



Refined Sunflower Oils: Testing and Finding the Best!

Edible vegetable oils serve as an important source of energy in the diet of people, supply nutritional requirements and provide important functional characteristics. Among edible oils, sunflower oil is used as a regular cooking medium and for deep-frying. Edible oils are refined before use through various refining processes viz. expression, solvent extraction methods.

The oil extracted from the seeds of sunflowers is known as sunflower oil. It has a high smoking point, which means that sunflower oil holds on to its nutritional content at higher temperatures.

Sunflower oil is a rich source of linoleic acid which is good for heart patients. Linoleic acid helps in washing out cholesterol deposition in the coronary arteries of the heart.

A Consumer Voice Report

Comparative Product Testing

Due to large scale availability of brands and sale across the country, VOICE Society decided to undertake comparative testing of the most selling, popular brands of Refined Sunflower oil marketed in the country. For this, 23 popular brands of Refined Sunflower oil from across the country were purchased from retail markets and subjected to laboratory testing as per the FSSAI regulations /

requirements and methods of tests specified.

Brands Tested

The following 23 brands of Refined Sunflower oil packed in poly pack/glass bottle of 1 litre capacity were tested in a NABL accredited laboratory. These brands have a sizable market share in the country/region.

Rank	Overall Score out of 100	Brand	Quantity, ml/gm	MRP, Rs.	Best Before, Months	Fortified (Claimed Vitamins)	Manufacturer/ marketer
1	93	Gemini	1000/905	220	9	A,D & E	Cargill India Pvt. Ltd.
2	91	Gold Drop	1000/910	171	9		Lohiya Edible Oils Private Limited
3	90	Nature fresh	1000/910	210	9	A & D	Cargill India Pvt. Ltd.
3	90	Fortune	1000/910	210	9	A & D	Adani Wilmar Ltd.
3	90	Mr Gold	1000/910	300	6	A , E, D, K	Sunraja Oil Industries Limited
4	89	Hello Life	1000/910	189	9	A, D	Ana Oils and Fats India Private Limited
4	89	Gold Winner	1000/910	172	9	A & D omega 6	Kaleesuwari Refinery Private Limited.
4	89	Samrat	1000/910	200	8		Parakh Foods and Oils Ltd
4	89	Sunny	1000/910	180	9	A & D,E	Frigorifico Allana Pvt Ltd
4	89	Sun Land	1000/900	170	9	A,D	K T V Health Food Pvt Ltd.
5	88	Sun Premium	1000/900	180	9	A,D & E	Sri Anagha Refineries Private Limited
5	88	Freedom	1000/910	185	9	A,D & E	Gemini Edibles & Fats India Limited
5	88	Sunday	1000/905	270	9	Imported Oil	Liberty Oil Mills Ltd
5	88	Dhara	1000/910	210	9	A,D	Mother Dairy Fruit & Vegetable Pvt. Ltd.
6	87	SunPure	1000/910	185	6	A,D & E	M K Agrotek Pvt Ltd
6	87	Sunrich	1000/900	194	9	A,D	Patanjali Foods limited
6	87	Emami	1000/900	190	9	A,D & E	Emami Agrotech Limited
7	86	Aadhar	1000/910	205	9	A,D	Adani Wilmar Ltd.
7	86	Dalda	1000/910	226	9	A,D	Bunge India Pvt. Ltd.
8	80	Priya	1000/910	171	9	A & D	Frigorifico Allana Pvt Ltd
8	80	Kirti Gold	1000/905	190	9	A,D & E	Kirti Agrotek Ltd
9	75	Sundrop	1000/910	270		A,D,E	Agrotek food Ltd
10	59	Everyday Gold	1000/900	171	8		BRS Refineries Private Limited



CV Recommendations

<p>Top Performer Gemini</p> <p>Value for Money Gold Drop</p>
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Key Findings

- Based on the overall test findings, brand Gemini is the top performer and is ranked No 1 followed by Gold Drop second.
- Gold Drop is value for money brand (MRP Rs.171) among the 23 brands tested and Mr. Gold was highest priced MRP Rs.300.
- Brand Gemini scored highest in the parameters of Saponification Value, Acid value and Iodine value.
- Most of the sunflower oils were fortified with vitamin A, D and E.
- Sundrop brand did not meet the requirements of Saponification value and iodine value.
- Everyday Gold did not meet the requirement of Acid value, Refractive index, Saponification value and iodine value.
- Everyday Gold, Kirti Gold, Priya, Sundrop



and Sunrich did not fully meet the fatty Acid Composition requirements of Food Safety & Standard Regulations (FSSAI).

- Saturated fat was highest in Everyday gold brand and lowest in Dhara.
- Most of the brands met the requirements of national standard (FSSAI) and are safe for consumption.
- None of the brands were found adulterated with Argemone and mineral oil.

