# LIPID UNIVERSE

Volume-6 January - December, 2018

Ghee : Its Properties, Importance and Health Benefits

Trade News

Important Figures

Health News

Carrot Seed Oil

Oil Technologists' Association of India (North Zone)

*Office Interiors, Hospital Interiors, Laboratory Interiors*
*Kitchen Cabinets, Home Furniture, Wadrobes*

*Aluminium Partitions, Glass Work, Special Purpose Counters*
*Doors, Windows, Frames*

INTERIOR & DECOR

Anu


**ANU INTERIOR & DECOR**
Village Jharsa, Kanhai More, Sector-39,
Gurgaon-122001, Haryana, INDIA
Cell : +919716749887
E-mail : shazad.aid@gmail.com

# Editor's desk

Indian edible oil and seed horizon has been facing challenges from last several years due to various reasons. Edible oil and seed industry faced new situations during year 2018. Import duty correction, preference in import of refined oil over raw oil, slow demand in the domestic market, huge reduction of export of Indian deoiled meal were few road blocks and cause of worry.

With an import bill of 11 billion US$ for edible oil, time has come to think about means and ways to reduce import bill and dependence on the imported oil. India import about 70% of its edible oil demand and rest is compensated with domestic production. Apart for economic contribution, oil industry also support the agricultural sector. These measure of self-sustenance will boost the agricultural sector as well.

Global oilseed production has been growing on an average 3.2% CAGR since 2006, while Indian oil seed production is hardly showing 30-40 % growth of global average. The high yielding variety seed, better availability of micronutrient for oil crop to increase the yield and productivity, new agricultural techniques and shifting of oil seed crop to irrigated areas from rain fed areas, are few key step to be implemented on national level.

The global trend in edible oil market is towards unprocessed, cold pressed, non GMO and organic oil. Costumer are ready to pay premium for these type of oils. Production of plant based protein from, deoiled cake is an important value addition. India may focus on production of these variety of products and take lead due to majority of non GMO production of oil seeds. The oil from new sources such as algae oil is emerging as health oil. India has a good potential for the same. Timely R&D and innovation can help in mitigating global challenges.

*Yours truly*
***C S Joshi***
*Editor*

# Oil Technologists' Association of India
# (North Zone)

## Zonal Executive Committee (ZEC) for the period 2017-2019 (For 2 years)

| Sl. No. | Discription | No of Positions | Name |
|---|---|---|---|
| 1. | **President** | 1 | Dr. R.K. Singh |
| 2. | **Vice Presidents** (Elected) | 2 | Dr. A. Madhavan |
| | | | Dr. S.K Luthra |
| 2A. | **Vice Presidents** (Nominated) | 2 | Mr. H.C.Goyal |
| | | | Mr. Prabhat Kumar |
| 3. | Hony. Secretary | 1 | Dr. S. N. Naik |
| 4. | Hony. Jt. Secretary | 1 | Mr. M. C. Pandey |
| 5. | Hony. Treasurer | 1 | Mr. Ravi Kumar Gupta |
| 6. | **Editor** | 1 | Mr. C. S. Joshi |
| 7. | **Members** | 10 | Mr. Ashok Mahindru |
| | | | Mr. Ashwani K. Sharma |
| | | | Mr. D. Mathur |
| | | | Mr. A.K. Jain |
| | | | Mr. S.K.Solanki |
| | | | Dr. Meenakshi Tripathi |
| | | | Mr. Rajvinder Singh |
| | | | Mr. Ramesh Tarale |
| | | | Mr Kushal Rai |
| | | | Dr. S. N. Naik |

| Co-opted members | Special Invitees | CEC Nominees |
|---|---|---|
| Mr. Ajay Tandon<br>Dr. R.K. Suri | Dr. M. K. Kundu<br>Dr. J.Adhikari<br>Dr. H.B.Singh<br>Dr. S. K. Saxena | Dr. A. Madhavan<br>Mr. H. C. Goyal |

| Editorial Board | | |
|---|---|---|
| | Mr. C.S.Joshi<br>Dr. Shyamal Adhikari<br>Mr. Srinibas Acharya<br>Dr. S. K. Handoo<br>Mr. Ashok Mahindru<br>Dr. S.N.Naik | Mr. Ashwani K. Sharma<br>Dr. A. Madhavan<br>Dr. Saurabh Dubey<br>Mr. Prabhat Kumar<br>Mr. Romesh C. Arora |

# Contents



# Advertisers

# Ghee : Its Properties, Importance and Health Benefits

**Anil Kumar, Shreya Tripathi, Nidhi Hans, Falguni Pattnaik, Satya Narayan Naik**
**Centre for Rural Development & Technology, Indian Institute of Technology, Delhi-110016**

## Abstract

Ghee is a type of clarified butter fat that has been produced and utilized in India from antiquity. It is used in Ayurveda as a therapeutic agent and also for religious rituals. It is popular in India because of its nutritional attributes and characteristic flavor and aroma and is considered as sacred food. It is made from milk, cream, or butter of several animal species. Ghee processing may be achieved by drawing fat from milk, cream or butter using direct heat with or without fermentation. Ghee is unique type of fat by its characteristic flavor which is basic criterion for its acceptance and is greatly influenced by the processing methods i.e. fermentation of cream, butter or milk and even heating processes. It is fairly shelf stable because of low moisture content as well as possible natural antioxidants contents. As a human food, ghee has been accepted universally as superior fat to other fats, mainly because of its characteristic short chain fatty acids content, which are responsible for its better digestibility and anti-cancer properties. Ghee is also an important carrier of fat-soluble vitamins (A, D, E, K) and essential fatty-acids (linolenic acid and arachidonic acid), apart from having rich and pleasant sensory properties. Ghee is believed to be a coolant, capable of increasing mental power, physical appearance, curative of ulcers and eye-diseases.

**Key Words:** Ghee, Physico-chemical properties, composition, importance, health benefits

## Introduction

Dairy activities and business have traditionally been rooted to India's rural economy. India is the leading producer and consumer of dairy products. As per the report of India Dairy Products Market Forecast & Opportunities, 2017, the market for dairy products has opened a wide window in food processing sector, simultaneously if provided with proper stable and sanitized conditions to achieve the international standards. The market in our country has grown rapidly over the last few decades and predicted to be growing at a faster rate as compared to the global dairy market. Amongst all dairy products, ghee is most valuable item as per its cost, nutrition and flavor attribute.

In ancient India, ghee (Ghrita) was produced far back as 1500 BC (Achaya, 1997). Some reports have also mentioned similar type of product in Middle East, available probably since same ancient times (Abdalla, 1994). It is one of the costlier and most acceptable type of fat on the Indian subcontinent, because of its economic, nutritional and sensory characteristics. In ghee manufacturing, the fermentation of milk to curd may or may not be performed to render fat from the medium. It can also be achieved directly by separating the cream form the milk followed by heat treatment. The term “Desi ghee” is generally used for milk fat obtained from fermented milks whether from cow or buffalo in which curd has to be churned to form butter followed by heat clarification to separate out fat from non-fat medium. Similarly, manufacturing of ghee can be achieved by numerous methods (figure 1) with respect to raw material utilized (milk, cream or butter), treatments given at different stages and the handling towards the final products (semi-finished or fully formed ghee).

Ghee is one of important cooking medium, because the taste it adds to food is absolutely pleasant and also promotes good health. It remains a top choice among households in India in comparison of other fats/oils, with some trusted brands (Gowardhan, Anik, Milkfood, Madhusudhan,Verka, Amul, Healthhaid, Gopaljee, Nestle Everyday, Patanjali and Britannia) having their stronghold in the market. However, it is essential for good health up to some extent, consuming it beyond the individual limit may show detrimental health effects, because of having cholesterol content and is also highly saturated in nature.

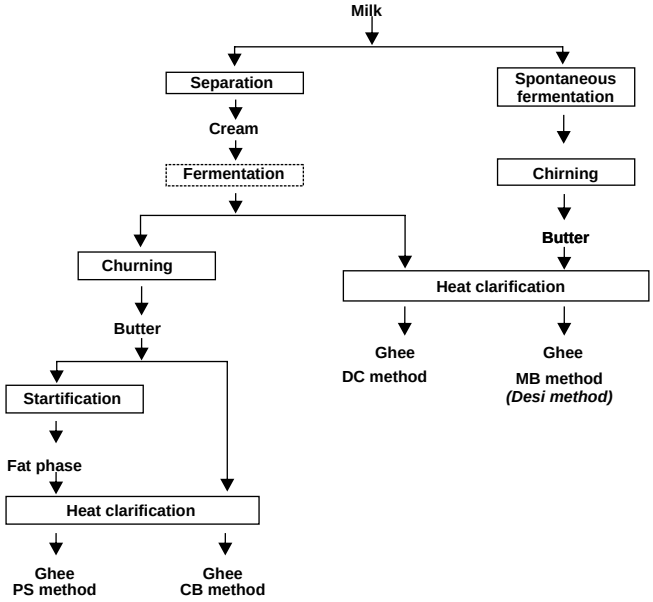



Figure 1. Flow diagram illustrating four methods of ghee manufacture: milk butter (MB) (desi); cream butter (CB); direct cream (DC); pre-stratification (PS).

## Indian Scenario

Indian dairy sector contributes large share in agricultural gross domestic products. Presently there are around 70,000 village dairy cooperatives across the country. Milk production gives employment to more than 72 millions dairy farmers. By, India's current year (CY) 2018, fluid milk production was forecasted at 167 million metric tons (MMT) assumed a normal monsoon, increased by 3.7 percent from previous year. The Government of India (GOI) estimates demand for milk to increase to 200 MMT by the year 2021-22, requiring a 20 percent increase in milk production. In order to augment the milk production to fulfill rising domestic demand, GOI has implemented the National Dairy Plan (NDP) through the National Dairy Development Board (NDDB).

