



Basmati Rice

Looking for more than a grain of truth

There is rice and more rice, and there is basmati. Some would say eating basmati rice is a complete sensual experience. There is appetite-inducing aroma, visual appeal, great taste, and an utter and inexplicable sense of fulfilment. And no, you won't call this exaggeration. As they say, the proof of the basmati is in the eating – or, shall we say that the proof is in the grain? After all, basmati rice is essentially about its long grains and the magic they stir up. However, all grains are not made equal. As the following report will tell you, there can be all sorts of flaws with grains. There is a minimum precooked and post-cooking grain length that determines the quality of the rice. One may also have to contend with broken and fragments grains, damaged/discooured grains, etc. In an inferior product, there may be red-striped grains, green grains, chalky grains, and so on. Then there are safety concerns of course, mainly relating to possible contamination by heavy metals and presence of pesticide residues. Keeping the relevant standards as reference point, we tested 12 leading brands of basmati rice on the above-mentioned parameters as well as other key quality determinants.

A Consumer Voice Report

A crucial aspect of the test programme was DNA analysis of the samples to detect any adulteration with non-basmati rice. Other key parameters included grain length/breadth ratio, average precooked grain length and elongation ratio. The samples were also

checked for presence of broken and fragments grains, damaged/discooured grains, chalky grains, green grains, other grains, moisture, uric acid, aflatoxins and foreign matter (such as dust and stones). A major health-related parameter was presence of the heavy metals lead and arsenic, as well as pesticide residues.

The tests were conducted at an NABL-accredited laboratory and as per requirements specified in Agmark Rules (Cereals Grading & Marking Rules) and FSS Regulations for rice. Note that Food Safety and Standards Authority of India (FSSAI) has no specific standard for basmati rice. Agmark has standards for Dehradun- and Saharanpur-grown basmati rice as well for basmati rice of export quality.

In the absence of specific standards for domestic trade of basmati rice, we have taken Agmark standards for export quality as reference standard for evaluation. Here it must be mentioned that none of the tested brands bears Agmark grading.



Basmati is a type of long-grain aromatic rice. In view of its unique cooking and eating properties, it is perceived to be a premium kind of rice. With effect from 5 February 2016, basmati rice is a registered GI (geographical indication) product. Agricultural and Processed Food Products Export Development Authority (APEDA), as registered proprietor of the GI, is responsible for putting in place a system for administration of GI and authentication of the product reaching consumers in India and abroad.

India is a leading exporter of basmati rice to the global market. During 2016–17, the country exported 4,000,471.56 MT of basmati rice, worth Rs 21,604.58 crore (or US\$3,230.24 million).

Brown Rice or White Rice

All white rice starts out as brown rice. The latter is converted into white rice through a milling process.

Both white and brown rice are high in carbohydrates. Brown rice, being a whole grain, is generally more nutritious than white rice. It's higher in fibre, magnesium and other nutrients. Whole-grain foods may help reduce cholesterol and lower the risk of stroke, heart disease, and type-2 diabetes.

