Black Tea

Of 14 brands, 1 failed the pesticides test

Tea is said to be the most consumed aromatic beverage in the world. Drinking tea is a habit like no other. Many of us need it first thing in the morning and revere it for what it does to our levels of energy and alertness. Sure enough, there is a range of amazing health benefits associated with drinking tea. For every study that raises the red flag about potential risks of drinking too much tea or low-quality tea, there are ten or more studies that tout the good things. For example, there are the antioxidant properties of tea, its ability to lower one's risk for some types of cancer, and so on. Despite health scare, drinking moderate amounts of tea is generally safe for most people. Drinking large amounts of black tea, or more than four or five cups a day, may cause health problems. That's mostly because of caffeine-related side effects.

So far as quality and safety aspects are concerned, adulteration is admittedly a serious issue. Also, are we drinking tea that has pesticides levels exceeding the standards prescribed by national regulations? What are the major quality parameters that one should look for in tea? These aspects are at the centre of the latest *Consumer Voice* report, which compares the performances of 14 leading brands of black tea. Read on to find out which brand had pesticide residues beyond the acceptable safety limit.

A Consumer Voice Report

We tested the 14 brands of black tea on quality and safety parameters at an NABL-accredited laboratory. The test programme was mainly based on Food Safety & Standards Regulations and relevant Indian Standard IS: 3633:2003, as well as other related standards applicable to this product.

The key parameters for which the 14 brands were tested included total flavonoids, theaflavins, crude fibre, pesticide residues (the tests covered seven pesticides), heavy metals (lead and copper), iron filings, water-soluble ash, total ash, water extract and added colouring matter.

Did You Know?

The botanical name of tea is *Camellia sinensis*.

Black, green and white tea all originate from the *Camellia sinensis* plant. Their differences come from the methods by which they are processed. The buds and young leaves are steamed and dried to produce white tea. Green tea is made from mature leaves that go through the same process as white tea. When the leaves are rolled or broken and allowed to oxidise or ferment, the result is black tea.

Broadly, tea is classified as orthodox or CTC (crush-tear-curl). Orthodox teas are whole-leaf teas manufactured using the traditional process of making tea, which involves plucking, withering, rolling, oxidation/fermentation and drying. CTC teas produce a granular leaf particle. It produces a very strong flavour, quickly infusing tea that is often boiled or used in tea bags.

Key Findings

- Based on the overall test findings, Brooke Bond Red Label is the top performer. Next in ranking are Brooke Bond Taj Mahal, Trusted Value Premium CTC Leaf, Tata Premium and Reliance Aarambh.
- The value-for-money brand is Trusted Value Premium CTC Leaf.
- Total flavonoids were found highest in Brooke Bond Red Label, while theaflavins were found highest in Marvel. Flavonoids and theaflavins are known for their antioxidant properties.
- All brands except Rungta's were found to meet the requirements of FSS Regulations and Indian Standard. Pesticides, namely quinalphos, were found to be above the prescribed limits in Rungta's – this means it is not safe for consumption.
- Heavy metals – specifically lead and copper – were within the acceptable limit in all the brands.
- Acid-insoluble ash and total ash were within the permissible limit.
- Iron filings, aflatoxins and colouring matter were not detected in any of the brands.

