



# Rice Bran Oil

## It's smoking-hot and all good

Rice bran oil is an excellent source of oryzanol, a natural and powerful antioxidant. Besides, it meets many of the criteria that define healthy edible oil for us, covering smoking point (a high smoking point means the oil holds on to its nutritional content at higher temperatures), good monounsaturated and polyunsaturated fats (as against bad saturated fats), HDL (good) cholesterol, and so on. At the same time, health claims by edible oil brands are a dime a dozen and can leave the consumer confused about the best/better buy. So, are all rice bran oils equally suitable for your consumption? Do they all meet the basic requirements? What do we know about their 'fatty acid profile'? Do we know that the iodine value in your rice bran oil is a measure of the unsaturated fats therein? Is there a way to find out if there are other oils or fats in your edible oil? How many of us know that the lower the acid value, the better the quality? This report is a firsthand study of nine brands of rice bran oil available with various retailers in India.

*A Consumer Voice Report*

**W**e tested the nine popular brands on a range of quality, safety and acceptability parameters. These included oryzanol, fatty acid composition (saturated and unsaturated fatty acids), unsaponifiable matter, saponification and iodine values, acid and peroxide values, refractive index and flash point. We further checked for moisture and insoluble impurities, admixture with other oils and presence of argemone oil. The study covered physically refined oils used for

edible purposes. All brands except Patanjali were in high-density polypacks of one litre capacity; Patanjali was packed in plastic bottle. All mentioned the nutritional values of the oil on the packaging.

The samples were tested as per specification laid out by FSS Regulations, 2011, and relevant Indian Standard IS: 3448-1984 (Specification for Rice Bran Oil). The tests were conducted at an NABL-accredited laboratory.

## BRANDS TESTED

Rank	Total Score out of 100 (rounded off)	Brand	Pack Size (litre)	MRP (Rs)	Best before, Months	Manufactured by
1	87	Gagan	1	116	9	Bunge India Pvt. Ltd
2	86	Porna	1	120	6	SKM Foods (Edible Oil Division), SKM Animal Feeds and Foods (India) Pvt. Ltd
2	86	Patanjali	1	110	9	Patanjali Ayurved Ltd
3	85	Ricela	1	136	9	A.P. Organics Ltd
3	85	Freedom	1	101	9	Gemini Edibles & Fats India Pvt. Ltd
4	83	Rizolo	1	125	9	Modi Naturals Ltd
4	83	Fortune	1	120	9	Adani Wilmar Ltd
5	81	Dhara	1	118	8	Mother Dairy Fruit & Vegetable Pvt. Ltd
6	80	Emami	1	92	8	Emami Agrotech Ltd

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

### CV RECOMMENDATION | TOP PERFORMER

**Gagan**

### VALUE FOR MONEY

**Freedom**



### Key Findings

- Based on the overall score, the top performer is Gagan.
- The value-for-money brand is Freedom.
- In fatty acid composition test, Gagan scored highest, followed by Purna and Freedom.
- Patanjali had the highest percentage of oryzanol and Emami the lowest.
- In brand Rizolo, erucic acid (C22-NDB- 2) was found to be 0.31 per cent against the requirement of 'not detected'.
- All brands were found to be free from argemone oil.



Rice bran oil (also known as rice bran extract) is the oil extracted from the germ and inner husk of rice. It is notable for its high smoke point. Its mild flavour makes it suitable for high-temperature cooking methods such as stir frying and deep frying. It is favoured by many for its content of vitamin E, ideal fatty acid balance, antioxidant capacity, and cholesterol-lowering abilities.





### Grades of Rice Bran Oil (as per Indian Standard)

- i) **Refined Grade:** The material of refined grade is suitable for edible purposes.
- ii) **Raw Grade 1:** The material here is suitable for making vanaspati and refined oil and not for direct human consumption.
- iii) **Raw Grade 2:** The material here is suitable for industrial purposes.

The refined rice bran oil shall be clear and free from rancidity, adulterants, sediment, suspended and other foreign matter, separated water and added colouring and flavouring substances.

### Shelf Life

The declared shelf life of all tested brands is in the range of 6 to 9 months. Where the shelf life is six months, there is all the more need for the consumer to be aware, particularly if they are buying the large pack of five litres capacity. They must ensure that the oil remains stable within the consumption period.

