



Mustard Oils (Kachi Ghani)

Did we find adulteration and admixture with other oils?

For centuries, mustard oil has been used as an edible oil as well as cure for all kinds of ailments, and despite the occasional doubts that are generated by research concerning its side effects, its place in many households across India (the eastern and northern parts in particular) remains intact. In fact, research reinforcing its vitamin-laden, anti-bacterial and anti-oxidant properties has served to make it even more popular. Its distinctive and pungent taste lends itself rather well to most food. With a host of mustard oil brands in the market, the question is whether they all meet the basic requirements. Are they all safe for consumption, keeping in mind aspects such as adulteration? How can we know whether there are other oils in the mustard oil? How many of us know that the oil must not have any traces of argemone oil? Is the oil rancid? What do attributes like iodine value and acid value tell us about the quality of the oil? This report is a firsthand study of 13 brands of kachi ghani (cold-pressed) mustard oil along these and other relevant parameters.

We tested the 13 brands on a range of quality, safety and acceptability parameters. These included allyl isothiocyanate, iodine value, acid value, saponification value, peroxide value, presence of argemone oil and hydrocyanic acid, moisture and insoluble properties, admixture with other oils, refractive index, unsaponifiable matter, flash point, specific gravity, polybromide test, Bellier's turbidity test, hexane, and colour on Lovibond Scale. These tests covered adulteration as well. The sensory tests covered aspects like appearance, colour, flavour and taste.

Among the 13 brands, Engine and P Mark are Agmark-certified. The difference between MRP and retail price was very high, going up to Rs 63, in most of the brands.

The samples were tested as per requirements of FSS Regulations, Agmark and Indian Standard. We followed the standard test methods at an NABL-accredited laboratory.



BRANDS TESTED

Rank	Total Score out of 100 (rounded off)	Brand	Net Volume (ml)	MRP/ Retail Price (Rs)	Best before (months)	Certification Mark	Manufactured/Marketed by
1	90	Dalda	1,000	160/97	12		Bunge India Pvt. Ltd
1	90	Tez	1,000	145/101	9		Recon Oil Industries Pvt. Ltd
2	89	Dhara	1,000	150/102	9		Mother Dairy Fruit & Vegetable Pvt. Ltd
2	89	Nature Fresh	1,000	140/106	12		Cargill India Pvt. Ltd
2	89	Reliance	1,000	130/99	12		Reliance Retail Ltd
2	89	Emami	1,000	130/103	9		Emami Agrotech Ltd
3	88	Fresh & Pure	1,000	150/102	9		Future Consumer Ltd
3	88	Fortune	1,000	145/109	12		Adani Wilmar Ltd
4	87	Patanjali	1,000	125/120	12		Patanjali Ayurved Ltd
4	87	P Mark	1,000	150/132	12	Agmark	Puri Oil Mills Ltd
4	87	Mahakosh	1,000	130/101	9		Ruchi Soya Industries Ltd
4	87	Engine	1,000	255/243	12	Agmark	Shree Hari Industries (Hari Oil Mills)
5	86	Kanodia	1,000	135/125	9		Kanodia Oil Mills

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

Comparative Test



CV RECOMMENDATIONS | TOP PERFORMERS

Dalda | Tez

VALUE FOR MONEY

Dalda



Key Findings

- Based on the overall test findings, Dalda and Tez are the top performers.
- The value-for-money brand is Dalda.
- All brands met the requirements specified in the national standards.
- No harmful substance was found in any of the brands, making them safe for human consumption.
- There was no admixture of any of the samples with other oils.
- Allyl isothiocyanate was found highest in Reliance, followed by Fresh & Pure and P Mark. All brands met the specified requirements.
- The gap between MRP and retail price of mustard oils is quite high, a point that consumers should keep in mind.

Shelf life/Best before

The declared shelf life of all tested brands is in the range of 9 to 12 months. Consumers should keep this in mind if they are buying the large pack (five litres or more). They should ensure that the oil remains stable within the consumption period.