India ranked first in milk production with per capita availability of milk is from 225 grams per day in 2001-2002 to 355 grams per day by 2016-17 (NDDB, 2018). The market size of ghee in India is more than 10,000 crores as of 2017. India is the world's largest producer of ghee and also largest consumer. In CY 2018, combined butter and ghee (clarified butter) production is estimated at 5.6 MMT, increased by 3.7 percent from previous year on rising domestic demand due to population growth and demographic shifts (GAIN, 2018). The demand for ghee (clarified butter) and butter continues to remain robust. Reportedly, ghee is the most consumed value added dairy product and is primarily used for cooking and frying and as dressing or toppings for various foods. It is also used in the manufacture of snacks and sweets often mixed with vegetables, cereals, fruits, and nuts. In some parts of the world, ghee is considered as a sacred product and is used in religious rites (Mortensen, 2011).

## Physico-chemical properties of ghee

Milk fat is one of the complex forms of lipids existing in nature. Ghee is processed milk fat and basically known as clarified butter fat or anhydrous milk fat. It is mainly composed of glycerides (usually mixed), and other minor constituents found, are free fatty acids, phospholipids, sterols, sterol esters, fat-soluble vitamins, carbonyls, hydrocarbons, carotenoids (only in milk fat derived from cow). It also contains small amounts of charred casein and traces of calcium, phosphorus, iron and so on. The moisture content in ghee is very negligible (0.3%) and the major part composed of glycerides (~98 % of the total matter). Of the remaining constituents about 2 %, sterol (mostly cholesterol) occurs to the extent of about 0.5%. Ghee may also contain good amount of conjugated linoleic acids, a reported anti- cancer agent (Clement et al, 1994).

Ghee is unique fat; because of flavor it imparts to the food articles and therefore, enhances overall acceptability of the product. Hence, flavor is primary criterion of its acceptability, which is greatly influenced by different factors like fermentation of the cream or butter and the heat treatments used. The key ghee flavoring compounds reported are carbonyls, lactones and free fatty acids (Wadhwa and Jain, 1990). It is fairly shelf-stable fat, because of its low moisture content, which is regulated by time and extent of heat treatment used in processing. It also has possible antioxidative properties, responsible for its stability by preventing oxidation. Therefore, it is more convenient product than butter and cream in the tropics regions, because it remains stable under warm conditions. Basically, the low moisture and milk solid non-fat contents in ghee are responsible for the restricted bacterial growth in it (O'Mahony, 1988). The other factors in ghee may be because of its phospholipids contents (ca. 400 mg/Kg), low acidity and the presence of natural antioxidants, which are also believed to contribute to the extension of its shelf life (Sserunjogi, et al, 1998).

Ghee can be served to the people of all age groups for their nourishment. It is a good carrier of fat-soluble vitamins (A, D, E and K) along with essential fatty acids (linolenic and arachidonic acid) which are responsible for wellbeing. The only concern of ghee is of its cholesterol level (0.2–0.4%) which makes appreciable contribution to cholesterol intake when consumed at high level. In recent years, the consumers becomes extra aware about the cholesterol-containing foods, hence is affecting the uses and the market growth of such products (Kumar, et al., 2010).

Being a valuable product, the standards and quality parameters of ghee has been prescribed by Government of India to ensure genuine product to the consumer, under FSSAI rules, 2011 (Table 1) and Agmark rules, 1981 (Table 2). However these standards are not comprehensive for detecting adulteration in ghee, and can hardly establish the type and the level of added adulterants. This may be because of wide variations in the physico-chemical makeup of milk fat owing to different factors like animal species, feeding practices and nutritional management etc.

Table 1. Standards of Ghee under FSSAI Rules (2011)

| Sr. No. | Name of the State & U.T. | BR Reading at 40 °C | RM (Reichert Meissl) value (Min) | Percentage of | |
|---|---|---|---|---|---|
| | | | | FFA (as Oleic acid) (Max) | Moisture (Max) |
| 1 | Bihar, Chandigarh, Delhi, Punjab, Haryana (Areas other than cotton tract areas), West Bengal (Areas other than Bishnupur sub-division), Sikkim, Jharkhand | 40-43 | 28 | 3 | 0.5 |
| 2 | Manipur, Meghalaya, Mizoram, Arunachal Pradesh, Orissa, Uttaranchal, Nagaland, Tripura, Assam, Goa, Kerala, Himachal Pradesh, U.P., J & K, Rajasthan (Areas other than Jodhpur Divn), Haryana (Cotton tract areas), Lakshadweep, Maharashtra (Areas other than cotton tract areas) | 40-43 | 26 | 3 | 0.5 |
| 3 | Karnataka (Belgaum district), Madhya Pradesh (Areas other than cotton tract areas), Pondicherry, Chhatisgarh | 40-44 | 26 | 3 | 0.5 |
| 4 | Andhra Pradesh, Daman & Diu, Dadar & Nagar Haveli, Karnataka (Areas other than Belgaum distt.) | 40-43 | 24 | 3 | 0.5 |
| 5 | Andaman & Nicobar Island, Tamil Nadu | 41-44 | 24 | 3 | 0.5 |
| 6 | Gujarat (areas other than cotton tract) | 40-43.5 | 24 | 3 | 0.5 |
| 7 | Gujarat (cotton tract areas), Madhya Pradesh (Cotton tract areas), Maharashtra (cotton tract areas), Rajasthan (Jodhpur sub division), West Bengal (Bishnupur sub division) | 41.5-45 | 21 | 3.0 | 0.5 |

a. Baudouin test shall be negative
b. By cotton tract is meant the areas in the state where cotton seed is extensively fed to the cattle and so notified by the State Govt. concerned.
c. Usually such cotton tract areas ghee has low RM value and high BR reading compared to other areas.

Table 2. Standards of ghee under AGMARK Rules (1987)

| Sr. No. | Characteristics | All India* | Regional and Seasonal@ | |
|---|---|---|---|---|
| 1 | Baudoin test | | Negative | |
| 2 | Phytosterol acetate test | | Negative | |
| 3 | BR reading at 40°C | 40.0 – 43.0 | 41.5 – 44.0 | 42.5 – 45.0 |
| 4 | Reichert – Meissl value | Not less than 28.0 | Not less than 23.0 | Not less than 21.0** |
| 5 | Polenske value | 1.0 – 2.0 | 0.5 - 1.2 | 0.5 – 1.0 |
| 6 | Moisture (%) | Not more than 0.3 | | |
| 7 | Percentage of free fatty acids (as oleic acid) | | | |
| A | Special Grade (Agmark Red Label) | Not more than 1.4 | | |
| B | General Grade (Agmark Green Label) | Not more than 2.5 | | |

a. * Areas other than cotton tracts of Saurashtra and Madhya Pradesh.

b. @ Recognized cotton tracts (of Saurashtra and Madhya Pradesh).

c. By cotton tract is meant that area where cotton seed is extensively fed to the cattle.

d. **Ghee with Reichert Meissl value between 19 and 21 shall be graded only after a phytosterol acetate test has been performed and the result thereof found to be negative.

e. Percentage of Free Fatty Acids (as Oleic acid) shall not exceed 3.0 for Standard Grade Ghee.

## Gross composition of ghee

Bulk of ghee is mainly made up of triglycerides (~98 %), derived whether from cow or buffalo milks (table 3). The other classes of lipids which are present in minor quantities in ghee are: diglycerides (1-2%), monoglycerides (0.1-0.2%), free fatty acids (1-10 mg/100 g), phospholipids (0 to 80 mg/l00, sterols (mainly cholesterol), fat soluble vitamins, carbonyl (4-6 ug/g), glyceryl ethers (O.8uM /g) and alcohols (1.8-2.3uM/g). The levels of diglycerides, monoglycerides and free fatty acids vary due to breakdown of triglycerides by hydrolysis during storage of ghee. The concentration of phospholipids in ghee also increases with time and temperature used during clarification of butter or cream to ghee. Furthermore, the levels of vitamin A, carotene and tocopherols (within certain limits), depend directly on the levels of these components in the ration of the animal (Ramamurthy, 1980).

Table 3. Gross composition of ghee.

| Components | Quality | |
|---|---|---|
| | **Cow ghee** | **Buffalo ghee** |
| Fat | 99.0-99.5% | 99.0-99.5% |
| Saturated Fat | | 46% |
| Cis-monoene | | 29% |
| Trans-monoene | | 7% |
| Diene | | 13% |
| Polyene | | 5% |
| Triglycerides (triacylglycerol) | | |
| SSS | 42% | 49% |
| SSU | 42% | 39% |
| SUU | 14% | 11% |
| UUU | 2% | 1% |
| Diglycerides (diacylglycerols) | 4% | |
| Monoglycerides (monoacylglycerol) | 1% | |
| Unsaponifiable Matter | | |
| Cholesterol | 300mg | |
| Lanosterol | 9µg $100^{-1}$ | |
| Lutein | 4µg $100^{-1}$ | |
| Saqualene | 60µg $100^{-1}$ | |
| Vitamin A | 9µg $100^{-1}$ | |
| Vitamin E | 28µg $100^{-1}$ | |
| Ubiquinones | 6µg $100^{-1}$ | |

S-Saturated, U-Unsaturated

Table adopted from the works reviewed by Achaya, 1997

## Fatty acid Composition

Ghee is a common term, mainly used for heat clarified milk fat derived whether form cow or buffalo or mixture thereof. The major fatty acids found in ghee are myristic, palmitic, stearic and oleic acids. There is slight differences in fatty acid composition of ghee from the two species (buffalo and cow) as reported by Kumar et al, 2015. The average percentage of unsaturated fatty acids of buffalo and cow ghee are 28.73 and 32.21, respectively. This indicates that cow ghee is slightly more unsaturated than buffalo ghee. In addition, buffalo ghee possessed slightly higher proportion of C4:0, C6:0, C16:0 and C18:0 fatty acids than those of cow ghee. There is a lower level of C18:1, C18:2, C18:3 and C20:0 fatty acids in buffalo ghee than in cow ghee. Similar differences in fatty acid profile of milk fats from the two species have also been reported by other workers (Lal & Narayan, 1984; Jensen et al, 1991). The differences noticed in the fatty acid composition of milk fats form both the species may be attributed to the species, breed, feed composition, physical health of herds and many more. The studies shown here are carried out under identical conditions of feeding and other parameters.

