

Nutritional Quality and Functional Properties of Edible Oils

Renu^{1*}, Nisha Kumari¹ and Jyoti Duhan¹

¹Department of Biochemistry, CCS Haryana Agricultural University, Hisar 125004, India

Corresponding Author

Renu

Email: renuyaduvanshi1697@gmail.com



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ABSTRACT

Edible oils are a crucial part of the human diet because they provide energy and necessary fatty acids. In addition to their main fat component, triacylglycerols, oils contain smaller quantities of useful substances such as vitamin E, phytosterols, carotenoids, phenolic compounds, and phospholipids. Although present in relatively small amounts, these compounds can have a significant effect on oil's nutritional value, flavor, aroma, shelf life, and performance during cooking.

The composition and quality of edible oils differ according to the plant source, growing conditions, extraction method, refining process, and storage environment. It includes the nutritional, sensory, and functional properties of regularly consumed oils, including mustard, groundnut, soybean, sunflower, olive oils commonly used by people.

INTRODUCTION:

Edible oils are mainly composed of triacylglycerols, which contain three fatty acids linked to one glycerol molecule. They are high-calorie foods, providing 9 kilocalories per gram on average.

Oils can also provide essential fatty acids, particularly linoleic acid and α -linolenic acid, which the human body cannot produce and must obtain through the diet.

Although triacylglycerols make up most of an oil, the smaller components should not be overlooked. Tocopherols, commonly known as vitamin E compounds, along with phytosterols, carotenoids, and phenolic substances, contribute to an oil's antioxidant activity, color, aroma, taste, nutritional value, and resistance to deterioration. Micronutrient retention in these vegetable oils is deeply impacted by the initial crushing and refining processes (Fine *et al.*, 2016).

Fatty acids in edible oils are generally classified as saturated, monounsaturated, or polyunsaturated. Oils having higher proportions of saturated and monounsaturated fatty acids are generally more stable to oxidation whereas oils with higher content of polyunsaturated fatty acids may undergo oxidation rapidly upon heating, exposure to air, or light (Gunstone, 2013). However, the oxidation stability of oils is not only determined by their fatty acid composition but also by the presence of natural antioxidants, processing, storage and packaging conditions (Gunstone, 2013, Kamal-Eldin, 2005)

Mustard Oil

Mustard oil is produced from the seeds of several different Brassica species, including *Brassica juncea*, *Brassica nigra* and *Brassica rapa*. It is widely used in India, Bangladesh, Nepal, Pakistan, and other parts of South Asia. Its strong pungent flavor is mainly associated with allyl isothiocyanate,



which is produced when glucosinolates in the mustard seeds break down. The oil contains considerable amounts of oleic acid, as well as linoleic and α -linolenic acids. Linoleic acid generally accounts for about 15–30% of its fatty acid composition, while α -linolenic acid

commonly ranges from approximately 5–14%. Some traditional mustard varieties have high levels of erucic acid; thus low-erucic variants are typically used in food preparations (Gunstone, 2013). Mustard oil has a distinct flavor that makes it ideal for use in curries, frying, pickling, marinades, and other richly seasoned dishes. However, its intense taste may not be appropriate for recipes requiring a neutral-tasting oil.

Groundnut Oil

Groundnut oil is also called peanut oil. It is extracted from peanut seeds. It has a pale-yellow color and a mild, pleasant nutty odor. The oil has a good balance of fatty acids, including with high levels of oleic acid and linoleic acid, conferring resistance to oxidation. The oil is typically used for frying, roasting, sauteing, and other high-temperature food preparation techniques (Zhang *et al.*, 2023). Refined groundnut oil has a more neutral flavor, while cold-pressed variants retain their characteristic peanut aroma.



Peanut allergy is a serious concern for some individuals. Unless highly refined, peanut oil usually contains traces of protein that can potentially trigger an allergic reaction in sensitive individuals; therefore, it is best to avoid it if one has a severe allergy and consult a physician's advice.

Soybean Oil

Soybean oil, obtained from the seeds of *Glycine max*, is one of the major vegetable oils in the world. It is typically a pale yellow, bland-tasting oil. Soybean oil usually undergoes refining, bleaching, and deodorizing

processes enhance its features and remove undesirable odors, resulting in the refined soybean oil. The oil contains a high amount of polyunsaturated fatty acids, including linoleic acid and α -linolenic acid and tocopherols, which act as antioxidants (Zhang *et al.*, 2023). However, its high degree of unsaturation



makes it more vulnerable to oxidation than oils that contain greater proportions of oleic acid.

Soybean oil is used in home cooking, baking, salad dressings, margarine, and many processed foods. In addition, high-oleic soybean varieties have been created to have superior stability to heat and oxidation.

Sunflower Oil

Sunflower oil is obtained from sunflower seeds and differs in a high content of linoleic acid. Due to the high content of this substance, the oil may have a light yellow or almost transparent color and a delicate flavor. The level of linoleic acid can vary from 45% to 74%, depending on the type of sunflower.



Linoleic acid is an essential omega-6 fatty acid, since it is an essential fatty acid, sunflower oil is beneficial for the human body.

However, since linoleic acid is highly prone to oxidation, such oil should be stored away from sources of heat, oxygen, and light.

On the contrary, high-oleic sunflower oil contains a higher proportion of oleic acid,

making it more valuable and suitable for frying, baking, or food processing (Fine *et al.*, 2016).

Olive Oil

Unlike most vegetable oils, olive oil is obtained from the fruit of the plant, not from seeds. Extra-virgin olive oil is produced by mechanical pressing of olives without the use of solvents. It has a fruity aroma and greenish-yellow color and a

distinctive bitter and peppery taste. Olive oil contains a significant amount of



monounsaturated fats, especially oleic acid, as well as antioxidants such as phenolic compounds and vitamin E (Zhang *et al.*, 2023). The beneficial components of olive oil, especially polyphenols, are responsible for its unique flavor and aroma. They also contribute to its nutritional value and relatively long shelf life. Extra virgin olive oil is ideal for salad dressings, dips, sauces, and finishing dishes. Refined olive oil, on the other hand, has a more subtle flavor, so it can be used in a greater variety of dishes. The quality of olive oil depends on the type of cultivar, the state of the fruit at the time of harvesting, technology of preparation, and storage conditions.

CONCLUSION

The quality and functionality of edible oils depend on their fatty acid composition and minor compounds such as tocopherols, phytosterols, carotenoids, phenolics, lignans, and γ -oryzanol. Oils rich in unsaturated fatty acids offer nutritional benefits but are more prone to oxidation. In contrast, oils high in oleic acid and antioxidants generally show better oxidative stability. Therefore, selecting

suitable oils and protecting them from heat, light, and oxygen through proper packaging can help maintain quality and extend shelf life.

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