

# Edible Oils in India: Types, Nutrition, and Health Aspects

India's edible oil market includes a variety of vegetable oils. The major ones are **palm oil, soybean oil, mustard (rapeseed) oil, sunflower oil, groundnut (peanut) oil, rice bran oil** and growing use of **olive oil** (mainly imported). Total edible oil consumption was about 27–28 million tonnes (MMT) in 2021 ( $\approx 19.7$  kg per capita) <sup>1</sup>. India meets roughly 44% of its edible oil demand via domestic production (primarily mustard/rapeseed, groundnut, soybean) and about 56% by imports <sup>2</sup>. By import value (2017–21), palm oil dominated at  $\sim 54\%$ , followed by soybean ( $\sim 25\%$ ) and sunflower ( $\sim 17\%$ ) <sup>3</sup>. Government initiatives (e.g. National Mission on Edible Oils) aim to boost domestic oilseed crops (rapeseed/mustard, soybean, groundnut) while import dependence remains high <sup>4</sup> <sup>2</sup>.

Most packaged oils in India are refined for stability. FSSAI recommends using only **refined, packed oils** (to avoid adulteration of loose oils) <sup>5</sup>. Refined oils are considered safe and have extended shelf-life <sup>6</sup> <sup>7</sup>. Visible fat intake guidelines (ICMR 2010) suggest total fats be  $\sim 30\%$  of calories ( $\approx 30$  g of cooking oil per day for a 2000 kcal diet) <sup>8</sup>.

## Nutritional Composition of Major Oils

Each oil has a characteristic fatty-acid profile and minor nutrients (vitamins, antioxidants) as summarized below. The key components are saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA, mainly omega-6 linoleic and omega-3 alpha-linolenic acids), and fat-soluble micronutrients (e.g. vitamin E). The table compares typical compositions (approximate % of total fat) and key nutrients:

Oil	SFA (%)	MUFA (%)	PUFA (%)	*Omega-6 (%) **	Omega-3 (ALA) (%)	Approx. n-6:n-3 ratio	Notable Micronutrients
<b>Sunflower</b>	$\sim 13$	$\sim 27$	$\sim 60$	$\sim 60$	$\sim 0$	$\sim 120:1$ <sup>9</sup>	High vitamin E (tocopherols)
<b>Soybean</b>	$\sim 15$	$\sim 27$	$\sim 58$	$\sim 53$	$\sim 5$	$\sim 11:1$ <sup>9</sup>	Vitamin E, K; lecithin
<b>Mustard</b>	$\sim 8$	$\sim 70$	$\sim 22$	$\sim 12$	$\sim 10$	$\sim 1:1$ <sup>10</sup>	Contains omega-9 oleic, some erucic acid (now $\leq 2\%$ )
<b>Groundnut</b>	$\sim 23$	$\sim 50$	$\sim 25$	$\sim 25$	$\sim <0.5$	Very high ( $\infty$ ) <sup>10</sup>	Niacin, magnesium

Oil	SFA (%)	MUFA (%)	PUFA (%)	*Omega-6 (%) **	Omega-3 (ALA) (%)	Approx. n-6:n-3 ratio	Notable Micronutrients
<b>Palm</b>	~44	~44	~12	~10	~<0.5	Very high ( $\infty$ ) <sup>10</sup>	Vitamin A precursors (carotenes), vitamin E (tocotrienols)
<b>Rice Bran</b>	~22	~41	~37	~35	~1.5	~23:1 <sup>10</sup>	$\gamma$ -Oryzanol, vitamin E, phytosterols
<b>Olive (Refined)</b>	~14	~73	~11	~10	~<0.5	~20:1 <sup>10</sup>	Polyphenols (if virgin), vitamin E

*Note:* Data from Indian studies <sup>10</sup> <sup>9</sup>. All oils naturally contain some vitamin E (highest in sunflower), and FSSAI mandates fortification with vitamins A & D (6–10  $\mu$ g retinol equivalent and 0.11–0.16  $\mu$ g vit. D per gram oil) <sup>11</sup>.

## Health Benefits and Risks

The fatty acid profile determines health effects. **Saturated fats** (e.g. in palm oil) tend to raise LDL (“bad”) cholesterol, whereas **MUFA** and **PUFA** lower LDL and are cardioprotective <sup>12</sup> <sup>13</sup>. In particular, omega-6 PUFAs (linoleic acid) lower LDL, and omega-3 PUFAs (alpha-linolenic acid) reduce triglycerides, blood pressure and inflammation <sup>14</sup>. Health authorities generally recommend an omega-6:omega-3 ratio of ~5–10:1 or lower <sup>15</sup>; many oils (sunflower, rice bran, palm) have very high ratios, whereas mustard (rapeseed) oil has an ideal ratio near 1:1 <sup>10</sup>. **Trans fats**, produced by hydrogenation (e.g. in vanaspati), raise LDL and lower HDL cholesterol and are strongly linked to heart disease <sup>16</sup>. India has capped trans-fat in oils at 3% by 2021 and 2% by 2022 <sup>17</sup>.