### How Should You Store Your Rice Bran Oil?

Store your rice bran oil in a cool dark place. Although rice bran has high antioxidant levels that protect the oil from degrading over time, it is best to store it in a cool cupboard away from sunlight and heat.

## Comparative Test

### TEST RESULTS FOR PHYSICOCHEMICAL PARAMETERS

Oryzanol | Unsaturated Fatty Acids | Saturated Fatty Acids | Unsaponifiable Matter | Saponification Value | Iodine Value | Moisture and Insoluble Impurities | Refractive Index | Peroxide Value | Acid Value | Flash Point | Hexane | Admixture with Other Oils | Test for Argemone Oil

#### ◆ Oryzanol

*Requirement: Not less than one per cent*

Oryzanol is a natural antioxidant present in rice bran oils and is known to reduce the absorption and deposition of LDL and VLDL (bad) serum cholesterol. Oryzanol also helps in reducing hypertension. It improves bone-mineral density and liver function and gives relief from gastrointestinal distress.

- *Oryzanol was well above the minimum requirement in all tested brands, ranging between 1.17 per cent and 1.67 per cent.*

- *Patanjali (1.67 per cent) had the highest percentage of oryzanol, followed by Gagan and Freedom (both 1.61 per cent). Emami (1.17 per cent) had the lowest amount.*

Clinical trials conducted in Japan have shown that 300 mg per day is the effective dose of oryzanol.

#### ◆ Unsaponifiable Matter

Unsaponifiable matter should not be more than 3.5 per cent for chemically refined oil and 4.5 per cent for physically refined oil.

- *All brands were within the specified limit. The top performers were Rizolo, Gagan and Ricela.*

Unsaponifiable matter includes those substances that are frequently found dissolved in fatty acids and drying oils which cannot be saponified by caustic treatment, but which are soluble in the normal fat solvents.



### Fatty Acid Composition

FSSAI has specified fatty acid composition for various oils and fats expressed as percentage of total fatty acids. The test is conducted for checking adulteration of edible oils with cheaper oils, for determination of the authenticity of the edible oils. Since the fatty acid composition is different for different edible oils, this test serves to expose and curb two malpractices: a) adulteration of expensive oils with cheaper oils, and b) misleading label claims on the composition of blended oils.

All edible oils have virtually the same fat. But the proportion of different types of fatty acids varies from one type of oil to another. An average person should limit the saturated-fat intake (saturated fats are mainly animal-based fats like milk fat, ghee and butter). Eating a lot of saturated fat increases the level of bad cholesterol (low-density lipoproteins, or LDL) in the blood. And it is generally acknowledged that high levels of LDL place one at a greater risk of heart disease. Saturated and trans fats are unhealthy 'bad' fats that can increase one's cholesterol, harden the arteries and eventually increase one's risk for heart disease.

Polyunsaturated fatty acids (PUFAs) and monounsaturated fatty acids (MUFAs) are unsaturated fats and considered to be good fats.

- All brands except Rizolo conformed to quality requirements of the relevant national standards in terms of fatty acid composition.
- In the case of Rizolo, erucic acid was found to be 0.31 per cent though the national standards required it to be 'not detected'. All other fatty acids were within the specified limit.
- In unsaturated fats, Gagan scored highest and was followed by Freedom.
- In saturated fats, Poma scored highest and was followed by Gagan.

### ◆ Iodine Value

The iodine value is a measure of the unsaturated fats and is a quality test for edible oils. Iodine value of rice bran oil shall be in the range of 90–105.

- All brands were within the specified limit.

### Is Your Oil Rancid?

#### ◆ Peroxide Value

Detection of peroxide gives the initial evidence of rancidity in unsaturated fats and oils. Other methods are available, but peroxide value is the most widely used. Concentration of peroxide in an oil or fat is useful for assessing the extent to which spoilage has advanced.

As per draft FSS Regulations, it shall be less than 15 milli-equivalents (meq)/kg.

- All brands were within the specified limit.

#### ◆ Acid Value

The acid value is a relative measure of rancidity as free fatty acids are normally formed during decomposition of oil. It shall be a maximum 0.5.