BRANDS TESTED

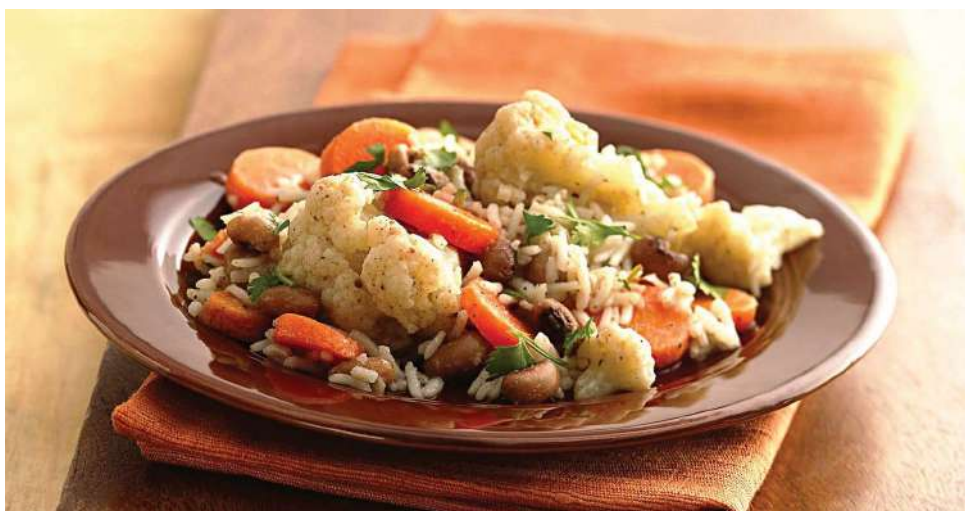
Rank	Total Score out of 100 (Rounded off)	Brand	Variety/ Type	MRP (Rs)	Net Weight	Best before	Manufactured/ Marketed by
1	92	Golden Harvest	Premium quality	130	1 kg	24 months	Future Consumer Ltd
1	92	Lal Qilla	Classic Whiteline	150	1 kg	36 months	Amar Singh Chawal Wala
2	89	Patanjali	Special	125	1 kg	24 months	Patanjali Ayurved Ltd
3	88	Tilda	Premium basmati	160	1 kg	36 months	Tilda Hain India Pvt. Ltd
4	87	Asbah	Silver	135	1 kg	24 months	DCP India (P) Ltd
4	87	India Gate	Tibar	132	1 kg	24 months	KRBL Ltd
5	84	Daawat	Devaaya	95 (free Rs 20 Paytm cash)	1 kg	24 months	LT Foods Ltd
6	82	Organic Tattva	Organic	190	1 kg	12 months	Mehrotra Consumer Products Pvt. Ltd
7	81	Aeroplane	1121	170	1 kg	24 months	Amir Chand Jagdish Kumar (Exports) Ltd
8	76	Heritage	Dubar	100	1 kg	24 months	LT Foods Ltd
9	63	Kohinoor	Everyday basmati rice	99	1 kg	24 months	Kohinoor Speciality Foods India Pvt. Ltd
10	62	Fortune	Rozana	95	1 kg	24 months	Adani Wilmar Ltd

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



**CV RECOMMENDATIONS | TOP PERFORMERS****Golden Harvest | Lal Qilla****VALUE FOR MONEY****Patanjali****Key Findings**

- Based on the overall test findings, Golden Harvest and Lal Qilla are the top performers.
- The value-for-money brand is Patanjali.
- Golden Harvest and Lal Qilla are pure basmati rice, with no trace of any other variety of rice.
- In DNA testing, Kohinoor and Fortune were found having 36.60 per cent and 32.86 per cent non-basmati rice, respectively – this indicates relatively high adulteration.
- Tilda is the top performer in the sensory panel tests. The least preferred brand is Heritage.
- Broken and fragments rice quantity was quite high in Fortune (45.7 per cent), Heritage (36.8 per cent) and Kohinoor (22.15 per cent).
- Lead content was detected in Daawat (0.6 ppm) and Fortune (0.3 ppm) – both are above the specified limit of 0.2 ppm.
- Organic Tattva, an organic product, was found having the pesticide pretilachlor (0.01ppm), thereby not meeting the requirement of FSS Regulations.



TEST RESULTS FOR DNA

DNA (deoxyribonucleic acid) testing can help to determine if the parent and child are biologically related. Similarly, in the case of basmati rice, DNA test can help determine its purity. The test can detect adulteration with non-basmati rice. Presence of inferior varieties of rice is considered as adulteration. The admixture of common rice in basmati rice shall not exceed limits prescribed in Agmark.

None of the 12 brands have either taken Agmark or declared their grade/origin of harvest. Therefore, we have considered the highest tolerance limit specified in Agmark standard – it is 20 per cent for Grade B.

As per Agmark standard, in basmati rice (for Dehradun area) any non-basmati rice including red grains shall be a maximum 1.0 per cent, 2.0 per cent and 4.0 per cent for special, A and B grades, respectively; for Saharanpur area it shall be a maximum 3.0 per cent, 7.0 per cent and 10.0 per cent for special, A and B grades, respectively. For export quality, other rice including red grains in basmati rice shall be a maximum 10 per cent, 15 per cent and 20 per cent for special, A and B grades, respectively.