Table 4. Fatty acid composition of ghee.

| Fatty Acid* | Cow Ghee** | Buffalo Ghee** |
|---|---|---|
| C4:0 | 3.79±0.03 | 4.83±0.08 |
| C6:0 | 2.29±0.03 | 2.64±0.12 |
| C8:0 | 1.39±0.03 | 1.27±0.04 |
| C10:0 | 3.11±0.07 | 2.43±0.05 |
| C12:0 | 3.54±0.06 | 3.15±0.04 |
| C14:0 | 11.73±0.22 | 11.69±0.17 |
| C14:1 | 1.38±0.03 | 1.01±0.04 |
| C15:0 | 0.89±0.02 | 1.04±0.06 |
| C16:0 | 26.90±0.24 | 28.37±0.34 |
| C16:1 | 1.98±0.05 | 2.13±0.09 |
| C17:0 | 0.38±0.02 | 0.35±0.04 |
| C18:0 | 10.73±0.15 | 12.58±0.12 |
| C18:1 | 24.52±0.35 | 22.85±0.19 |
| C18:2 | 2.53±0.07 | 1.33±0.10 |
| C18:3 | 1.81±0.05 | 1.41±0.06 |
| C20:0 | 3.05±0.06 | 2.94±0.12 |
| Total saturated fatty acids | 67.79±0.51 | 71.27±0.29 |
| Total unsaturated fatty acids | 32.21±0.50 | 28.73±0.27 |

*The first figure refers to the number of carbon, and the second figure to the number of double bonds.

**Data represent the mean±SE of six determinations

Similarly, numerous studies showed the compositional variation of ghee in different seasons. Summer season's (May-June) samples showed slight increase in the unsaturated fatty acids, whereas in monsoon (July-August) and winter (January-February) seasons marginal decrease in unsaturated fatty acids was observed (Ramamurthy & Narayan, 1971; Frelich et al, 2009, Kumar et al, 2015, Upadhyay et al, 2018).

## The shelf life of ghee

Ghee deterioration may occur as a result of development of oxidized and/or rancid flavors (van den Berg, 1988). Basically, the thermal processing involved in ghee manufacturing lowers down the moisture content which plays an important role in destruction of most bacteria and further restricts them to grow. Buffalo ghee has been reported to be more resistant to lipolysis than cow ghee (van den Berg, 1988), mainly because of low unsaturated fats. The keeping quality of ghee is governed by several factors i.e. ripening of cream, method of manufacture, clarification temperature and the permeability of the packaging material to air and moisture (Singh and Ram, 1978). The shelf life of ghee may be of 06-08 months, even at ambient temperatures. Although, some studies reported it up to two years (Bekele and Kassaye, 1987). However, such variations in shelf life could be due to regional preferences in taste and many other factors.

Furthermore, the storage stability of ghee is attributed to the low moisture content (ca. 0.2%) and high content of phospholipids (ca. 400 mg kg~1) and perhaps the free amino acids, which are liberated from the phospholipid-protein complex into the fat phase (Achaya, 1997). The low acidity of the ghee and the presence of natural antioxidants are also believed to contribute to extend its shelf life (van den Berg, 1988). Cow ghee is apparently more shelf stable than buffalo ghee due to the higher content of natural antioxidants in the former (van den Berg, 1988). Generally, ghee derived from fresh cream/butter has a longer shelf life than ripened cream/butter ghee (Ganguli and Jain, 1972; Singh et al, 1979).

Similarly, the antioxidant properties of different constituents in ghee were also been studied. Pagote and Bhandari (1988) reported that phospholipids particularly cephalin, possess antioxidant properties, therefore the antioxidant property of ghee does not depend on one constituent alone. Other constituents such as amino acids, sulphydryl compounds, free sugars and products of their interaction with proteins during heating are also considered to contribute, mainly because of their reducing capacity. Phospholipids may exhibit antioxidant activity by binding metals, regenerating other antioxidants, and providing synergism with phenolic antioxidants. Sripad et al (1996) has associated the antioxidant properties of the ghee residue with the presence of tocopherols, phospholipids and products of browning reactions. Similarly, Harendra and Vijayender (1987) investigated the role of polar carbonyls, produced during heating in the preparation of ghee, on its oxidative stability.

Textural changes may also occur in ghee during storage. The fat in ghee crystallizes with the formation of solid, semisolid and liquid layers. Ghee stored at 20°C or below has been reported to solidify uniformly with fine crystals. However, the ghee stored above 20°C and below 30°C solidifies with a loose structure. It has been suggested that ghee should be stored at temperatures below 20°C to avoid layer formation (Ganguli and Jain, 1972).

## Importance of ghee

Modern science now verified, what Ayurvedic health science has said since thousands years ago: Ghee is a health booster, offers cooking benefits and is good for the mind and spirit. Here are a few benefits:

Ghee is considered as ideal medium for deep frying because it possess high smoke point (250 °C) which is well above the normal cooking temperatures (180-200 °C) and also higher than most of the vegetable oils (Bader, 2010; Deosarkar et al, 2016). Ghee does not require refrigeration conditions to store, therefore not spoil easily. It is not likely to affect people with a dairy or casein intolerance. Ghee is made from butter but the milk solids and impurities have been removed, so most people who are lactose or casein intolerant have no issue with ghee. It is rich in the oil soluble vitamins A and E (Achaya, 1997) and also rich in vitamin K2 and CLA (Conjugated Linoleic Acid); an antioxidant with anti-viral and anti-cancer properties, if sourced from grass fed cows (Dhiman et al, 1999, 2000).

Ghee is nutritionally superior to other oils/fats because of its medium chain fatty acids (MCFAs) content, which are absorbed directly by the liver and burned to provide energy. Therefore, for athletes it can be of consistent energy source. Also, the energy from medium chain fatty acids can be used to burn other fats in the system and to lose weight (St-Onge & Jones, 2008: Nokasa et al, 2009), therefore the anti-obesity properties of these MCFAs are well recognized. Ghee (unlike other oils) exclusively contain butyric acid; a short chain fatty acid (Kumar et al, 2015), which contributes to its distinct flavor and easy digestion. Beneficial intestinal bacteria convert fiber into butyric acid and then use that for energy and intestinal wall support (Maurice Bugaut, 1987). A healthy body therefore makes its own form of 'ghee' but we are aiding that greatly by consuming of it. It is proved that people with unhealthy digestive tracts do not produce

butyric acid. Research shows that adequate production of butyric acid supports the production of killer T cells in the gut and thus a strong immune system (Chang et al, 2014).

In addition, ghee based formulations are well scripted in Ayurvedic system of medicines used for wound healing purposes (Vure & Dorle, 2006). It was also observed that when rats fed with diets containing greater than 2.5 wt% of ghee showed lower levels of serum cholesterol compared with rats fed diets containing groundnut oil (Matam et al, 2000). Other study revealed that the consumption of ghee up to a 10% level in the diet altered blood lipid profiles in such a manner as not to elevate the risk factors for cardiovascular diseases (Matam et al, 1999). Ayurvedic physicians have been using ghee enemas for centuries to decrease inflammation.

Ghee stimulates the secretion of gastric acid, thus aiding in the digestive process.

In Ayurveda, ghee is placed under most satvic foods, and is considered to promote positivity, growth and expansion of consciousness. The positive subtle effects of ghee is said to come from the fact that it comes freely from cows. Cows are domestic animal in most parts of the world, but these are considered special and holy in Hindu cultures of India. Therefore, the milk from cows contains the essence of all those energies, and ghee is the essence of the milk. Ghee is used as a suitable carrier for many herbs and spices with different medicinal properties, which are to be absorbed and transported to targeted areas of the body. This is why, Ayurveda uses ghee in thousands of different herbal preparations for curing various ailments.

## Conclusion

Ghee has been considered immensely superior to other fats mainly because of the presence of characteristic short chain fatty acids, carrier of four fat soluble vitamins viz., A, D, E, K and essential fatty acids such as linolenic acid and arachidonic acid. The market penetration of ghee is about 37% in urban areas and about 21% in rural areas. Daily consumption of ghee in an adequate amount, imparts various health benefits such as binds toxins, enhances complexion and glow of the face and body, a great rejuvenator for the eyes, increases physical and mental stamina etc. in addition to providing sustaining energy.

Since, ghee is a fat-rich product; therefore natural antioxidants and other constituents like phospholipids and protein residues etc plays major role in preventing rancidity. Generally, synthetic antioxidants are also used in ghee to increase shelf life by preventing it from oxidative deterioration. Now, as per the mentioned benefits of ghee, more research is to be needed to validate the health promoting properties of ghee. It is one of the costlier products; hence ghee manufacturing could be a profitable business for rural India. At present, GOI, come up with different schemes for setting own business in dairy sector to improve the livelihood of the Indian peoples.

## References


Abdalla, M. (1994). Milk in the rural culture of contemporary Assyrians in the Middle-East. In milk and milk products from medieval to modern times, ed. P. Lysaght. Canongate Press, Edinburgh: 27-39.

Achaya, KT (1997). Ghee, vanaspati and special fats in India. In ¸ Lipid Technologies and Applications, eds F.D. Gunstone and F.B. Padley. Marcel Dekker Inc., New York: 369-390.

Agmark (1981). Ghee Grading and Marking Rules, 1938 (as amended). Government of India, Ministry of Food and Agriculture, Department of Agriculture, New Delhi, India.

Kumar A, Upadhyay N, Padghan PV, Gandhi K, Lal D and Sharma V. (2015). Detection of vegetable oil and animal depot fat adulteration in anhydrous milk fat (ghee) using fatty acid composition. MOJ Food Processing & Technology. 1 (3): 00013. DOI: 10.15406/mojfpt.2015.01.00013.