- Again, all brands were within the specified limit.

#### ◆ Refractive Index

This is used to detect rancidity in edible oil. Refractive index shall be between 1.4600 and 1.4700 for rice bran oils.

- All brands were within the specified limit. They were clear and without any haziness.

## Comparative Test

### ◆ Flash Point

It should not be less than 250 degrees Celsius in case of rice bran oil. The higher the flash point of rice bran oil, the lower is the risk of ignition in the oil.

- *Flash point of all the brands was above 250 degrees Celsius, thus meeting the requirement.*
- *Rizolo, Ricela, Porna and Gagan were found to have higher flash points.*

Hexane is used as a solvent to extract cooking oils from seeds. It is a toxic chemical and must therefore be within the specified limit.

The flash point of a volatile material is the lowest temperature at which it can vaporize to form an ignitable mixture in air. At the flash point, the vapour may cease to burn when the source of ignition is removed.

### ◆ Hexane

It shall not be more than 5 ppm as per the national standards.



- *Hexane was not detected in any brand (detection limit being 0.2 mg/kg).*

Hexane is used as a solvent to extract cooking oils from seeds. It is a toxic chemical and must therefore be within the specified limit.

## Other Oils, Other Stuff

### ◆ Saponification Value

The saponification value helps to detect the presence of other oils/fats. Saponification value of rice bran oil should be between 180 and 195.

- *All brands were within the specified limit.*

### ◆ Argemone Oil

Argemone oil in edible oil should be negative. Consumption of this oil can lead to health hazards.

- *Argemone oil was not detected in any brand.*

### ◆ Admixture with Other Oils

Tests were conducted to check for admixture of other oils in the rice bran oil.

- *There was no admixture of other oils in any of the brands.*

### ◆ Moisture and Insoluble Impurities

Moisture is the amount of water present in edible oils. The amount of water should be as low as possible. The permissible limit is a maximum 0.10 per cent by mass.

- *All brands were within the specified limit. The top scorers were Gagan, Porna and Emami.*

Specific gravity is the ratio of the density of a material to the density of water. The specific gravity of edible oils must be in the range of 0.910–0.920.

- *All brands were within the specified limit.*



## PHYSICOCHEMICAL SCORES

Parameter	Weightage (%)	Gagan	Porna	Patanjali	Ricela	Freedom	Rizolo	Fortune	Dhara	Emami
Oryzanol	15	13.58	13.35	14.03	13.35	13.58	12.60	13.20	11.85	10.28
Unsaturated fatty acids	13	10.21	9.45	9.61	9.67	10.02	8.83	9.76	9.50	9.04
Saturated fatty acids	7	5.28	5.47	4.87	4.79	4.74	4.84	4.69	4.73	4.71
Unsaponifiable matter	8	7.04	6.56	6.88	7.04	6.72	7.20	6.88	6.72	6.72
Saponification value	7	5.57	5.99	5.63	5.32	5.68	5.90	4.95	5.87	5.93
Iodine value	7	5.48	5.95	5.45	5.70	5.63	5.50	5.24	5.25	5.29
Moisture and insoluble impurities	5	4.80	4.80	4.60	4.60	4.40	4.20	4.40	4.60	4.80
Refractive index	5	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Peroxide value	5	4.72	4.75	4.74	4.96	4.74	4.31	5.00	4.71	4.51
Acid value	4	3.48	3.16	3.48	3.04	3.24	3.00	3.00	2.56	2.56
Flash point	4	3.60	3.72	3.16	3.72	3.16	4.00	3.36	2.80	3.04
Hexane	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Admixture with other oils	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Test for Argemone oil	3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Note: Saturated fatty acids and unsaturated fatty acids are part of the fatty acid composition test.



## V for Vitamin E

According to the National Institutes of Health (NIH), vitamin E is a powerful antioxidant that may help protect cell membranes against damage caused by free radicals and thereby slow the ageing process of cells. As per NIH, the recommended daily allowance (RDA) is 15 mg for adults older than 14 years; 15 mg for pregnant women of any age; and 19 mg for breastfeeding women of any age.

- Among the tested samples of rice bran oil, seven had declared vitamin E content to be 50 mg/100 gm.