Brand	Results (percentage of non-basmati rice detected)	Score out of 25
Golden Harvest	0.0%	25.0
Lal Qilla	0.0%	25.0
Patanjali	2.82%	22.88
Tilda	5.63%	20.77
Organic Tattva	6.40%	20.2
Asbah	6.66%	20.00
Daawat	7.89%	19.08
India Gate	8.41%	18.69
Heritage	9.53%	17.85
Aeroplane	17.35%	11.98
Fortune	32.86%	5.0
Kohinoor	36.60%	3.75

- Golden Harvest and Lal Qilla did not contain any other variety of rice and are therefore pure basmati rice.
- All other brands had some percentage of other varieties of rice.
- Two brands, Fortune and Kohinoor, did not meet the Agmark standard.

FOR PHYSICOCHEMICAL PARAMETERS

Broken and Fragments Grains | Grain Length/Breadth (L/B) Ratio | Moisture | Protein | Carbohydrates | Energy | Elongation Ratio | Uric Acid | Aflatoxins | Foreign Matter | Damaged, Discoloured Grains | Average Precooked Grain Length | Other Grains | Chalky Grains | Under-milled/Red-stripped Grains | Green Grains

◆ Moisture

Moisture generally refers to the presence of water in a product. It is an important factor in retaining a product's quality, preservation and resistance to deterioration. As per FSS Regulations for rice, moisture content shall not be more than 16 per cent by weight.

- Moisture content in all the brands was within the specified limit.
- The lowest moisture content was in India Gate (11.1 per cent). Patanjali was found with higher moisture content (12.5 per cent).

◆ Protein

Protein is an essential nutrient. It plays an important role in cellular maintenance, growth and functioning of the human body. Protein is inherently found in all cereals including rice. While there is no standard requirement for protein in rice, a higher

quantity is desirable. It should be as per the declared value on the product label.

- The highest amount of protein was found in Fortune (9.3 per cent) and the lowest in Kohinoor (7.4 per cent).
- Protein in Lal Qilla was less than the declared value.



The Truth Is in the Grains

◆ Broken and Fragments Grains

'Broken' denotes pieces of kernels that are less than three-fourth of a whole kernel. Pieces smaller than one-fourth of the whole kernel are to be treated as 'fragments'. For export quality, these shall be a maximum 5.0 per cent, 10 per cent and 10 per cent for special, A and B grades, respectively.

- Golden Harvest had zero percentage of broken rice.
- The percentage of broken and fragments grains in Fortune, Heritage and Kohinoor was significantly high at 45.7 per cent, 36.8 per cent and 22.15 per cent, respectively. These three brands – none of which had taken Agmark, which is a voluntary standard – clearly did not meet the requirement of Agmark standard.

◆ Grain Length/Breadth (L/B) Ratio

After cooking, the basmati rice should show equivalent breadth-wise expansion but better length-wise expansion to give it a finer look. For export-quality basmati rice, grain length/breadth shall be a minimum 3.5.

- All the brands met the grain length/breadth requirement mandated for export quality.
- Aeroplane and Lal Qilla scored highest on this parameter.

◆ Elongation Ratio

Kernel elongation after cooking is an important character of fine rice. For export-quality basmati rice, elongation ratio shall be a minimum 1.7.

- Elongation ratio for all brands was above the requirement for export quality. It was highest in Golden Harvest (2.40) and Lal Qilla (2.32).

◆ Average Precooked Grain Length

For export-quality basmati rice, average precooked grain length shall be a minimum 7.1 per cent, 7.0 per cent and 6.8 per cent for special, A and B grades, respectively.

- Most of the brands met the requirement of export quality. The most length was of Aeroplane (8.6 mm) and Lal Qilla (8.46 mm).

◆ Damaged, Discoloured Grains

These are internally damaged or discoloured (including black grains), materially affecting the quality. As per Agmark standard for basmati rice (Dehradun area), damaged, discoloured grains shall be a maximum 0.25 per cent, 0.50 per cent and 0.75 per cent for special, A and B grades, respectively; for Saharanpur area, it shall be a maximum 0.25 per cent, 0.35 per cent and 0.75 per cent for special, A and B grades, respectively.

- India Gate and Patanjali did not have any damaged, discoloured grains. In the other brands these varied between 0.05 per cent and 0.5 per cent.

◆ Other Grains

As per the national standard for export-quality rice, 'other grains' shall be a maximum 0.1 per cent, 0.1 per cent and 0.2 per cent for special, A and B grades, respectively.

- None of the brands had other grains.

◆ Chalky Grains

Chalky grain is grain at least half of which is milky white in colour and brittle in nature.