What is kachi ghani?

Kachi ghani refers to the 'cold press' extraction process for taking out oil from seeds. For extracting mustard oil, mustard seeds are crushed at low temperature so that the natural properties, antioxidants and essential oils are retained in the oil. The essential oils content of kachi ghani mustard oil also acts as a preservative and exhibits antibacterial and antioxidant properties.

TEST RESULTS FOR PHYSICOCHEMICAL PARAMETERS

Allyl isothiocyanate | Iodine value | Acid value | Saponification value | Peroxide value | Argemone oil and hydrocyanic acid | Moisture and insoluble impurities | Admixture with other oils | Refractive index | Unsaponifiable matter | Flash point | Specific gravity | Polybromide test | Bellier turbidity test | Hexane | Colour on Lovibond Scale

◆ Allyl isothiocyanate

As per FSS Regulations, allyl isothiocyanate shall not be less than 0.20 per cent. The Indian Standard requirement is 0.20 per cent to 0.60 per cent. As per Agmark, it shall be in the range of 0.25 per cent to 0.60 per cent for Grade I oil, and 0.10 per cent to 0.60 per cent for Grade II.

- All brands fulfilled the requirements set by the national standards.

- Reliance, Fresh & Pure, and P Mark scored higher in this parameter.

Allyl isothiocyanate is responsible for the pungent flavour of mustard oil. Kachi ghani mustard oil is expected to be rich in natural essential oil (allyl isothiocyanate) as it is extracted through the cold-press process.

◆ Iodine value

Iodine value of mustard oil shall be between 96 and 112 as per FSS Regulations.

- All brands were within the specified limit.
- P Mark scored highest in this parameter.

The iodine value is a measure of the unsaturation of fats and oils. This is measured in terms of centigrams of iodine absorbed per gram of sample (% iodine absorbed).

Is the oil rancid?

◆ Peroxide value

Peroxide value gives the initial evidence of rancidity in unsaturated fats and oils. Concentration of peroxide in an oil or fat is useful for assessing the extent to which spoilage has advanced. Peroxide value of mustard oil shall be a maximum 15 as per FSS Regulations.

- All brands were within the specified limit.
- Tez, Nature Fresh and Patanjali had the lowest peroxide values.

◆ Acid value

The acid value gives an idea about the age of the oil, because acid content increases in oil with time due to hydrolysis with moisture. Acid value shall be not more than 6.0 as per FSS Regulations and not more than 1.5 as per Indian Standard and Agmark.

- Acidity in none of the brands exceeded 1.5, as required by the Indian Standard.
- Dalda, Tez and Mahakosh were found to have the lowest acid values.

◆ Refractive index

Refractive index is used to detect rancidity in edible oil. For mustard oil, it should be between 1.4646 and 1.4662.

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

Comparative Test

◆ Moisture and insoluble impurities

Agmark and Indian Standard have set the permissible limit for moisture in edible oils at not more than 0.25 per cent of net weight/volume. The product should also be free from any kind of impurities that are insoluble in oil.

- All brands were within the specified limit.
- Dalda, Dhara and P Mark scored highest in this parameter.

Moisture is the amount of unwanted water present in edible oils. The amount of water should be as low as possible.

◆ Unsaponifiable matter

Unsaponifiable matter in mustard oil shall not be more than 1.2 per cent by weight.

- All brands were within the specified limit.
- Patanjali and Dalda had the least unsaponifiable matter.

Checking for other oils and adulterants

◆ Saponification value

Saponification value helps to detect the presence of other oils/fats. For mustard oil, it should be between 168 and 177 as per FSS Regulations.

- All brands were within the specified limit.
- Kanodia, Fortune and Fresh & Pure scored highest in this parameter.

◆ Argemone oil

Mustard oil shall be free from argemone oil. Argemone oil is reported to cause glaucoma, dropsy and sometimes total blindness due to the presence of alkaloids.

- Argemone oil was not detected in any of the brands.

