

## Sunflower Oil: Efficient Oil Source for Human Consumption

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“The food that is good for the heart is likely to be good for the brain”

-Hippocrates

Oil crops are well distinguished for supplying protein and energy in human diet (Mehran et al. 2011). Sunflower (*Helianthus annuus*) is a significant crop possessing 15-21% protein and 50% oil content (Ayeen 1996). It holds second position in the world in edible oil manufacturing following soyabean oil (Nandha et al. 2014) and grouped among preeminent plant oils for human diet due to its nutritional worth (Skoric et al. 2008). Its seeds provide considerable amount of vitamins, minerals and tocopherols (Skoric 2009) and found to be rich in minerals like magnesium, iron, copper, calcium, zinc, sodium, potassium, phosphorus, selenium and manganese (Nandha et al. 2014). Regular sunflower oil contains 69% linoleic acid, 20% oleic acid and 11% saturated fatty acids, but a number of strategies have been adopted to present advance range of sunflower oils with elevated oleic acid, stearic acid, linoleic acid, palmitic acid and low saturated acid.

Presence of Vitamin E content in sunflower oil makes it advantageous for human consumption. Defense system against ROS (reactive oxygen species) is strengthened by the presence of Vitamin E component i.e.,  $\alpha$ -Tocopherol facilitating oxidation of polyunsaturated fatty acids. Growth conditions have a large impact on the fatty acid organization of the sunflower oil. Warmer climatic conditions generate more monounsaturated fatty acid MUFA oleic acid and less n-6 polyunsaturated fatty acid (PUFA) and linoleic acid (an essential fatty acid, EFA) in comparison to colder climatic conditions (Morrison et al. 1995).

### Fatty Acid Composition of Sunflower Oil

Fatty acids that cannot be synthesized in our body but most required for human health are designated as Essential fatty acids (EFA) and grouped to the class polyunsaturated fatty acids (PUFAs). On one hand, where saturated oils coagulate, these stay fluid in cold climatic conditions. PUFAs can be grouped in to two categories, omega-3 and omega-6. Linoleic acid and alpha-linolenic acid (ALA) is parent of omega-6 fatty acid and omega-3 fatty acid respectively (Singh 2005). Although human body cannot synthesize either of these fatty acids from scratch, it can use them to synthesize other essential fatty acids.

These essential fatty acids are crucial in cell membrane construction and for maintenance of body developmental activities. These two categories of EFA are functionally different from each other. Polyunsaturated fatty acids like Arachidonic acid (AA) (omega-6), Dihomo-gamma-linolenic acid (DGLA) (omega-6) and Eicosapentaenoic acid (EPA) (omega-3) are involved in the manufacture of signaling components, eicosanoids. Eicosanoids are involved in controlling immunological system, cell development and blood clotting. But they control these functions depending on their origin either from AA, EPA or DGLA. This is the basic reason why maintaining the intake of AA (omega-6), DGLA (omega-6), and EPA (omega-3) is significant for our proper health. An intake of omega 6 and omega 3 in the ratio of 5 to 10 has been recommended by world health organization (WHO) (WHO/FAO, 2003).

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## Role of Important Constituents

Sunflower oil has gained importance due to increased content of oleic and linoleic acid that may help diminishing the cholesterol leading to reduction in heart diseases (Chowdhury et al. 2007). Also, cholesterol content and cancer risk is controlled by the presence of high content of phytosterols in sunflower seeds, i.e., approximately 280 mg per 100 gm (Phillips et al. 2005). Tocopherols in sunflower oil protect body from inflammation and tumors by neutralizing free radicals and avoiding oxidative injury to cells, thus helpful in diseases like rheumatoid arthritis and bronchial asthma. Vitamin E has a positive affect on coronary system of the body and hence reduces stroke and atherosclerosis (Dutta and Dutta 2003; Singh et al. 2005). Sunflower oil contains magnesium that is supportive for curing migraine, hypertension, and bronchial asthma along with maintaining muscular tone of the body. Folic acid in seeds helps in the formation of blood and nucleic acids. Mental stress and uneasiness can be resolved by choline and tryptophan in sunflower seeds. Minerals like zinc improve the immune system, while selenium protects from the prostate cancer due to the antioxidant action. Occurrence of several components in sunflower oil make it curative as anti-inflammatory, anti-bacterial, anti-fungal, anti-cancer, cardioprotective and dermatoprotective in human beings (Nandha et al. 2014).

## An Effort towards Trans fat free life: NuSun Sunflower Oil

Understanding the disadvantages of trans fat, efforts have been made to manufacture NuSun sunflower oil with substantial amount of oleic acid that was brought in market in 1999. Several hybrid seed brands, farmers and USDA have been accredited with its launch. None of the transgenic techniques have been involved in its production making it desirable sunflower oil. It is made up of approximately 90% unsaturated fatty acid including 65% monounsaturated and 26% polyunsaturated fat. As it is naturally devoid of trans fat, partial hydrogenation is not required.

When vegetable oils are converted in to semi-solid fats utilized in cooking, trans fats are produced. Trans fats are supposed to be harmful for the human health (Mozaffarian et al., 2006) leading to the increment of total and LDL cholesterol levels

(Mensink 2003). Since January 2006, it has been mandatory by FDA to mention the content of trans fat on the food products. A high number of coronary diseases have been reported every year due to the usage of trans fat (Mozaffarian et al. 2006). As NuSun was found to be better than canola, corn, cottonseed, soybean and peanut oil, no doubt, its utilization in place of trans fats can be of much benefit for healthy lives (Campbell et al. 1999, 2000 and 2001; Kleingartner et al. 2002).

Also, rancidity is a major problem associated with most of the available natural oils leading to the production of irritating compounds. FloraSun 90 has emerged as a solution of this problem. It is natural, triglyceride oil with wonderful oxidative stability and exceptional emollient properties. The high oleic acid content of FloraSun 90 (85-90%) makes it incredibly resistant to rancidity. The oxidative stability is achieved by adding monounsaturated fatty acid and eliminating high levels of polyunsaturates. For less stable vegetable oils, non-biodegradable mineral oils and/or synthetic esters in personal care formulations, FloraSun 90 is a natural alternate. Furthermore, it is hypo-allergenic, non-comedogenic and Generally Recognized as Safe (G.R.A.S.) for human use around the world.

## Conclusion

Complimentary fatty acid composition of sunflower has made it an important oil crop in the world. Available advanced technologies including genetic modifications and marker assisted breeding should be efficiently exploited to transform the fatty acid composition of oils. In current scenario with enhanced risk of coronary heart diseases, improved research on producing more healthy sunflower oil can play a crucial role.

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