- Golden Harvest, India Gate and Aeroplane did not have chalky grains.
- The highest percentage (1.45) of chalky grains was found in Heritage and Lal Qilla.

◆ Under-milled/Red-striped Grains

Under-milled grain is one whose bran portion is not completely removed during polishing or which has substantial bran streaks left on it. Red grains are the kernels, whether whole or broken, which have 25 per cent or more of their surface coated with red bran.

- None of the brands had under-milled or red-striped grains.

◆ Green Grains

These are grains that are not properly developed or are green in colour.

- None of the brands had green grains.

**◆ Carbohydrates**

Carbohydrates are a source of energy. They are the sugars, starches and fibres found in grains, fruits, vegetables and milk products. There is no requirement for carbohydrates in rice, though these should be as per the declared value on product label.

- Carbohydrates percentage was highest in Lal Qilla (79.6) and lowest in Tilda (77.5).
- Carbohydrate amount in Tilda and Heritage was found to be slightly less than the claimed value.

◆ Energy

Energy value is the amount of calories which our body obtains from food. The source of energy in rice is from carbohydrates, fats, etc. The total energy (per 100 gm of sample calculated in kcal) was compared with the declared value. While there is no standard requirement for energy in rice, a higher amount of it is considered to be better. Besides, it should be as per the declared value on product label.

- Among the tested brands, energy value was highest in India Gate (354.4 kcal/100 gm) and lowest in Tilda (342.5 kcal/100 gm).

- Energy value was less than the claimed value in Tilda, Heritage, Aeroplane and Lal Qilla.

Below Detection Limit**Uric Acid**

- Uric acid shall not be more than 100 mg per kg. It was not detected (detection limit being 10 mg/kg) in any of the brands.

Aflatoxins

- Aflatoxins are carcinogenic substances that may affect rice quality to a great extent. These shall not be more than 30 micrograms per kilogram of rice. In the 12 tested brands, aflatoxins were below detection limit (detection limit being 1.7 ug/kg)

◆ Foreign Matter

Foreign matter includes dust, stones, lumps of earth, chaff, straw and any other impurity. As per FSS Regulations for rice, foreign matter and damaged grains shall not be more than six per cent by weight.

- Foreign matter was not detected in any of the brands.

PHYSICOCHEMICAL

Parameter ↓	Weightage (%)	Golden Harvest	Lal Qilla	Patanjali	Tilda
Variety/Type →		Premium	Classic Whiteline	Special	Premium
Broken and fragments grains	8	8.0	7.94	7.86	7.92
Grain length/breadth (L/B) ratio	5	3.88	4.25	3.99	4.16
Moisture content	4	3.38	3.47	3.3	3.41
Protein	4	3.34	3.04	3.34	3.52
Carbohydrates	4	3.15	3.35	3.21	3.10
Energy	4	3.06	3.68	3.52	2.50
Elongation ratio	3	2.85	2.73	2.48	2.61
Uric acid	3	3	3	3	3
Aflatoxins	3	3	3	3	3
Foreign matter	2	2	2	2	2
Damaged, discoloured grains	2	1.94	1.94	2.0	1.88
Average precooked grain length	2	1.62	1.94	1.59	1.66
Other grains	1	1	1	1	1
Chalky grains	1	1.0	0.89	0.92	0.93
Under-milled/red-stripped grains	1	1	1	1	1
Green grains	1	1	1	1	1

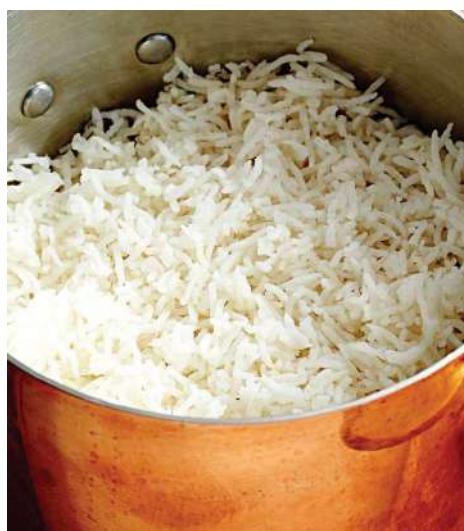
**FOR HEAVY METALS
(LEAD, ARSENIC)**

Heavy metals contamination in agricultural soil is a potential environmental threat to the safety of agricultural food crops such as rice. We carried out tests to check for the presence of lead and arsenic. In this regard, FSS Regulations has specified limits for rice. There are no standards for organic rice, though.