◆ Bellier's turbidity test

Bellier's turbidity temperature test is conducted to check for presence of other oils. It shall be in the range of 23 degrees C–27.5 degrees C.

- All brands fell within the specified range.
- Patanjali, P Mark and Mahakosh scored highest in this parameter.

◆ Polybromide test

This test is conducted to check for adulteration of unsaturated oils in oils and fats. The results should be negative as per Indian Standard and Agmark.

- All brands cleared the test.

◆ Admixture with other oils

Tests were conducted to check for admixture of other oils (castor oil, cottonseed oil, groundnut oil, kusum oil, linseed oil, mineral oil, neem oil, etc.) in the mustard oil.

- No adulteration with other oils was detected in any of the brands.

◆ Hydrocyanic acid

Hydrocyanic acid is sometimes present as an impurity in synthetic allyl isothiocyanate, which is commonly used as an adulterant to enhance the flavour of poor-quality mustard oil.

- Hydrocyanic acid was negative in all brands.

◆ Flash point

The higher the flash point, the lower is the risk of ignition in the oil.

- Flash point of all the brands was above 250 degrees Celsius.
- Dalda, Tez, Mahakosh and Dhara were found to have higher flash points.

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.

◆ Specific gravity

The specific gravity of mustard oil shall be in the range of 0.907–0.910 as per Agmark and Indian Standard.

- All brands were within the specified limit.

Specific gravity is the ratio of the density of a material to the density of water. Materials that are lighter than water (specific gravity less than 1.0) will float. Specific gravity of edible oil shall be less than 1.0 as they are insoluble and lighter than water.



◆ Hexane

It should be absent in cold-pressed mustard oil.

- Hexane was not detected in any of the brands up to detection limit of 0.1 ppm.

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.

◆ Colour on Lovibond Scale

The Lovibond Scale is widely used for measuring the colours of oils and fats. The method determines the colour of the oil by comparison with standard Lovibond glasses of known colour characteristics. The colour levels shall not be deeper than 50 as per Indian Standard.

- Colour levels in all brands were within the maximum limit, being in the range of 28.4 to 32.2.
- Mahakosh, P Mark and Emami scored highest in this parameter.



PHYSICOCHEMICAL

Parameter	Weightage (%)	Dalda	Tez	Dhara	Nature Fresh	Reliance	
Allyl isothiocyanate	12	9.26	9.50	9.79	10.13	10.42	
Iodine value	6	4.29	4.31	4.24	4.38	4.46	
Acid value	6	6.00	6.00	5.80	5.62	5.60	
Saponification value	6	5.57	5.17	5.79	5.39	5.90	
Peroxide value	6	5.16	6.00	5.35	5.73	4.91	
Argemone oil and hydrocyanic acid	6	6	6	6	6	6	
Moisture and insoluble impurities	5	5.00	4.50	4.80	3.70	4.10	
Admixture with other oils	5	5	5	5	5	5	
Refractive index	5	3.25	3.00	3.00	3.25	3.25	
Unsaponifiable matter	5	4.43	4.34	4.31	4.34	4.28	
Flash point	4	3.94	3.87	3.68	3.36	3.36	
Specific gravity	4	3.60	3.60	2.80	3.60	2.80	
Polybromide test	4	4	4	4	4	4	
Bellier's turbidity test	4	3.01	3.01	2.94	3.07	3.17	
Hexane	3	3	3	3	3	3	
Colour on Lovibond Scale	3	2.72	2.65	2.72	2.70	2.63	

FOR SENSORY ATTRIBUTES

The samples were judged by an expert panel on these attributes: a) colour and appearance, b) flavour and taste, c) eye irritation, and d) darkness/transparency.

Mustard oil has a distinctive pungent flavour and may irritate the eyes.

- All samples had natural colour and were free from foreign matter.
- Flavour and taste were found acceptable for all brands.
- Eye irritation was medium in brands Kanodia, Engine, Mahakosh, Tez, Patanjali and P Mark. The rest of the brands caused very high eye irritation. Note that high eye irritation actually indicates good quality and presence of natural essential oil.
- All samples were transparent.