Bader, M H. (2010). The wizard of food's encyclopedia of kitchen and cooking secrets. Strategic Book Publishing, Durham: 118.

Bekele, E and Kassaye, T. (1987). Traditional Borana milk processing-efficient use of subtle factors needs further research work. International Livestock Centre for Africa (ILCA) Newsletter 6 (4): 4-5.

Chang, HK, Park E and Kim M. (2014). Gut microbiota-derived short-chain fatty acids, T cells, and inflammation. Immune Netw., 14 (6): 277–288.

Clement Lp, Scimeca JA, Thompson HJ. (1994). Conjugated linoleic acid; A powerful anti-carcinogen from animal fat sources. Cancer. 74 (S3 1): 1050–1054.

Frelich J, Šlachta M, Hanuš O, Špicka J, Samková E. (2009). Fatty acid composition of cow milk fat produced on low-input mountain farms. Czech J Anim Sci, 54 (12): 532-539.

FSSAI Act (2006) and rules (2011) Akalank's food safety

and standards Act, rules and regulation, Akalank publication, India: 40-43.

GAIN (2017). https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Dairy%20and%20Products%20Annual_New%20Delhi_India_10-13-2017.pdf (assessed on 08/10/2018)

Ganguli, NC and Jain, MK. (1972). Ghee: its chemistry, processing and technology. J.Dairy Scie, 56: 19-25.

Harendra, S and Vijayender, DR. (1987). Polar carbonyls and oxidative stability of ghee. Ind J Dairy Scie, 40: 62-64.

Jensen RG, Ferris AM, Lammi-Keefe CJ. (1991). The composition of milk fat. J Dairy Scie 74 (9): 3228-3243.

Kumar, M, Sharma, V, Lal, D, Kumar, A, & Seth, R. (2010). A comparison of the physicochemical properties of low-cholesterol ghee with standard ghee from cow and buffalo creams. Inter J Dairy Tech, 252 - 255.

Lal D, Narayanan KM (1984) Effect of lactation number on the PUFAs and oxidative stability of milk fat. Ind J Dairy Sci, 37 (3): 225-228.

Matam VK, Kari S, and Belur RL. (1999). Effect of dietary ghee—the anhydrous milk fat, on blood and liver lipids in rats. J. Nutr. Biochem. 10: 96–104.

Matam VK, Kari S, and Belur RL. (2000). Hypocholesterolemic effect of anhydrous milk fat ghee is mediated by increasing the secretion of biliary lipids. J. Nutr. Biochem., vol. 11: 69-75.

Maurice B. (1987). Occurrence, absorption and metabolism of short chain fatty acids in the digestive tract of mammals. Comp. Biochem. Physiol. 86 (3): 439-472.

National Dairy Development Board (NDDB). (2018). http://www.nddb.org/English/Statistics/Pages/ Milk-Production.aspx (assessed on 08/10/2018).

Upadhyay N, Kumar A, Lal D, Kant R and Goyal R. (2018). Detection of groundnut oil and goat body fat adulteration in ghee using principal component analysis on fatty acid profile. Indian J Dairy Sci 71 (5) (Accepted).

Nosaka N, Suzuki Y, Nagatoishi A, Kasai M, Wu J, Taguchi M. (2009). Effect of ingestion of medium-chain triacylglycerols on moderate- and high-intensity exercise in recreational athletes. J Nutr Sci Vitaminol (Tokyo); 55: 120–125.

O'Mahony F. (1988). Rural dairy technology: Experiences in Ethiopia; International Livestock Centre for Africa, Addis Ababa, Ethiopia. ILCA Manual No. 4, Dairy Technology Unit: 3- 8.

Pagote CN and Bhandari V. (1988). Antioxidant properties and nutritive value of ghee. Indian Dairyman, 40: 73-77.

Ramamurthy MK. (1980). Factors affecting the composition, flavour and textural properties of ghee. Indian. Dairyman, 32 (10): 765-768.

Ramamurthy MK, Narayanan KM. (1971) Fatty acid compositions of buffalo and cow milk fats by gas liquid chromatography (GLC). Milchwissenschaft, 26 (11): 693-696.

Deosarkarn SS, Khedkar CD, Kalyankar KD. (2016). Ghee. Encyclopedia of Food and Health, Pages 217–221.

Singh S and Ram BP. (1978). Effect of ripening of cream, manufacturing temperature and packaging materials on flavor and keeping quality of ghee. J Food Scie Tech, 15: 142-145.

Singh S, Ram BP and Mittal SK. (1979). Effect of phospholipids and method of manufacture on flavour and keeping quality of ghee. Indian J Dairy Scie, 32: 161-167.

Sripad S, Kempanna C and Bhat GS. (1996). Effect of Alcohol extract of defatted ghee residue on the shelf life of ghee. Indian J Dairy Bio Scie, 7: 82-84.

Sserunjogi ML, Abrahamsen RK and Narvhus J. (1998). A review paper: current knowledge of ghee and related products. Inter Dairy Journal, 8: 677–688.

St-Onge MP, Bosarge A. (2008). Weight-loss diet that includes consumption of medium-chain triacylglycerol oil leads to a greater rate of weight and fat mass loss than does olive oil. Am J Clin Nutr., 87: 621–626.

Dhiman TR, Anand GR, Satter LD, Pariza MW. (1999). Conjugated linoleic acid content of milk from cows fed different diet. J. Dairy Sci., 82: 2146–2156.

Dhiman TR, Satter LD, Pariza MW, Galli MP, Albright K, Tolosa MX. (2000). Conjugated linoleic acid (CLA) content of milk from cows offered diets rich in linoleic and linolenic acid. J. Dairy Sci., 83: 1016-1027.

Van den Berg JCT. (1988). Dairy technology in the tropics. Pudoc, Wageningen, Netherlands.

Vure Prasad & Avinash Kumar Dorle. (2006). Evaluation of ghee based formulation for wound healing activity. Journal of Ethnopharma, 107: 38–47.

Wadhwa BK and Jain MK. (1990) Chemistry of ghee flavor: a review. Indian J Dairy Scie, 43: 601-607.

## EU Parliament votes to phase out palm oil biodiesel, freeze crop-based fuels to 2017 levels

The European Parliament voted on 17 January in favour of a Renewable Energy Directive (RED II) proposal that would remove palm oil-based biodiesel from its list of renewable fuels by 2021 and froze crop-based biofuels at levels reached in 2017.

The decision to remove palm oil biodiesel from the list of biofuels that counted towards the EU's renewable fuels targets was likely to mark the end of palm methyl ester (PME) imports from Southeast Asia from 2021 onwards, Platts wrote on 17 January.

"Today's parliament vote sends a clear message to the biofuels industry that growth can only come from sustainable advanced fuels such as waste-based biofuels, not from food crops. This compromise redirects investments into the fuels of the future and eliminates palm oil biodiesel, the highest emitting biofuel," said Laura Buffet, clean fuels manager at industry body Transport and Environment.

Indonesia and Malaysia, two of the world's largest palm oil producers, have been increasingly critical of EU's plans to phase out palm oil biodiesel, with both countries threatening retaliation in trade and taking the matter to the World Trade Organization (WTO).

"In a sequence of acts akin to crop apartheid, the EU Parliament has taken steps to raise trade barriers, leading to an ultimate breach of the EU's World Trade Organization (WTO) commitments," said Malaysian Minister of Plantation Industries and Commodities Datuk Seri Mah Siew Keong in December 2017, adding that the country would bring the matter to the WTO if needed.

With palm oil diesel now removed from the list of renewable fuels, Indonesia and Malaysia can be expected to soon make their decisions on how they will oppose the decision.

In addition to eliminating palm oil from fuels, the EU Parliament voted to limit the contributions of crop-based fuels to the level each member state had reached in 2017.

"Biomass fuels consumed in transport, if produced from food or feed crops, shall be no more than the contribution from those to the gross final consumption of energy from renewable energy sources in 2017 in that member state, with a maximum of 7% of gross final consumption in road and rail transport," the Parliament's decision read.

Additionally, the Parliament voted for an overall renewables fuels target of 12% in transport, which contained a 10% blending mandate for "advanced" fuels, such as electricity, waste-based biofuels and recycled carbon fuels.

European renewable ethanol association ePure said the 12% overall renewables target left from for sustainable biofuels to replace fossil fuels in the EU energy supply, but argued that the decision should have done more.

"It needs a renewable energy policy that looks beyond labels like 'conventional' or 'advanced' and instead to the real sustainability credentials of biofuels," ePure said.

Courtesy: Oils and Fats international

## Turkey accused of stealing Syrian olives, passing off oil as their own

The Turkish government is being accused of stealing olives from Syria, pressing them into oil and passing them off as their own to sellers in European Union countries for a hefty profit.

Bernhard Guhl of Switzerland's Conservative Democratic Party says he's contacted the government about claims that Turkey is trying to peddle the stolen olives as their own and use the funds to finance militias backed by Ankara.

Greek Police arrest "criminal gang family , relative for selling bogus olive oil. "In Turkish-occupied Afrin, the olive groves are being pillaged by both Turkish forces and the militias they support. The olives they steal have been sold to Spain, and the sale will continue," Guhl said.

The accusations follow an investigative report from Spanish newspaper El Público, Turkish government documents obtained and published by Firat News Agency (ANF) and observations from the United Kingdom-based Syrian Observatory for Human Rights.

The seized Syrian olives are pressed in local mills that have been taken over by paramilitary groups. The oil is then transported across the border to Turkey where it's blended and labeled as Turkish olive oil before being shipped to EU countries, according to locals who spoke with El Público.

Turkish forces are in the area because they invaded Aleppo, a northwestern Syrian province, in January 2018. The mission, ironically called Operation Olive Branch, was meant to help stabilize the region but has led to widespread accusations that Turkey is exploiting the region for financial gain.