Comparative Performance Score

Brands	Weight-age, %	Gemini	Gold drop	Nature Fresh	Fortune	Mr Gold	Hello Life	Gold winner	Samrat	Sunny	Sunland	Sun Pre-mium	Free-dom	Dhara	Sunday	Sun Pure	Sunrich	Emami	Aadhar	Dalda	Priya	Kirti Gold	Sundrop	Every-day gold
Fatty acid composition	7	7	7	7	7	7	7	7	7	7	7	7	7	5	7	6	5.6	7	7	7	3.5	3.5	3.5	3
Saturated fatty acids	5	3.65	3.75	3.8	3.65	4.35	3.25	3.85	3.9	3.85	3.45	3.8	3.6	4.85	3.75	3.55	3.45	3.75	3.2	4.35	4.35	4.4	4.35	0.5
MUFA	5	3.52	4.04	3.85	3.07	3.23	3.04	3.74	3.28	3.14	2.99	3.16	3.8	3.05	3.22	3.92	3.52	4.03	2.68	2.78	1.5	1.5	1	3
PUFA	5	4.04	3.53	3.77	4.49	4.55	4.4	3.88	4.36	4.48	4.49	4.45	3.74	4.88	4.39	3.62	4	3.56	4.75	4.99	1.5	1.5	1	0.5
Trans fatty acids	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Moisture & insoluble impurities	5	4.25	4	3.5	3.75	3.75	4.75	3.74	4	3.5	3.25	3.75	3.75	3.5	3.25	4.25	3.5	3.75	3.5	3.5	3.25	3.25	3	3.25
Specific Gravity	5	3.95	4.65	4.65	3.95	4.65	3.95	3.25	3.95	4.65	3.95	3.95	4.65	3.25	3.95	4.65	3.95	3.95	3.25	3.25	3.95	4.65	4.65	3.95
Refractive Index	7	6.37	6.79	5.74	6.48	6.27	6.69	6.9	6.16	6.06	6.69	6.48	6.9	6.06	6.48	6.48	6.27	6.37	6.48	5.95	6.37	6.06	5.43	1.4
Saponification value	7	7	6.02	5.67	6.02	5.88	4.62	6.93	6.58	5.95	5.81	6.02	6.93	4.9	6.09	6.79	5.74	5.04	5.81	6.37	5.18	4.62	1.4	1.4
Iodine value	7	6.66	6.34	6.09	5.42	5.26	5.47	6.05	5.63	5.11	5.64	5.89	6.08	5.39	5.57	5.53	5.71	6.02	5.35	5.11	6.9	6.59	6.1	1.4
Unsaponifiable matter	7	7	6.3	7	6.3	6.3	7	6.3	6.3	7	6.3	7	5.6	7	7	7	6.3	6.3	7	6.3	6.3	7	6.3	5.6
Acid value	7	7	5.74	6.16	7	5.88	6.58	5.04	5.04	6.86	6.44	4.34	4.2	5.18	5.32	3.78	6.44	5.32	5.6	4.6	6.72	5.04	5.46	2.1
Flash point	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Peroxide value	5	4.98	4.93	4.95	4.93	4.7	5	4.93	4.93	3.43	4.93	4.95	4.2	5	3.85	2.75	4.58	3.83	4.15	4.3	3.08	4.18	5	4.93
Hexane	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mineral and argemone oil	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Packing	2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Markings	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Physical Observations	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Net weight	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Overall Score (Rounded off)	100	93	91	90	90	90	89	89	89	89	89	88	88	88	88	87	87	87	86	86	80	80	75	59



Test Parameters and Results

Fatty Acid composition

All edible oils have virtually the same fatty acids but the proportion of different types of fatty acids varies from one type of oil to another. Sunflower oil contains approximately 10-15% saturated fat, 85-90 % unsaturated fatty acids. The unsaturated fats are classified into monounsaturated fats (MUFA), containing one double bond and polyunsaturated fats (PUFA) containing more than one double bond. An average person should limit the saturated fat intake to less than 10 percent of daily calories. Eating a lot of saturated fat can increase the level of bad cholesterol (low density lipoproteins - LDL) in the blood.

Brands Everyday Gold, Kirti Gold, Priya, Sundrop and Sunrich did not fully meet the fatty acid composition requirements of FSSR. In Everyday Gold, Palmitic Acid C16, Palmitoleic acid C16:1,

oleic acid C18:1 and Linoleic acid C18:2 were out of specified ranges. In Kirti Gold oleic acid C18:1 and Linoleic acid C18:2 were out of ranges. Priya Gold has oleic acid C18:1 and Linoleic acid C18:2 out of ranges. In Sundrop, oleic acid C18:1 and Linoleic acid C18:2 were out of ranges. In Sunrich, Linolenic acid C18:3 was found above specified range.