Packing and Marking

The mustard oil should be in food-grade packing material. This material should not affect the properties of oil and should be able to maintain the shelf life of the product. It should preferably be reusable/recyclable.

Each pack is required to be labelled with name and type, net quantity, name of manufacturer and trademark if any, batch number or lot number, month and year of manufacture, MRP, nutritional information, green dot (to indicate vegetarian status), and customer-care details. It is mandatory to mention 'free from argemone oil' on the packaging.

- All brands were packed in sealed plastic (PET) bottle of one-litre capacity.
- All required information was given by all brands.
- Net quantity of all brands was within the permitted tolerance limit (deviation of 1.0 per cent for a product up to/equal to 1 kg/1 litre) with reference to their declared quantity.

SCORES

	Emami	Fresh & Pure	Fortune	Patanjali	P Mark	Mahakosh	Engine	Kanodia
	9.98	10.27	9.94	9.65	10.18	7.54	9.41	9.46
	4.27	4.25	4.28	4.54	4.56	4.52	4.32	4.30
	5.44	5.62	4.97	4.79	5.15	6.00	5.39	4.52
	5.66	5.93	5.94	5.50	5.13	4.94	5.57	5.97
	4.87	4.10	4.96	5.53	3.71	4.38	4.99	4.95
	6	6	6	6	6	6	6	6
	4.50	3.90	4.70	4.00	4.80	4.60	4.00	3.70
	5	5	5	5	5	5	5	5
	3.00	3.00	3.00	3.50	3.50	3.50	3.00	3.00
	4.25	4.34	4.28	4.46	4.16	4.25	4.40	4.19
	3.30	3.49	3.04	2.85	3.17	3.87	3.23	2.66
	3.60	3.60	2.80	2.80	2.80	3.60	2.80	3.60
	4	4	4	4	4	4	4	4
	3.01	3.01	3.01	3.33	3.26	3.20	3.01	3.01
	3	3	3	3	3	3	3	3
	2.76	2.66	2.74	2.73	2.76	2.80	2.73	2.71



Health benefits of mustard oil

Heart health

Mustard oil is rich in monounsaturated and polyunsaturated fats, which may help to balance cholesterol levels in the body.

Antibacterial

When consumed, mustard oil may fight bacterial infections inside the colon, intestines, urinary tract and other parts of the digestive system.

Antifungal

Applied directly to the skin, mustard oil can help fight fungal infections.

Digestive aid

Mustard oil boosts the appetite and aids in digestion by stimulating the secretion of gastric juices and bile as well as stimulating the excretion system.

Respiratory aid

Some research suggests that mustard oil may have positive effects on patients suffering from sinusitis. It may also help soothe the effects of coughs, colds and other respiratory illnesses and irritants.

Anti-inflammatory and pain relief

Applied topically, mustard oil has been known to relieve the painful effects of rheumatism and arthritis as well as help soothe sprained ankles and other such joint aches and pains.

Skin health

The high vitamin E content of mustard oil helps improve skin health. Applied topically, it may also help protect the skin from ultraviolet light and other pollutants.

Source: www.healthdiaries.com

Nutritional differences between types of oils

There are two fatty acids, omega-6 linoleic acid (LA) and omega-3 alpha-linolenic acid (LNA), that our body cannot manufacture and therefore must come from an outside source. For this reason, omega-6s and omega-3s are called essential fatty acids (EFAs). They are used to make hormones, build cell membranes, and help control blood pressure and blood clotting. The omega-3s also help reduce the risk of heart disease, improve dry skin conditions, enhance brain function and reduce inflammation associated with arthritis.

How to best match oils to foods

It is beneficial to consume a mix of oils to maintain a balance between the fatty acids. All oils are good in one way or the other. It is advisable to use a combination of oils either by blending or by rotation.

An important thing 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.

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