Saleh Ibo, the Agricultural Council Deputy Chairperson for the district of Afrin, said that at least 5,000 tons of olive oil have been produced which has raked in $80 million for Turkey, the Olive Oil Times reported.

"They have also been confiscating the fields and olive groves of people who have had to flee Afrin due to the

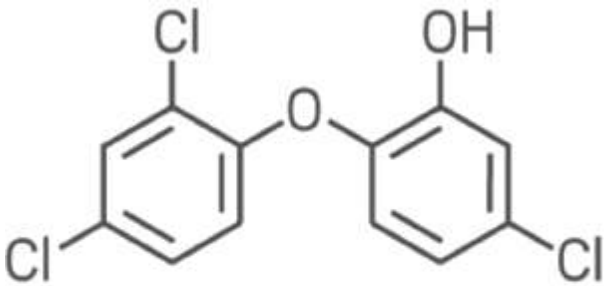
Turkish state violence in the months since the invasion," he said. "We can say that 80 percent of the olives in Afrin are being taken to Turkey with no cost through the paramilitary groups and the councils they formed."

For its part, Turkey has admitted to taking the olives but say they are doing so to prevent the money-making fruit from falling into the hands of Kurdish forces that has previously occupied the area.

Courtesy: Fox News

## U.S. FDA halts use of triclosan in health care antiseptics

Agency defers action on two quaternary ammonium compounds




**Triclosan**

The antibacterial compound triclosan, already banned in the U.S. from consumer soaps, will no longer be allowed in antiseptic products used in hospitals and other health care settings. The U.S. Food & Drug Administration deemed triclosan and 23 other antiseptic ingredients to not be generally recognized as safe and effective. "There was a lack of sufficient safety and efficacy data" for the 24 affected chemicals, explains FDA Commissioner Scott Gottlieb.

The new regulation affects hand washes and rubs used by health care professionals, surgical hand scrubs and rubs, and antiseptic preparations used on patients' skin before injections or surgery.

FDA's action stems from a settlement the agency made with the Natural Resources Defense Council (NRDC). The environmental group sued the agency in 2010 for failing to finalize a 1978 proposal to ban triclosan in soaps.

In the new regulation, FDA put off deciding whether six other ingredients are safe and effective in antiseptic health care products, giving manufacturers more time to provide data to the agency. These substances are: two quaternary ammonium compounds, benzalkonium chloride and benzethonium chloride; chloroxylenol; ethyl alcohol; isopropyl alcohol; and povidone-iodine.

The American Cleaning Institute, which represents producers of soaps and detergents, is pleased that the agency deferred action on the six chemicals.

"Manufacturers need sufficient time to provide FDA with additional safety and efficacy data to support the continued use of these products in health care facilities," the industry group says. "The active ingredients used in health care antiseptic drug products have very favorable benefit/risk ratios demonstrated over many years of extensive use."

But Mae Wu, a senior attorney with NRDC, is concerned about the delay. Companies have had decades to provide FDA with the safety and efficacy data, she points out.

NRDC is particularly focused on the two quaternary ammonium compounds, saying the data suggests that these chemicals may cause health problems. Hand sanitizers containing these chemicals are marketed as alcohol-free and are widely used in schools as well as in health care settings, Wu says.

Wu is worried about how long FDA will take to make a determination about the six antibacterial substances.

"I don't want us to wait another 40 years for FDA to make a decision on these other chemicals," she says, noting the time that elapsed between FDA's proposal to ban triclosan and its final action.

FDA banned triclosan and certain other antiseptic chemicals in consumer soaps and body washes more than a year ago. It found that companies haven't shown the compounds to be safe for long-term daily use, and said that manufacturers failed to show that products with the substances were more effective at preventing the spread of germs than plain soap and water. FDA also cited concern about potential hormonal effects and antibiotic resistance associated with the chemicals.

Courtesy; c&en

## Bunge completes acquisition of IOI Loders Croklaan

Global agribusiness and food company Bunge completed its acquisition of a controlling 70% ownership interest in speciality oil firm IOI Loders Croklaan from Malaysia's IOI Corp Berhad on 1 March.

The US$946M deal, first announced in September 2017, would transform Bunge into a global leader in business-to-business (B2B) solutions with expanded value-added capabilities, the company said in a statement.

With Loders under its wing, Bunge would be able to serve B2B customers in food processing, industrial and artisanal bakery, confectionery, human nutrition and food service applications.

Loders would change its full name to Bunge Loders Croklaan and operate under Bunge's Food & Ingredients business. "This is a transformational acquisition that increases our value-added food and ingredients

activities to the 30-40% share of our portfolio we've targeted," said Bunge CEO Soren Schroder.

"With a comprehensive product offering derived from seed and tropical oils, leading innovation and application capabilities, and world-class sustainability programmes, Bunge Loders Croklaan will be the first choice for global edible oils customers seeking to innovate and grow," he added.

Bunge expected Loders to generate US$105M of full-year EBITDA in 2018 in addition to US$15M in synergies.

Loders was an established player in the US$33bn semi-speciality and speciality business-to-business oil market with a full range of palm and tropical oil-derived products and a focus on confectionery, bakery and infant nutrition applications, Bunge said last September.

Courtesy: Oils and Fats International

## Cargill launches de-oiled rapeseed lecithin as consumers demand clean and non-GMO ingredients

Cargill has introduced a new range of de-oiled lecithin products to complete its portfolio of GMO and non-GMO lecithin products, in response to the growing demand from consumers for label-friendly ingredients. Cargill's de-oiled rapeseed lecithin is a first to market in Europe, which is designed to help bakery and snacks manufacturers deliver the ingredient labels that consumers want, at an affordable price.

Speaking to FoodIngredientsFirst, Dr. Roland Rabeler, Lecithin Product Manager for Cargill Starches, Sweeteners & Texturizers maintains that this launch is not a shift away from soy lecithin, but an additional offering to the market. "We have a balanced portfolio and we have lecithin from a wide variety of botanical sources, non-GM and GM soy, from sunflower, as well as rapeseed now, and what we want to do is provide something to the market as an add-on not necessarily as a replacement."

"There is virtually no difference in functional performance of both soy and rapeseed lecithin. We have tested rapeseed against sunflower lecithin, also against soy lecithin in a variety of applications, and we have noted equivalent functionality. It's more about the labeling needs and the needs of the market that we are answering rather than a functional deficit to fill," he explains.

According to Dr. Rabeler, the non-GMO advantage is significant. "We are currently seeing this as a major trend. There is a move towards non-GMO as well as non-allergen claims for applications and also what we see parallel to this is a general move away from artificial ingredients and considerable interest in lecithin," he notes. "Customers want to have a non-GMO solution and also a non-allergen solution which allows them to have full flexibility of label claims."

This ingredient can be labeled as rapeseed lecithin and also canola lecithin, but also it can be more generally labeled as lecithin," says Dr. Rabeler. "This is globally available now, we do see a preference in European and North American markets, in Asia there is no real tendency to move away from soy currently," he adds. The focus for Cargill is Europe and North America.

"We can now offer much more flexibility to our customers, the market has been turbulent in the past with regards to other lecithin and you could see there were some issues around trust," he states. "With the new rapeseed solutions, we want to give that confidence back to our customers and develop what they aim to achieve. So, at Cargill, we want to provide them with safe, reliable solutions without supply chain risks coming from Europe that deliver on those European needs."

"In a world of increasingly label-conscious consumers, we are striving to meet the demand for simple ingredients and provide the familiarity consumers are looking for related to food origin from trusted, reliable sources," explains Dr. Rabeler. "With the introduction of the de-oiled rapeseed lecithin range of emulsifiers, customers can be assured Cargill has a lecithin option that will work for them. The de-oiled rapeseed lecithin range provides a non-GMO and allergen-free option for consumers and it provides customers a cost-effective, label-friendly alternative to soy lecithin".

The de-oiled lecithin is 100 percent sourced from Central European crops with the highest levels of quality, food safety and a reliable supply.

"This new range offers great emulsification performance without compromising on taste or texture," explains Juergen Detert, technical service manager for Cargill Starches, Sweeteners & Texturizers. "Through extensive research, our R&D and applications teams developed a reliable texturizing solution that offers comparable functionality to soy and sunflower. At the same time, it delivers high flexibility and is easily incorporated into customer recipes."

With this introduction, Cargill's European customers benefit from a full (GMO and non-GMO) lecithin product portfolio ranging from soy and sunflower to de-oiled rapeseed solutions.

Dr. Rabeler concludes: "This is something that Cargill always had in mind. If there was any change or any risk to supply of rapeseed lecithin, we are confident that we would have a balanced supply of sources and the ability to invest when appropriate. We already do that for sunflower lecithin and we are prepared to do that for rapeseed lecithin in case additional needs were coming from the market."