Comparative Test

CV RECOMMENDATION | TOP PERFORMER

Brooke Bond Red Label

VALUE FOR MONEY

Trusted Value Premium CTC Leaf

BRANDS TESTED

Rank	Total Score out of 100 (Rounded off)**	Brand	MRP (Rs)	Net Weight	Price/ 250 gm	Best before (Months)	Manufactured/ Marketed by
1	84	Brooke Bond Red Label	90	250 gm	90	12 Months	Hindustan Unilever Ltd, Mumbai
2	83	Brooke Bond Taj Mahal	113	250 gm	113	12 Months	Hindustan Unilever Ltd, Mumbai
2	83	Trusted Value Premium CTC Leaf	75	250 gm	75	12 Months	Spencer's Retail Ltd, Kolkata
2	83	Tata Premium	85	250 gm	85	12 Months	Tata Global Beverages, Bengaluru
2	83	Reliance Aarambh CTC Tea*	97 (Rs 20 off on MRP)	250 gm	97	12 Months	Reliance Retail Ltd, Thane
3	82	Marvel Colvin Premium	60	250 gm	60	12 Months	Marvel Ltd, Uklana, Haryana
4	81	Double Diamond Premium Leaf Tea	352	1 kg	88	18 Months	Duncan's Tea Ltd, Faridabad
4	81	Utsav	398	1 kg	99.50	12 Months	Godfey Philips India Ltd (GPI), Mumbai
5	80	Rungta's Real Gold	190	500 gm	95	12 Months	Rungta Tea Pvt. Ltd, Delhi
5	80	Wagh Bakri Premium Leaf Tea	100	250 gm	100	12 Months	Gujarat Tea Processors & Packers Ltd, Ahmedabad
5	80	Today Haryali* CTC Tea	85 (Free 1 bon china mug)	250 gm	85	12 Months	Today Tea Ltd, New Delhi
6	79	Nova	70	250 gm	70	12 Months	Surya Marketing Co., New Delhi
6	79	Goodricke CTC Leaf Tea	148	500 gm	74	12 Months	Goodricke Group Ltd, Kolkata
6	79	Fresh & Pure Family Tea	99	250 gm	99	12 Months	Future Consumer Enterprise Ltd, Mumbai

**Under promotional scheme*

*Score Rating: >90: very good*****, 71–90: good****, 51–70: fair***, 31–50: poor**, up to 30: very poor**

TEST RESULTS

FOR PHYSICOCHEMICAL PARAMETERS

Flavonoids | Theaflavins | Crude Fibre | Pesticide Residues | Acid-Insoluble Ash | Total Ash | Water-Soluble Ash | Water Extract | Alkalinity of Water-Soluble Ash Expressed as KOH | Added Colouring Matter | Iron Filings | Lead | Copper | Aflatoxins

◆ Flavonoids

Indian Standard has not specified any requirement for total flavonoids.

Black tea develops different types of flavonoids. These flavonoids have antioxidant abilities and may help prevent heart disease and some types of cancer.

- *Total flavonoids were found in the range of 6.25 per cent–55.69 per cent w/w (mass/mass). Red Label had the highest amount and Goodricke the lowest.*

◆ Theaflavins

There is no standard requirement for theaflavins either.

- *Theaflavins were found in the range of 0.78 per cent–2.15 per cent w/w (mass/mass). Marvel had the highest amount and Taj Mahal the lowest.*

Theaflavins are primarily responsible for the darker colour and stronger flavour of black tea. These have been proved to be effective as antioxidants and have many uses – from treating headaches and staving off allergies to protecting the heart and reducing cancer risk.

◆ Crude Fibre (on dry basis)

Crude fibre is a measure of the quantity of indigestible components present in foods. These components have little food value but because of their effect on the digestive system, they are thought to help with such problems as diabetes and high levels of blood cholesterol. Crude fibre is an important parameter in the quality evaluation of tea and influences its sensory properties.

As per FSS Regulations and Indian Standard, crude fibre in tea shall not be more than 16.5 per cent.

- *Crude fibre was found within the specified limit of 16.5 per cent.*

◆ Pesticide Residues

Pesticide is a chemical or biological agent (such as a virus, bacterium, antimicrobial, or disinfectant) that deters, incapacitates, kills, or otherwise discourages pests. Pesticides may cause acute and delayed health effects in people who are exposed. Such adverse health effects range from simple irritation of the skin and eyes to more severe effects like affecting the nervous system, mimicking hormones causing reproductive problems, and causing cancer.

We have conducted tests for following pesticides residues as per requirements of FSSAI.

a) Dicofol: Maximum permissible limit is 5.0 mg/kg.

- *It was not detected in any of the samples.*

b) Ethion: Maximum permissible limit is 5.0 mg/kg.

