baruah Sabitri; Ashok Kumar Bordoloi; Monuj Kumar Gogoi; Romen Chandra Gogoi and Mridul Hazarika (2012). Study of antioxidant property in different types of tea. *Two and A Bud.* 59(2): 102-105.
2. Baruah, Pradip (2008). *The Tea Industry of Assam: Origin and Development.* India Guwahati. 257-258.
3. Baruah, Pradip (2011). *op cit.*
4. Baruah, Pradip (2011). *op cit.*
5. Baruah, Pradip (2011). Tea drinking: Origin, perceptions, habits with special reference to assam, its tribes and role of Tocklai. *Science and Culture*, September-October, 2011, 77(9-10): 365-372.
6. Baruah, Pradip (2014) Unpublished. Origin, discovery of tea, wild tea and early development of tea in Assam, indigenous Tea and tea drinking habit among the tribes in Assam of India.
6. Baruah, Sabitri, A.K. Bordoloi and M. Hazarika (2008) *ibid.*
7. Baruah, Sabitri; P. Tamuly; P. Bordoloi; A.K. Bordoloi; S. Sabhapandit; R. Gogoi; J.N. Kalita; L.P. Bhuyan; M.N. Gogoi and M. Hazarika (2005). Technology for Product Diversification and Value Added Items of Tea. Proceedings of 34<sup>th</sup> Tocklai Conference, 2005. Tea Research Association, Tocklai Experimental Station, Jorhat, Assam, 63-69.



8. Deka, Aniruddha and Taparia, Madan (1999). *op cit.*
9. Deka, Aniruddha and Taparia, Madan (1999). Dictionary of tea. First published, Computech India, Jorhat, Assam, 269.
10. Griffiths, John (2007). *Tea: The Drink that Changed the World*. First edn. Andre Deutch: London, p 7.
11. Harlar, C.R. (1933). *The Culture and Marketing of Tea*. First edn. Humphrey Milford, Oxford University Press: London.
12. Mahanta, 1988; Mahanta and Singh, 1990 and Hazarika (2002). Quoted in Baruah, Sabitri, A.K. Bordoloi and M. Hazarika (2008). Diversified Products: Bakery Items of Tea-Tea Biscuits and Tea Cakes. *Two and A Bud*. 55(1&2): 48-49.
13. Simaranay, Joseph P. (2010). "Concept of safe tea: A consumer point of view". Paper presented at Infinita, Ensuring the Future of Tea at Tocklai Tea Centenary Conference, New Delhi, 10-11 May, 2010.
14. Tea Research Association, Tocklai Experimental Station (2011). *ibid.*
15. Tea Research Association, Tocklai Experimental Station (2011). *op cit.*
16. Tea Research Association, Tocklai Experimental Station (2011). *op cit.*
17. Tea Research Association, Tocklai Experimental Station (2011). *op cit.*
18. Tea Research Association, Tocklai Experimental Station (2011). *Tea Manufacturing Manual, Tea.*
19. Research Association, Tocklai Experimental Station, Jorhat, 97-101.