Saturated Fatty acids

Like Trans fat, saturated fats are also unhealthy fats thus its consumption should be limited. These fats are most often solid at room temperature. Too much saturated fat in your diet can lead to heart disease and other health problems. Eating too much saturated fat in your diet can raise "bad" LDL cholesterol in your blood. Saturated fat generally comes from meat, dairy products, as well as coconut and palm oil, etc. Saturated fat should be lower in edible oil.

Saturated fat was lowest in Dhara and highest in Everyday Gold brand. All the brands except Everyday Gold were within the specified limit of FSSR.

MUFA (Monounsaturated fatty acids)

Monounsaturated fatty acids (MUFAs) are a good/healthy type of fat. MUFAs lower the level of bad cholesterol (LDL) in the blood and raise the good cholesterol (HDL). MUFA is found in vegetable oils like canola, peanut, olive oil, in nuts, almond, corn, sesame, grapeseed, safflower, sunflower oil etc.

MUFA was highest in Sundrop and Emami and lowest in Aadhar and Dalda. Priya, Kirti Gold, Sundrop, Everyday Gold had MUFA above the specified range of FSSR, therefore did not meet the requirement of fatty acid composition.

PUFA (Polyunsaturated fatty acids)

Polyunsaturated fats are considered good/healthy fat and can help reduce bad cholesterol levels in your blood which can lower your risk of heart disease and stroke. Sources of PUFA are walnuts, sunflower seeds, sesame seeds, peanut butter and peanuts, flaxseed, poppy seed and oil of avocado, olive and safflower.

PUFA was highest in Dalda and Dhara and lowest in Gold Drop. Priya, Kirti Gold, Sundrop, Everyday Gold did not meet the requirement.

Trans Fatty acids (Trans fat)

Trans fat is produced by industrial process-partial hydrogenation of edible vegetable oils. Trans fat is very harmful to human health hence, edible oil should not have Trans fat above the specified limit and should not be consumed as part of our diet. Trans fat raises bad cholesterol and lowers good cholesterol. Trans fat have been linked to heart diseases, overweight/obesity, high blood pressure, diabetes and some types of cancers. Trans fat was below detection limit in all the brands tested.

Moisture

Presence of higher moisture content in edible oils leads to deteriorative changes affecting the quality and shelf life of the edible oils and hence has to be below the prescribed limit given in FSSR. Moisture should not be more than 0.1%.

All the brands of sunflower oil complied with this requirement of FSSR (Food Safety & Standard regulations). Lowest moisture was found in Hello life followed by Gemini and Sun pure.

Specific Gravity at 30°C/30°C

Specific gravity of edible oils should be less than 1.00 as they are insoluble in water. Agmark standard has specified requirement of 0.913-0.918 for sunflower oil. All brands were found within the above specified range of Agmark standard.

Refractive index at 40 °C

Refractive index of oil indicates the possible chances of rancidity in oil. Higher the refractive index higher is the chances of spoilage due to oxidation. It is used to detect rancidity in edible oil. It should be 1.4640-1.4691 as per FSSAI. If reading does not fall between the two, then oil may have developed rancidity.

All the brands except Everyday Gold were within the specified limit. Gold Winner, Freedom and Gold Drop scored highest in this parameter. Refractive index of Everyday Gold did not meet this requirement of FSSR.

Saponification Value

Saponification helps to detect the presence of other oils/fats. Saponification value of sunflower oil should be between 188 – 194 as per FSSR.

Sundrop and Everyday Gold did not meet this requirement. Gemini scored highest in this parameter.

Iodine Value (Wijs)

Iodine value is measurement of the degree of unsaturation of oil and fat. The higher the iodine



value means oil is less stable and more susceptible to oxidation and rancidification which leads to off flavour in oil.

Iodine value of sunflower oil should be amongst 100 – 145. All brands except Everyday Gold were within the specified range of FSSR. Priya and Gemini scored highest in this parameter.

Unsaponifiable matter

Unsaponifiable matter generally constitutes less than 1% in most oils and fats. Unsaponifiable matter includes those substances frequently found dissolved in fatty acids and drying oils.

Unsaponifiable matter should not be more than 1.5 % by wt. in sunflower oil. All the brands of sunflower oil were found within the specified limit.

Acid Value

Acid value indicates the proportion of free fatty acid present in oil. Acid value gives an idea about the age of the oil. High acid value indicates stale oil stored under improper conditions. Rancid oil can develop harmful free radicals that cause long-term cell damage and potentially lead to the development of chronic diseases. Requirements of acid value should be 0.6 maximum.

Acid value of all the brands were found within

the specified limit of FSSR. Gemini and Fortune had the lowest acid value followed by Sunny and Priya.