Specific oils: Olive oil (rich in MUFA and polyphenols) is known to improve blood lipids and reduce oxidative stress <sup>18</sup>. Sunflower oil (high in PUFA and vitamin E) is beneficial for lowering cholesterol but has virtually no omega-3 <sup>9</sup>. Mustard (rapeseed) oil is low in SFA and high in MUFA/PUFA (including ~10% omega-3) <sup>18</sup>; studies in India report much lower CHD risk with mustard vs sunflower oil <sup>19</sup>. Soybean oil is balanced (moderate SFA, MUFA, PUFA) and provides some omega-3; it tends to lower LDL. Groundnut oil, high in MUFA, is good for heart health but lacks omega-3. Rice bran oil has a balanced profile and contains  $\gamma$ -oryzanol (a phytosterol) and tocopherols, which may help lower cholesterol. Palm oil is very stable for cooking but high in saturated fat (raising LDL); however, it also contains vitamin A precursors and tocotrienols.

No dietary cholesterol is present in vegetable oils. Regular use of oils high in MUFA/PUFA in place of saturated fats (like ghee) is recommended for heart health <sup>12</sup> <sup>13</sup>. All vegetable oils should be used in moderation: global guidelines (ICMR) suggest total fats <30% of calories <sup>8</sup>, and FSSAI advises visible fats ~30 g/day (for a 2000 kcal diet) <sup>20</sup>.

## Cooking and Usage Considerations

Different oils have different smoke points and stability. **High-SFA/MUFA oils** (coconut oil, palm olein, groundnut oil, rice bran oil, high-oleic sunflower) are preferable for deep frying, as they resist oxidation

<sup>21</sup> . Oils rich in PUFA (standard sunflower, soybean, flaxseed) have lower heat stability. Extra-virgin olive and many cold-pressed oils have lower smoke points and are best for dressings or low-heat cooking. FSSAI explicitly advises against reusing or repeatedly heating cooking oil to avoid formation of toxic compounds <sup>21</sup> . Packaged (branded) oils are recommended over loose oils to minimize risk of adulteration <sup>5</sup> .

## Market Share and Consumption Trends

India's edible oil market is projected to grow modestly (IMARC estimates ~25 MMT in 2024, rising to ~28 MMT by 2033). Per capita edible oil consumption has soared over decades (from ~3.2 kg/yr in 1960 to ~19.7 kg/yr by 2021 <sup>1</sup> ), driving import reliance. **Palm oil** is the single largest category – roughly half of edible oil consumed (about 50–55%) is palm oil (mostly imported) <sup>2</sup> <sup>3</sup> . **Soybean oil** is the second largest (on imports and domestic supply). **Mustard/rapeseed oil** (predominantly domestic) accounts for ~10% of consumption (a staple in North/East India) <sup>4</sup> . **Sunflower and groundnut oils** each constitute roughly 8–12% of the market (sunflower largely imported, groundnut largely domestic in West/South). **Rice bran oil** has a small but growing niche (<5%). **Olive oil** is used only by a very small premium segment (<1–2%).

The East/NE and North favor mustard oil, the South and West favor groundnut and sunflower, while palm and soybean are ubiquitous and often blended. Domestic edible oil production (oilseeds) has historically lagged demand: of the ~37 MMT oilseeds grown in 2020-21, only ~14–15 MMT edible oil was produced (~44% of consumption) <sup>2</sup> <sup>1</sup> . Imported oils fill the rest. The Government is pursuing higher oilseed yields and area (rapeseed-mustard, soybean, groundnut, palm in NE) to reduce imports <sup>4</sup> <sup>1</sup> .

## Government Guidelines and Recommendations

Regulatory and health bodies have issued guidelines for edible oils:

- **Dietary guidelines:** ICMR/NIN recommends total fat  $\leq 30\%$  of energy ( $\approx 30$  g cooking oil/day in a 2000 kcal diet) <sup>8</sup> . Visible fats (cooking oil used) should be about 30 g/day <sup>20</sup> . Keep a balanced intake of essential fatty acids (ALA and LA).
- **Health claims and fortification:** FSSAI's Fortification Regulations mandate edible oils be fortified with vitamins A and D (to combat deficiencies) <sup>11</sup> . Fortified oils carry an "F+" logo. FSSAI also provides nutrient/health claims guidelines (e.g. "low fat," "high MUFA," "low cholesterol") based on set thresholds <sup>22</sup> <sup>23</sup> .
- **Trans fat restriction:** In line with WHO's call, FSSAI has reduced industrial trans-fat limits in oils/fats to 3% by 2021 and 2% by 2022 <sup>17</sup> , aiming for eventual elimination of artificial trans-fats.
- **Food Safety (packaging):** FSSAI advises consumers to buy only branded, packaged oils (loose oils can be adulterated) <sup>5</sup> .
- **Cooking advice (Eat Right India):** Use oils that are stable at cooking temperatures (high-SFA/MUFA oils for frying) and avoid reheating oil repeatedly <sup>21</sup> . Incorporate a variety of healthy oils (e.g. rotating oil types) to balance fatty acid intake.