Courtesy: Food Ingredients 1st

# Important Figures

## Commodity Profile of Edible Oil for July - 2018

### 1. Edible Oil estimates for India (marketing year- November 2017- October 2018)

(Unit: Million Tonnes)

| Table 1:Production, Stocks, Trade and Availability of Edible Oils | | | | |
|---|---|---|---|---|
| **2016-17** | **2017-18* Estimates** | | **May,2017** | **Source** |
| 10.75 | 10.52 | Production | 10.52 | DVVOF |
| 15.34 | 14.85 | Imports | 7.04** | DOC |
| 26.09 | 25.37 | Availability | 17.56 | |
| 0.65 | 0.63 | Export and Industrial use | 0.63 | DVVOF |
| 25.44 | 24.74 | Total Available for domestic consumption | 16.93 | |

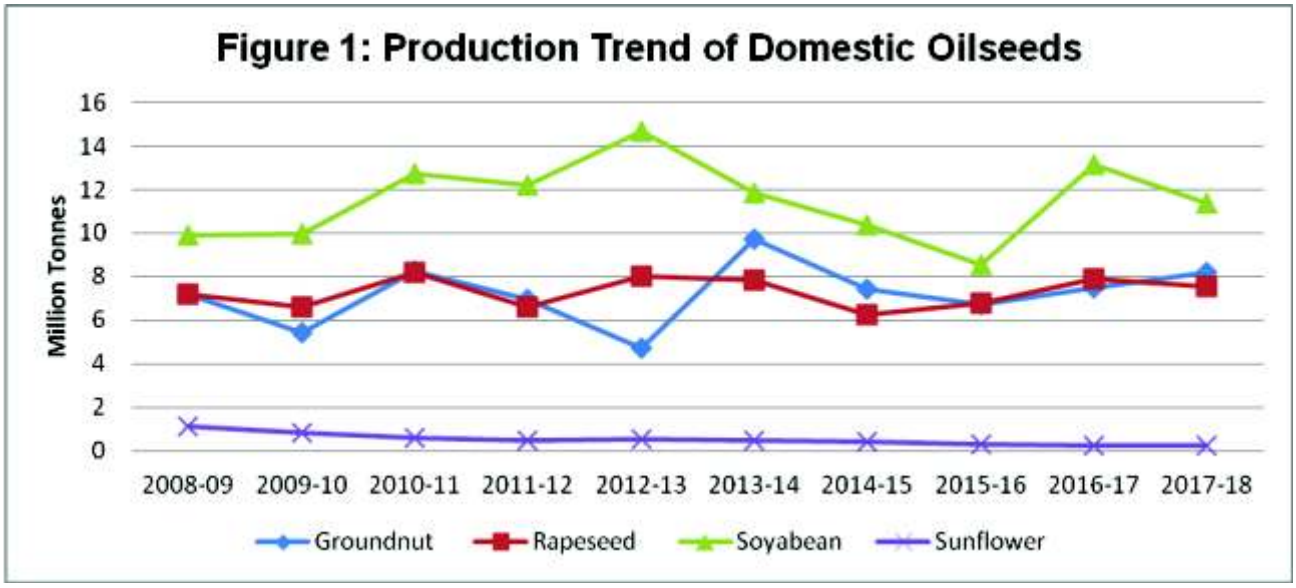
Source: Directorate of Vanaspati, Vegetable oil and Fats (DVVOF) and Department of Commerce

*For 2017-18 estimates, Production, Export Industrial use is estimates from DVVOF and Import is 3 years average from DGCI&S, Kolkata.

**Figure of import is for the period Nov-May, 2017-18.

Availability: Domestic production plus Imports; Total Availability for Domestic Consumption: Availability minus export and Industrial use.

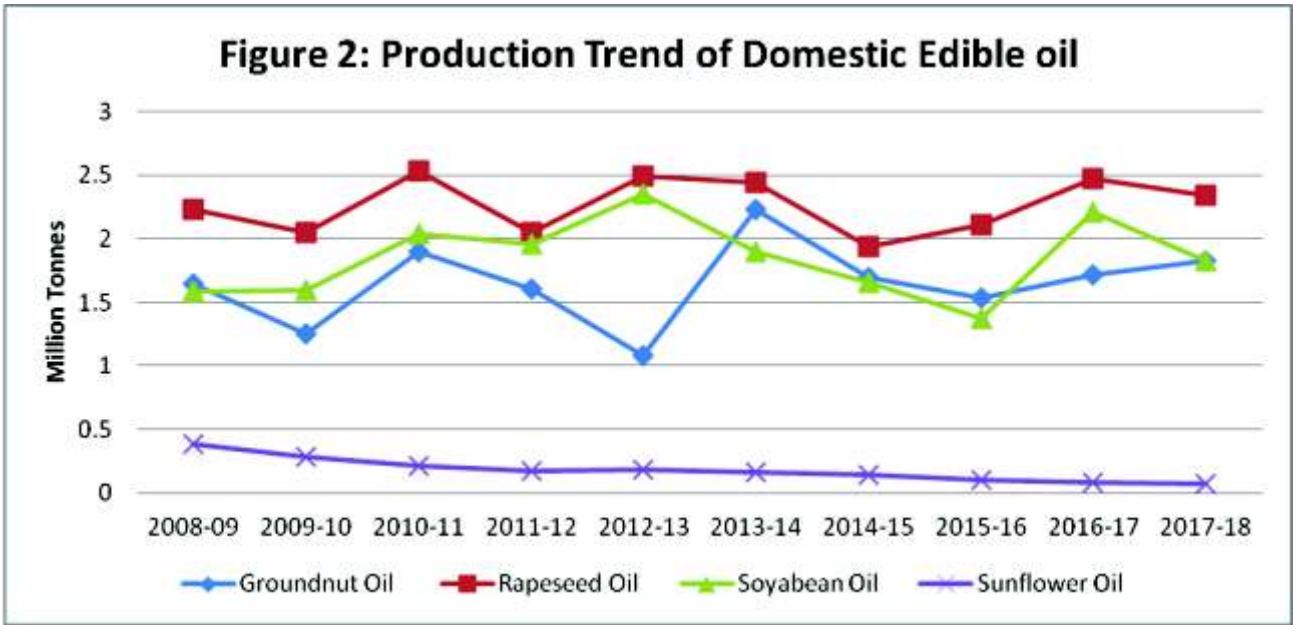
### 2. Production Trend of Domestic Oilseeds




Source: Directorate of Economics and Statistics

- India's Soybean production has increased in the last 10 years at CAGR of 1 percent.
- Groundnut production is estimated to be 8.94 Million Tonnes in 2017-18 as compared to 7.46 Million Tonnes in 2016-17 showing a growth of around 20%.

### 3. Production Trend of Domestic Edible Oils




Source: Directorate of Vanaspati, Vegetable oil and Fats (DVVOF)

- Soybean oil production has increased in the last 10 years at CAGR of 1.48 percent.
- Rapeseed oil production increased is estimated to be 2.33 Million MT in 2017-18.

### 4. Global & Domestic Production, Exporters and Importers of Major edible oil

(Qty in Million MT)

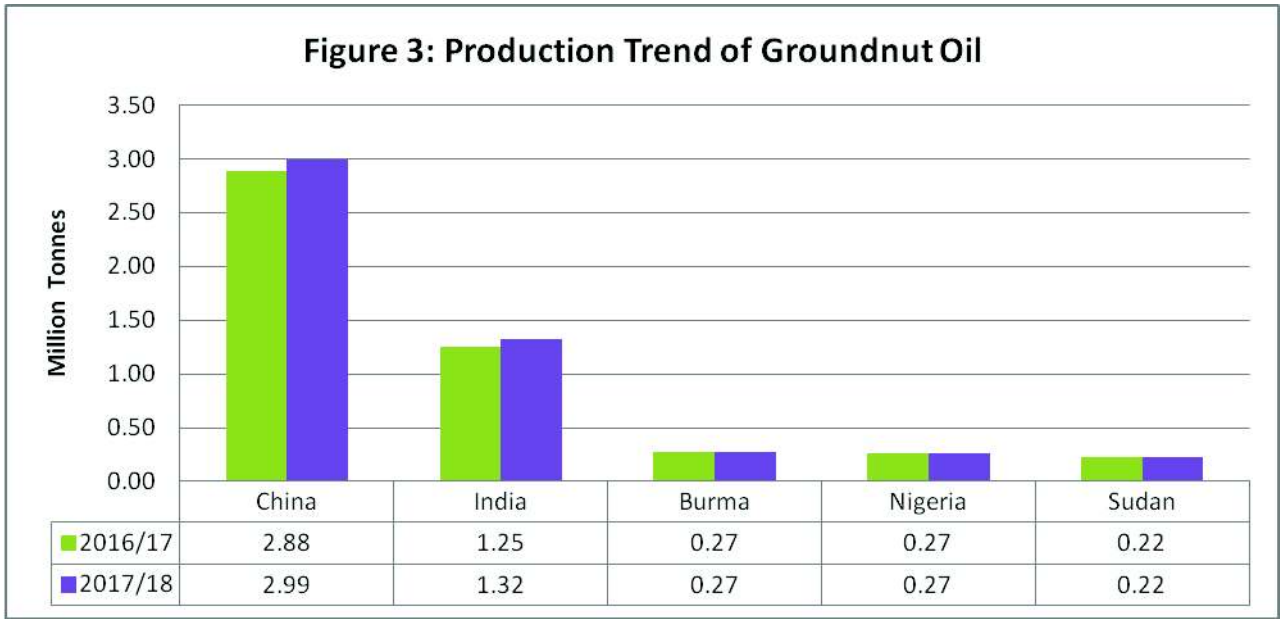
Table 2: Global & Domestic Production, Exporters and Importers of Major edible oil

| Edible oil | Global production (2017-18) | India's production (2017-18) | Major Exporters/ Importers (2017-18) |
|---|---|---|---|
| Ground nut oil | 5.52 | 1.86 | Exporters: Argentina, Brazil, Senegal |
| | | | Importers: China, Italy, USA |
| Mustard oil | 28.35 | 2.34 | Exporters: Canada, Germany, Czech Republic |
| | | | Importers: USA, China, Netherland |
| Sunflower oil | 17.75 | 0.07 | Exporters: Ukraine, Russia, Argentina |
| | | | Importers: India, China, Netherlands |
| Soybean oil | 56.15 | 1.83 | Exporters: Argentina, Brazil, USA |
| | | | Importers: India, Bangladesh, Algeria |
| Palm oil | 69.42 | 0.22 | Exporters: Indonesia, Malaysia, Netherland |
| | | | Importers: India, China, Pakistan |

Source: Global Production: USDA, India's Production: DVVOF, Exporters & Importers: Comtrade