Flash Point

Flash point is the lowest temperature at which a liquid can give off vapour to form an ignitable mixture in air near the surface of the liquid. It should not be less than 250 °C.

Flash point of all the brands was found above the specified limit 250°C, thus meeting the requirement of FSSR.

Peroxide Value

Concentration of peroxide in an oil or fat is useful for assessing the extent to which spoilage has advanced. Peroxide value is used for measuring the state of oxidation in oils and its value measures the oxidative rancidity or degree of oxidation of the fat/oil.

It should be maximum 10 mEq/kg. All the brands were found within the specified limit. However Hello Life had the lowest value followed by Dhara and Sundrop.

Hexane

Hexane is used as a solvent for extraction of edible oils from its seeds after cleansing and

degreasing. It should be not be more than 5 ppm. Hexane was within the specified limit in all the brands.

Argemone Oil

Argemone is a wild herb which grows in fields and bears capsules full of brown black seeds. Argemone oil is very toxic and may cause eye disease leading to blindness. Regular consumption of it may also cause disease called epidemic dropsy, resembling wet beriberi.

Argemone oil should be absent in sunflower oil. Argemone oil was not detected in any brand.

Mineral Oil

Mineral oil is from mineral source, particularly a distillate of petroleum. It is classified as non-edible oil so it should be absent in edible oil. Adulteration of vegetable oil is usually by using mineral oils or any other cheaper oil.

All the brands were found free from mineral oil.

Packing

Packing of the sunflower oil should be of food grade packing material which should not affect the properties of oil as well as also maintain the shelf life of the product. All the brands of sunflower oils were packed in poly pack of 1 litre except Sundrop which was in a plastic bottle.

Marking

The following particulars should be clearly and indelibly marked in English or Hindi on the containers:

1. Name and trade-mark, type and grade of oil
2. Name and address of manufacturer/marketer
3. Batch Number, month and year of manufacturer
4. Free from argemone oil
5. Nutritional information
6. Best Before
7. Net quantity

8. Standard Mark if any
9. Green Dot mark
10. Customer care details
11. FSSAI license number
12. MRP

All brands had given required information on their labels.

Physical observations

All the brands were clear, free from suspended / other foreign matter and separated water.

Net quantity

According to legal metrology (packaged commodity) rules for 1000-10000 ml, tolerance allowed is 1.5 %. All the brands were found above the declared quantity.

Shelf Life

The declared shelf life of all tested brands is in the range of 6 to 9 months. There is need for the consumer to be aware, particularly if they are buying the large pack of five litres or higher capacity.

Conclusion

Based on the evaluation of the test results, it was observed that most of the brands tested, fulfilled the minimum requirements of national standards (FSSAI regulations). Most of the brands were free from adulteration. Argemone and mineral oil were not found in any brand thus are safe for human consumption. Brands Everyday Gold, Kirti Gold, Priya, Sundrop and Sunrich did not fully meet the fatty acid composition of FSSAI.

Based on overall scores, most of the brands fall in very good to good category. Brand Gemini is the top performer followed by Gold Drop. Gold Drop is value for money brand at MRP Rs. 171 per litre. Most of the brands of Refined Sunflower oil were fortified with vitamin A, D and E.

Refined and Filtered Oils

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

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.

The ideal method to pair your cooking oils

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.

The only way to ensure that you consume healthy oil is by switching between two-three of them. Any single oil alone is not preferred. Reheating of oils should be avoided. Blending oils is another option, whereby you take equal proportions of different oils in one container and then use it. This way you do not get prolonged exposure to the side effects of one type of oil and also get the benefits of different oils.

You could also have two or more different kinds of oils in your kitchen which 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. This will let you avail of the health benefits offered by each oil brand.

Manufacturers Comments: As per our procedure we shared test results with concerned manufacturers. Some of them commented on test results and our designated lab replied to their queries as below:

Brand	Manufacturer' Comments	Consumer VOICE' Reply
Sunrich	Kindly recheck C18:3. At Patanjali Foods Limited all the batches are checked prior to release. Have attached the report of testing done during release as well as of control sample analysed both in-house and from 3P lab. All the parameters are within the limit.	Our designated lab responded on C18:3 results as below: "the fatty acid profile is analyzed in duplicate & rechecked and found to be as reported earlier."
Priya	We request you not to publish the results of the sample you have tested as they do not match with our test results of fatty acid profile.	"Before releasing the test report, the result was re-verified by repeat analysis. Hence, the result is the average value of triplicate analysis. If required, the lab can perform witness test as per terms & conditions."
Dalda	We request for retesting of moisture, acid value, Iodine value and peroxide parameters.	"The test parameters questioned were analyzed in duplicate by different analysts and the calculation check is found to be the same. If required, the lab can perform a witness test also as per terms & conditions."