- *It was not at all detected in 12 brands. Traces of ethion were found in Rungta's and Goodricke but*

these were well below the specified limit. Thus, all the brands passed this test.

c) **Fenazaquin:** Maximum permissible limit is 3 mg/kg.

- *It was not detected in any of the samples.*

d) **Glufosinate ammonium:** Maximum permissible limit is 0.01 mg/kg.

- *It was not detected in any of the samples.*

e) **Glyphosate:** Maximum permissible limit is 1.0 mg/kg.

- *It was not detected in any of the samples.*

f) **Propargite:** Maximum permissible limit is 10.0 mg/kg.

- *It was not detected in any of the samples.*

g) **Quinalphos:** Maximum permissible limit is 0.01 mg/kg.

- *Traces of this pesticide were found in Rungta's – at 0.04 mg/kg, these went above the specified limit. Hence, this brand is not recommended for consumption.*

◆ Acid-Insoluble Ash (on dry basis)

Acid-insoluble ash indicates the presence of impurities like sand, dirt and dust in food. As per Indian Standard and FSS Regulations, acid-insoluble ash in tea should not be more than 1.0 per cent by mass.

- *Acid-insoluble ash was found within the specified limits. It was lowest in Rungta's (0.11 per cent) and highest in Fresh & Pure (0.64 per cent).*

◆ Total Ash (on dry basis)

As per Indian Standard and FSS Regulations, total ash in tea shall be between 4.0 per cent and 8.0 per cent.

- *Total ash in all brands was within the permissible range.*

What Does Ash in Food Mean?

Ash refers to the inorganic material, such as minerals, present in food. It is the portion of the food or any organic material that remains after it is burned at very high temperatures. Some minerals are essential to a healthy diet (for example, calcium, phosphorus, potassium and sodium), whereas others can be toxic (lead, mercury, cadmium and aluminium). The quality of many foods depends on the concentration and type of minerals they contain, including their taste, appearance, texture and stability.

◆ Water-Soluble Ash

Water-soluble ash is part of the total ash dissolved by water under the conditions specified in Indian Standard. As per both FSS Regulations and Indian Standard, the water-soluble ash component of total ash shall be a minimum 45 per cent by mass.

- *The water-soluble ash component of total ash was found to be above the minimum requirement of 45 per cent. Thus, all brands passed in this test.*

Alkalinity of Water-Soluble Ash Expressed as KOH

Alkalinity of the water-soluble ash is either the amount of acid required to neutralise the aqueous extract of the total ash or the amount of alkali equivalent to this acid. As per FSS Regulations, it should be between 1.0 per cent and 3.0 per cent of total ash; as per Indian Standard, it should be in the range of 1.19 per cent–2.62 per cent.

All the tea samples were found within the specified limit.

◆ Water Extract (on dry basis)

It refers to the soluble matter extracted from a test portion by boiling water under the conditions specified in Indian Standard, expressed as a percentage by mass on a dry basis. As per both Indian Standard and FSS Regulations, water extract shall not be less than 32 per cent.

- *All samples met the requirement set by the standards. Water extract was highest in Red Label (63.52 per cent) and lowest in Nova (32.81 per cent).*

◆ Added Colouring Matter

Colour adulteration is not acceptable from the point of view of consumers' health. As per FSS Regulations and Indian Standard, colouring matter shall be negative/absent in tea.

- *Colouring matter was absent in all the samples.*

The iron content present in tea is classified as 'inherent iron' and 'iron filings'. The former is of plant origin (nonmagnetic part), while the latter is extraneous in nature (magnetic part). In tea-manufacturing process, a lot of machinery made of iron are utilised to crush, tear, curl and roll the withered leaf after harvesting. For example, tea leaves are dried in a sieve fitted with a mesh and leaves are cut using iron rollers. The powder is crushed in an iron machinery. Due to continuous wear and tear of these machines, the metallic iron particles may get stuck to the tea grains.

◆ Iron Filings

The national standards have capped the maximum limit for iron particles in tea powder at 250 mg per kilogram.