These official guidelines emphasize moderation of total fat, reduction of saturated/trans fats, consumption of unsaturated fats, and use of fortified edible oil for public health.

## Comparative Summary

In summary, **mustard/rapeseed oil** is nutritionally attractive (low SFA, high omega-3) and suited to Indian cooking, but is regionally limited and has traces of erucic acid (now regulated). **Sunflower and soybean oils** offer polyunsaturates (vitamin E), though high omega-6, and help lower cholesterol. **Groundnut oil** is rich in MUFA but has almost no omega-3. **Palm oil** is cheap and heat-stable, but very high in SFA. **Rice bran oil** has a balanced profile plus cholesterol-lowering components. **Olive oil** (especially extra-virgin) has cardiovascular benefits but is mainly imported and typically reserved for raw or low-heat use. Consumers are advised to use blended approaches: for example, blend an omega-3-rich oil (mustard/soy) with a high-stability oil (palm/groundnut) for everyday cooking, and use olive or sesame oil in salads or special dishes.

The tables below compare key attributes of these oils:

Oil	Main Fatty Acids	Omega-3 (ALA)	Smoke Point†	Suitability	Notable Vitamins/Compounds	Heart-Health Notes
<b>Sunflower</b>	~13% SFA, ~27% MUFA, ~60% PUFA	~0%	~225–230 °C	Frying (refined); salad	Very high vitamin E	Lowers LDL; very high omega-6:3 ratio <sup>9</sup> .
<b>Mustard</b>	~8% SFA, ~70% MUFA, ~22% PUFA	~10%	~250 °C	Frying, all uses	Contains oleic acid, some ergosterol	Low SFA, <i>high</i> ALA (omega-3) <sup>10</sup> , ideal n6:n3 (~1:1); linked to lower CHD <sup>19</sup> .
<b>Soybean</b>	~15% SFA, ~27% MUFA, ~58% PUFA	~5%	~232 °C	Frying, sauté, salad	Vitamin E, K, Phytosterols	Balanced profile; lowers LDL; moderate omega-3 <sup>9</sup> .
<b>Groundnut</b>	~23% SFA, ~50% MUFA, ~25% PUFA	~<0.5%	~230–240 °C	Frying, sauté	Niacin, Magnesium	High MUFA; little omega-3; good stability <sup>21</sup> .

Oil	Main Fatty Acids	Omega-3 (ALA)	Smoke Point†	Suitability	Notable Vitamins/Compounds	Heart-Health Notes
<b>Palm</b>	~44% SFA, ~44% MUFA, ~12% PUFA	~<0.5%	~235 °C	Deep-fry	Carotenes (vitamin A), Tocotrienols	Very high SFA; raises LDL; stable fat; some nutrient content.
<b>Rice Bran</b>	~22% SFA, ~41% MUFA, ~37% PUFA	~1.5%	~254 °C	Frying, high-heat	γ-Oryzanol, Vit E, Phytosterols	Balanced PUFA/MUFA; contains oryzanol (cholesterol-lowering).
<b>Olive</b>	~14% SFA, ~73% MUFA, ~11% PUFA	~<0.5%	~210–230 °C (refined)	Dressings, low-heat	Polyphenols (if virgin), Vit E	Very high MUFA; antioxidants; improves lipids <sup>18</sup> . Not ideal for very high heat.

† Smoke points vary by refinement and oil grade; values are approximate.

#### Sources and Notes:

Fatty-acid data are typical values from Indian research<sup>10 9</sup>. “Smoke Point” and “Suitability” are practical cooking guides (FSSAI/Eat Right). Heart-health notes summarize findings from Indian and global studies<sup>12 24</sup>.

**Table:** Characteristics of major edible oils in India (SFA = saturated, MUFA = monounsaturated, PUFA = polyunsaturated fatty acids).

In conclusion, no single oil is ideal in all respects. A **mixed-oil strategy**—rotating or blending oils—can balance fatty-acid intake. Emphasis should be on using oils high in MUFA/PUFA (mustard, soybean, sunflower, rice bran, olive) instead of saturated/trans fats, while following dietary guidelines on total fat. Finally, following FSSAI norms (fortification, labelling, usage recommendations) helps ensure safety and nutritional benefits<sup>11 5</sup>.

**References:** Authoritative Indian and international sources as cited above, including FSSAI/ICMR guidelines<sup>8 5 11 17</sup> and peer-reviewed analyses of oil composition and health effects<sup>10 9 24</sup>.

<sup>1 4</sup> niti.gov.in

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