## 5. Global Production Trend of Major Edible Oils

### A) Groundnut oil

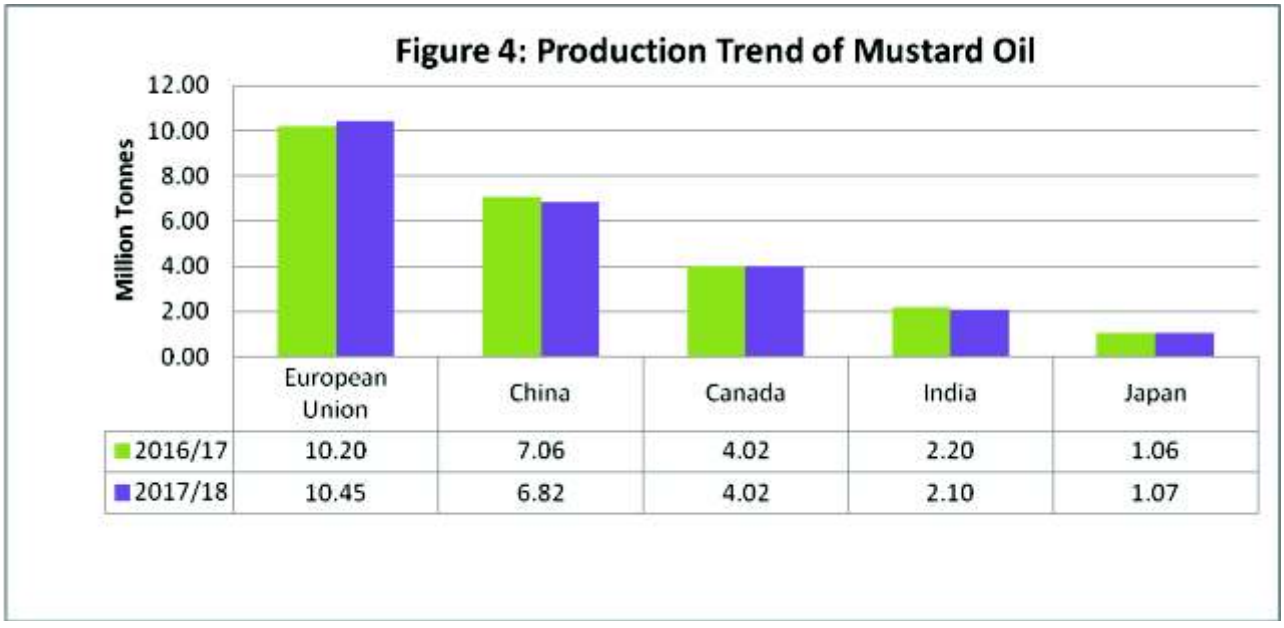



| | China | India | Burma | Nigeria | Sudan |
|---|---|---|---|---|---|
| 2016/17 | 2.88 | 1.25 | 0.27 | 0.27 | 0.22 |
| 2017/18 | 2.99 | 1.32 | 0.27 | 0.27 | 0.22 |

Source: United States Department of Agriculture

- China is expected to be the top producer followed by India and Burma in 2017-18.
- India's share in global production of Groundnut Oil in 2017-18 may be around 23 percent.

### B) Mustard Oil

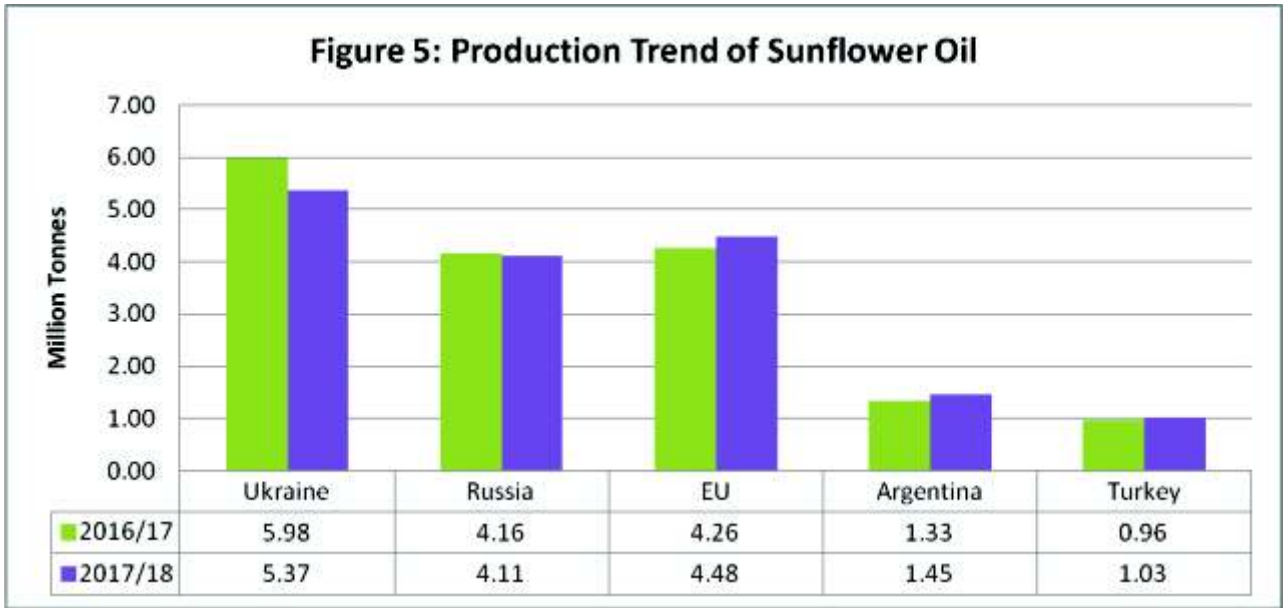



| | European Union | China | Canada | India | Japan |
|---|---|---|---|---|---|
| 2016/17 | 10.20 | 7.06 | 4.02 | 2.20 | 1.06 |
| 2017/18 | 10.45 | 6.82 | 4.02 | 2.10 | 1.07 |

Source: United States Department of Agriculture

- European Union (EU) is expected to be the top producer followed by China and Canada in 2017-18. India may be the fourth largest producer.
- India's share in global production of mustard oil in 2017-18 may be around 8 percent.

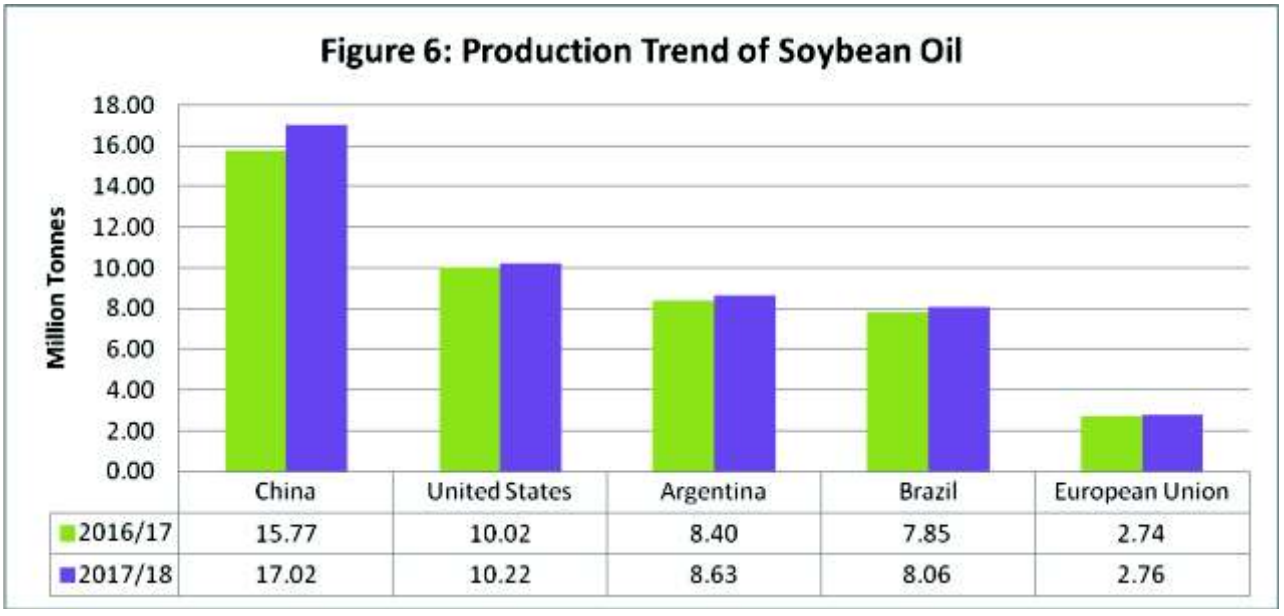
### C) Sunflower oil




Source: United States Department of Agriculture

- Ukraine is expected to be the largest producer followed by Russia and EU in 2017-18.
- India's share in global production of sunflower oil in 2017-18 may be around 4.0 percent.