- *Iron filings were not found in any of the brands tested.*

Iron Overload?

An excess of iron in the human body can cause overloading and lead to diseases like liver cirrhosis, osteoporosis, scurvy, heart failure and oesophageal cancer.

◆ Heavy Metals

a) Lead: Lead contamination of food poses a serious health issue. Consumption of even a small amount of lead can cause lifelong health problems and repeated exposure will have lasting and detrimental effects.

As per Indian Standard and FSS Regulations, lead in tea shall not be more than 10 mg/kg.

- *Lead was found within the specified limit in all the 14 brands.*

b) Copper: Copper is an essential mineral required by the body for bone and connective tissue production, and for coding specific enzymes that carry out a range of functions, from eliminating free radicals to producing melanin. However, overconsumption of copper may lead to cramps, diarrhoea and vomiting in the short term, and to depression, schizophrenia, hypertension, senility and insomnia in the long term. Copper in large amounts can even be poisonous.

As per Indian Standard and FSS Regulations, copper in tea shall not be more than 150 mg/kg.

- *Copper was found within the specified limit in all the brands.*

◆ Aflatoxins

Aflatoxins are poisonous and cancer-causing chemicals that are produced by certain moulds (*Aspergillus flavus* and *Aspergillus parasiticus*) that grow in soil, decaying vegetation, hay and grains. Aflatoxins are highly toxic compounds and can cause both acute and chronic toxicity in humans and many other animals. Four types of aflatoxins are naturally found in foods. These are aflatoxins B1, B2, G1 and G2. Aflatoxin B1 is the most commonly found in food and also the most toxic.

There is no standard requirement for aflatoxins. These are expected to be absent in tea.

- *Aflatoxins were not detected in any of the samples.*

PHYSICOCHEMICAL

Parameter ↓	Weightage (%)	Brooke Bond Red Label	Brooke Bond Taj Mahal	Trusted Value CTC Leaf	Tata Premium	Reliance Aarambh	
Total flavonoids	10	9.48	6.53	5.10	8.61	5.25	
Theaflavins	10	6.7	5.14	7.81	5.38	6.46	
Crude fibre	10	5.47	5.81	6.04	5.81	7.69	
Pesticide residues	8	8	8	8	8	8	
Acid-insoluble ash	8	6.94	7.30	6.94	6.56	6.85	
Total ash	7	5.31	5.33	5.19	5.33	5.31	
Water-soluble ash	8	6.95	6.84	7.17	6.57	6.88	
Water extract	7	6.54	6.51	5.11	5.76	4.75	
Alkalinity of water soluble ash expressed as KOH	6	3.76	5.90	5.76	5.90	6.0	
Added colouring matter	4	4	4	4	4	4	
Iron particles	4	4	4	4	4	4	
Lead	4	3.18	4.0	4.0	3.31	4.0	
Copper	3	2.64	2.77	2.87	2.74	2.74	
Aflatoxins	3	3	3	3	3	3	

SCORES

	Marvel Colvin Premium	Double Diamond Premium Leaf Tea	Utsav	Rungta's Real Gold	Wagh Bakri	Today Haryali CTC Leaf	Nova	Goodricke CTC Leaf	Fresh & Pure
	4.90	3.91	4.50	7.98	3.66	5.96	3.71	3.55	4.17
	9.25	8.08	8.05	5.26	5.83	5.35	5.89	6.97	8.68
	6.95	6.89	7.0	5.48	8.12	6.32	7.48	6.84	6.27
	8	8	8	5.95	8	8	8	7.95	8
	6.40	7.04	6.4	7.65	7.17	6.11	6.97	7.04	5.89
	4.90	4.97	5.07	5.42	5.07	4.94	5.42	4.98	5.08
	6.48	6.87	6.59	7.50	6.91	6.30	6.61	6.71	6.08
	4.36	4.55	4.58	4.39	4.73	5.96	4.28	4.55	4.62
	5.76	5.64	5.78	5.74	5.52	5.93	5.64	5.78	5.30
	4	4	4	4	4	4	4	4	4
	4	4	4	4	4	4	4	4	4
	3.30	3.50	3.34	3.32	3.31	3.32	4.0	3.42	3.31
	2.60	2.65	2.77	2.60	2.62	2.73	2.76	2.59	2.64
	3	3	3	3	3	3	3	3	3