### Packing, Marking and Net Weight

The rice bran oil shall be packed in suitable, closed tin or plastic containers of food-grade quality. The packing material should not affect the properties of the oil and at the same time maintain the shelf life of the product. Packing, once used, shall not be reused.

The container shall be marked with name and net volume of the material in the container; manufacturer's name and trademark, if any; batch number, month and the year of manufacture; best before; MRP; and customer-care details.

- *All brands were of one-litre capacity and all except Patanjali were packed in high-density polythene containers. Patanjali oil was packed in a plastic (PET) bottle.*
- *All brands provided all required information on their labels.*
- *Net weight in all brands was found to be above or close to the declared value of 910 gm.*

### Refined and Filtered Oils

#### Refined oil

This type of edible oil has been purified with chemicals to remove suspended particles, toxic substances, flavour components, colour and odour, thereby leaving behind clear and pure oil.

#### Physically refined oil

The oil is physical refined as to preserve the nutrients that would otherwise be lost due to the use of harsh chemicals like caustic. Physically refined rice bran oil is generally golden (dark yellow) in colour as it has been refined through the steam distillation process which preserves all the essential nutrients, whereas the chemically refined variant is generally lighter in colour (stripped off from nutrients due to use of chemicals).

#### Filtered oil

Obtained by the traditional cold-pressing method, this is filtered once or twice to remove suspended particles. They are simply filtered and bottled with no further processing. Unrefined or filtered oils retain the savoury flavour of the seed, nut or fruit from which they are derived.

### Why Rice Bran Oil?

- Rice bran oil is a naturally occurring source of oryzanol, a nutrient that, in addition to its antioxidant activity, is often associated with cholesterol-lowering, anti-inflammatory, anti-cancer and anti-diabetic effects.
- Rice bran oil has the best balance of saturated, monounsaturated and polyunsaturated fats as recommended by such organizations as the American Heart Association. It's the oil of choice for improving serum cholesterol levels and preventing cardiovascular diseases.
- Tocopherol (Vitamin E) is an antioxidant present in rice bran oil which reduces the incidence of stroke, reduces coronary blockage, and helps in balancing the nervous system. Tocotrienols inhibit platelet aggregation and growth of human breast cancer cell. It has anti thrombotic and anti-cancer properties.
- Rice bran oil has a high smoke (burn) point, making it perfect for deep frying and pan or stir frying. It offers a good alternative to hydrogenated oil, which contains trans fats.



### The Good and the Bad Fats in Edible Oils

Monounsaturated	Polyunsaturated	Saturated	Trans
Good Fat	Good Fat	Bad Fat	Bad Fat
Reduces bad cholesterol (LDL) levels and increases good cholesterol (HDL) levels	Reduces bad cholesterol (LDL) levels	Increases overall cholesterol levels, especially bad cholesterol	Increases the bad cholesterol (LDL) level and decreases good cholesterol (HDL) levels
Found in nuts and seeds, avocados, olive oil and canola oil	Found in fatty fish such as salmon, mackerel, trout and sardines, and also in corn, safflower, sunflower and soybean oils	Found in animal-based foods such as meat, poultry and eggs, and also in butter, cream and other dairy products  Also found in plant-based products such as coconut, coconut oil, palm oil and palm kernel oil, and cocoa butter	Found in hydrogenated fat products such as margarines and vegetable shortenings  Used in packaged snack foods such as cookies, crackers and chips, and in fried foods

### Do Mix and Match

One of the most important things to keep in mind is that oil behaves differently when heated – it changes texture, colour, taste and nutritional properties. When the oil reaches its smoking point, a lot of the nutrients are destroyed and it can sometimes form harmful compounds.

It is advisable to use a combination of oils, either blended or by rotation – for example, mustard oil, groundnut oil, soya bean oil, sunflower oil, rice bran oil – so that you get the benefit of all. For blending, you take equal proportions of different oils in one container and then use it. This way you don't get prolonged exposure to the side effect of one type of oil and get the benefits of different oils. You could also have two or more different kinds of oils in your kitchen that you could use for different purposes. For example, you could use olive oil for salads, groundnut/rice bran oil for frying, and mustard/soybean/sunflower oil for other cooking purposes.

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