Lead in cereal grain (rice) should not exceed 0.2 mg/kg. As for arsenic, it shall not be more than 1.1 mg/kg.

- Lead content in Daawat and Fortune was found to be above the specified limit.
- All of the brands were within the limit specified for arsenic.

Arsenic can be easily accumulated by all types of cereals, largely because of the high bioavailability of arsenic under reduced soil conditions.



SCORES

Asbah	India Gate	Daawat	Organic Tattva	Aeroplane	Heritage	Kohinoor	Fortune
Silver	Tibar	Devaaya	Organic	1121	Dubar	Everyday basmati rice	Rozana
7.41	7.73	7.49	7.66	7.98	1.6	2.00	1.2
4.17	3.99	3.96	3.34	4.26	3.38	3.90	3.32
3.52	3.69	3.44	3.52	3.58	3.61	3.41	3.41
3.58	3.40	3.22	3.10	3.58	3.46	2.80	3.94
3.27	3.32	3.27	3.21	3.29	3.28	3.32	3.16
3.88	3.93	3.44	3.32	3.87	3.58	3.88	3.48
2.52	2.34	2.60	2.39	2.63	2.70	2.15	2.27
3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3
2	2	2	2	2	2	2	2
1.64	2.0	1.94	1.88	1.94	1.40	1.52	1.94
1.69	1.57	1.57	1.24	2.0	1.32	1.62	1.23
1	1	1	1	1	1	1	1
0.94	1.0	0.97	0.92	1.0	0.89	0.90	0.93
1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1

Pesticide Residues

Pesticide is a chemical or biological agent that deters, incapacitates, kills, or otherwise discourages pests. Pesticide exposure can cause a variety of adverse health effects such as skin and eye irritation; it also affects the nervous system, mimicking hormones causing reproductive problems. It has been linked to birth defects and cancer as well.

We conducted tests for residues of 37 pesticides as per requirements of Food Safety and Standards Regulations 2011.

Traces of the pesticide tricyclazole were found in Kohinoor but it was within the specified limit.

Traces of the pesticide pretilachlor were found in Organic Tattva, which means it did not meet the standard requirement.

Pesticides in other brands were found below the detection limit of 0.01 mg/kg.



FOR SENSORY ATTRIBUTES

Panellists judged the sensory attributes of the basmati rice on these attributes: fragrance/aroma, appearance, size of kernel, colour, texture and taste. Rice shall be free from abnormal flavours, odours, living insects and mites. Raw rice was boiled in water and judged for their sensory attributes. The expert panel assigned scores on a 10-point scale and mean score was taken for evaluation and scoring.

Brand	Score out of 12
Tilda	10.49
Golden Harvest	9.85
Daawat	9.69
India Gate	9.63
Patanjali	9.30
Organic Tattva	9.25
Aeroplane	9.25
Asbah	9.24
Kohinoor	9.17
Lal Qilla	8.51
Fortune	8.14
Heritage	7.80

- Tilda was the most liked brand among panellists, and was followed by Golden Harvest.
- Heritage was the least favoured among all tested brands.

FOR GENERAL QUALITIES

◆ Marking

The following details shall be marked on the product label:

- Name of the commodity and variety
- Name of manufacturer/marketer
- Batch or code number
- Net weight
- Date of packing and year of harvest
- The words 'Best before'
- Grade if brand has Agmark certification

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- MRP
 - Green dot (to denote vegetarian status)
 - FSSAI license number
 - Customer-care details
- All brands had provided the required information. None of brands have taken Agmark and given their grade.

Net Weight

Samples from all brands were verified for net weight as per the quantity claimed. 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

The rice shall be packed in containers made of jute, cotton or paper. These shall be clean, dry and in sound condition. Further, containers that have been previously used for commodities likely to cause damage or impart any obnoxious flavor, odour, or other undesirable characteristics to the rice shall not be employed.

- All brands had flexible plastic packing.

Dear readers: We are open to hearing your suggestions on products and services that you believe should be reviewed/ tested by Team Consumer Voice. You may write to editorial@consumer-voice.org