FOR GENERAL QUALITIES

Marking/Labelling

The following details shall be marked on each pack:

(a) Name and address of manufacturer
(b) Name of the product
(c) Net weight
(d) Month and year of manufacture
(e) Batch number
(f) The words 'best before' (month and year)
(g) Tea Board registration number if flavour is added
(h) Declaration if flavour and flavouring substance is added
(i) Green dot denoting vegetarian status
(j) Maximum retail price (MRP)
(k) FSSAI license number
(l) Customer care details

- *All samples had the necessary information on their packs. It may be noted that storage instruction and nutritional information are not mandatory for tea, and most of the manufacturers have not provided complete details in this regard. Most of them have missed giving either storage instruction or nutritional information*

Net Weight

The weight of the product is measured and compared with the declared values on the pack. The net weight should be within the tolerance limit permitted in Legal Metrology Rules.

Net weight of all the tested brands was found as claimed and they scored equally well on this parameter.

Packing

Tea shall be packed in closed, clean and dry containers made of material that does not lead to any deterioration in the quality of the tea.

- *Red Label and Taj Mahal had double packing (flexible as well as hard paperboard). All other samples had flexible thermo plastic packing.*

Parameter ↓	Weightage (%)	Brooke Bond Red Label	Brooke Bond Taj Mahal	Trusted Value CTC Leaf	Tata Premium	Reliance Aarambh	Marvel Colvin Premium	
Marking	4	4	4	4	4	4	4	
Packing	2	2.0	2.0	1.6	1.6	1.6	1.6	
Net weight	2	2	2	2	2	2	2	

Difference between Green Tea and Black Tea

As stated earlier, both green and black teas are made from the leaves of the same tea bush. Whether these tea leaves end up green or black depends on how they are processed.

Green tea is made from tea leaves that are 'fixed' (via steam or pan-firing at a hot temperature) immediately after being plucked. This process prevents the leaves from oxidizing (turning brown), ensuring they remain closest to their pre-plucked state

Black tea, on the other hand, is made from leaves that are heavily oxidized. Because the enzymes within the leaves are allowed to fully oxidize the finished leaves appear dark and brownish in color. A high level of oxidation also converts the polyphenols in the tea (catechins) into oxidase compounds, most notably theaflavins and thearubigins. Theaflavins provide black tea with its briskness and sharp taste while thearubigins give body and impart a dark reddish-brown color typically associated with black teas.

Tea Masters' Tips: The Real versus the Unreal

a) CTC: Take a teaspoon (tsp) of tea and put it in a glass. Pour hot water. Good tea will take three minutes to give colour; the bad takes 30 seconds.

b) Leaf tea: Take a tsp of tea and put it in a glass. Pour hot water and let it steep for three minutes. The inferior tea will reveal leaves, stalks and dust, while the other will show a uniform hue.

c) Take an airtight container and put in the tea. Shut the lid tightly. Open after 24 hours. A musty odour will emerge if the tea is inferior. Good tea will give off fragrance.

–By Vikram Mittal and Nutan Lugani

Big Numbers

India is one of the largest tea producers in the world, and what's more, over 70 per cent of the tea is consumed within India itself. India recorded total tea production of 1233.14 million kg during the financial year 2015–16, which was the highest ever recorded by the country until then. As compared to 2014–15, the total tea production registered an increase of 35.96 million kg.

	Double Diamond Premium Leaf Tea	Utsav	Rungat's Real Gold	Wagh Bakri	Today Haryali CTC Leaf	Nova	Goodricke CTC Leaf	Fresh & Pure
	4	4	4	4	4	4	4	4
	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	2	2	2	2	2	2	2	2

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