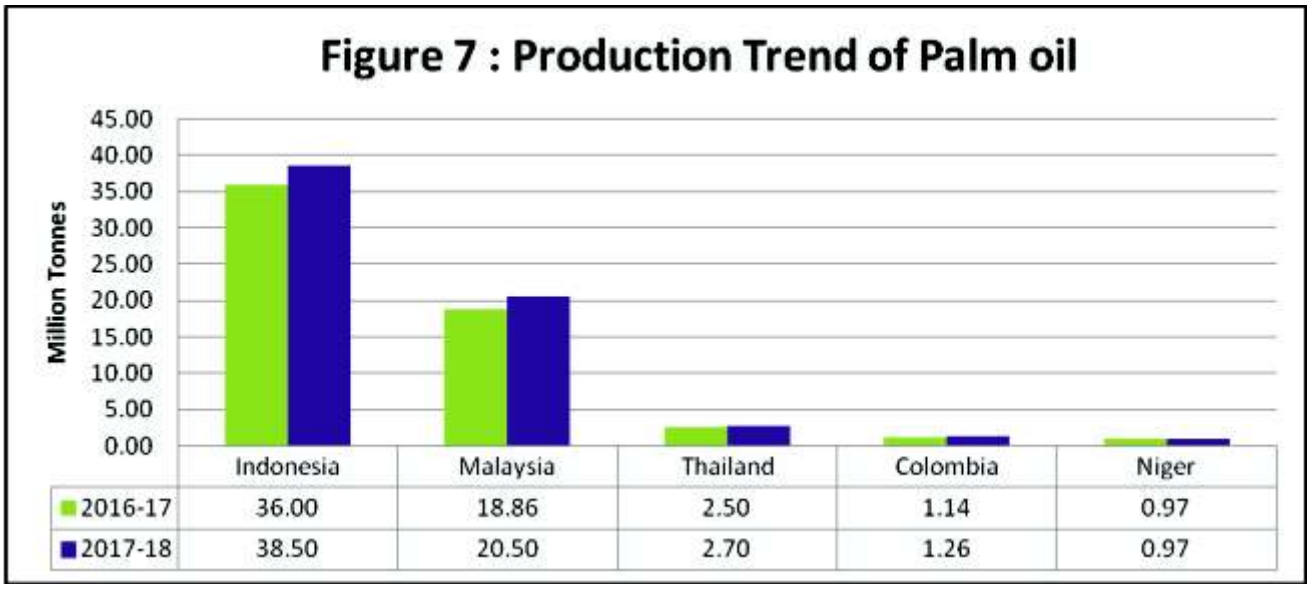
### D) Soybean oil




Source: United States Department of Agriculture

- China, United States, Argentina and Brazil are expected to be the key producers of Soybean oil in 2017-18.
- India's share in global production of Soybean Oil in 2017-18 may be around 3 percent.

### E) Palm Oil



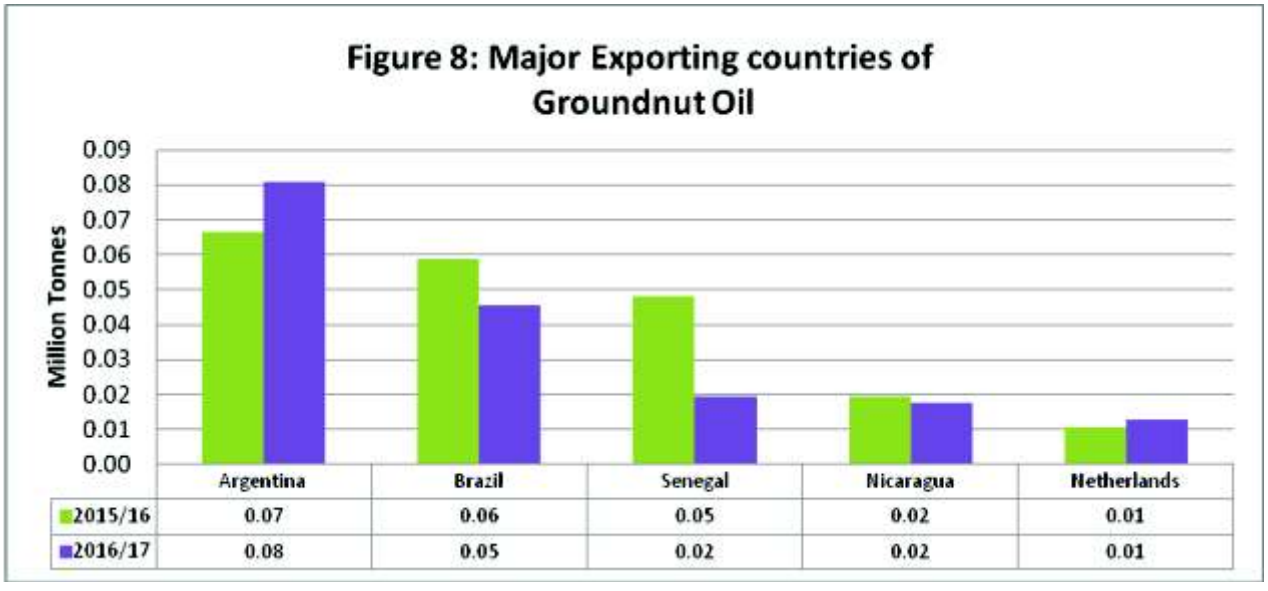

| | Indonesia | Malaysia | Thailand | Colombia | Niger |
|---|---|---|---|---|---|
| 2016-17 | 36.00 | 18.86 | 2.50 | 1.14 | 0.97 |
| 2017-18 | 38.50 | 20.50 | 2.70 | 1.26 | 0.97 |

Source: United States Department of Agriculture

- Indonesia and Malaysia are major Palm oil producers in the world.

## 6. Major Exporting and Importing Countries of Edible Oils

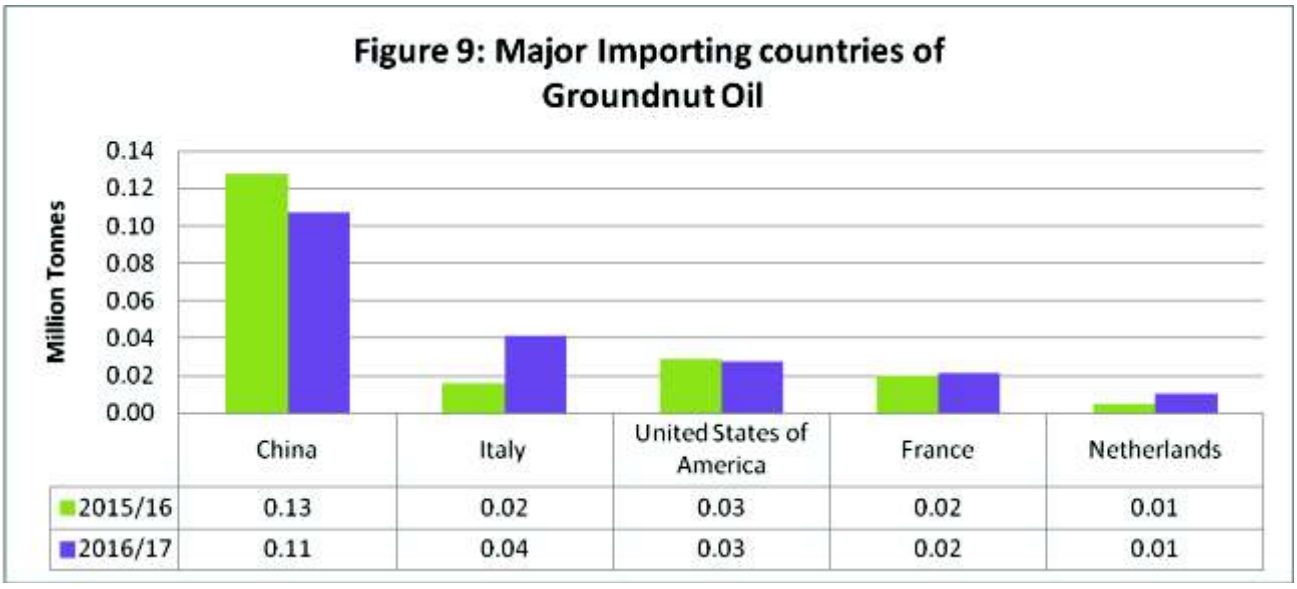
### A. Groundnut oil




| | Argentina | Brazil | Senegal | Nicaragua | Netherlands |
|---|---|---|---|---|---|
| 2015/16 | 0.07 | 0.06 | 0.05 | 0.02 | 0.01 |
| 2016/17 | 0.08 | 0.05 | 0.02 | 0.02 | 0.01 |

Source: Comtrade

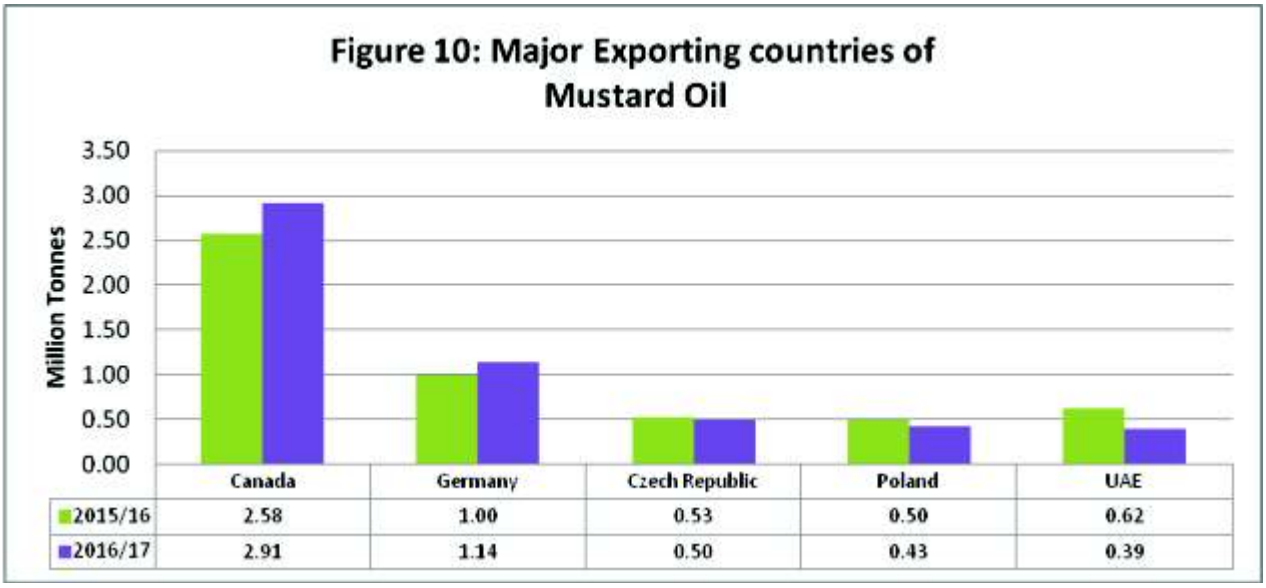
- Argentina and Brazil were the top two exporting countries of Groundnut oil in 2016-17.




Source: Comtrade

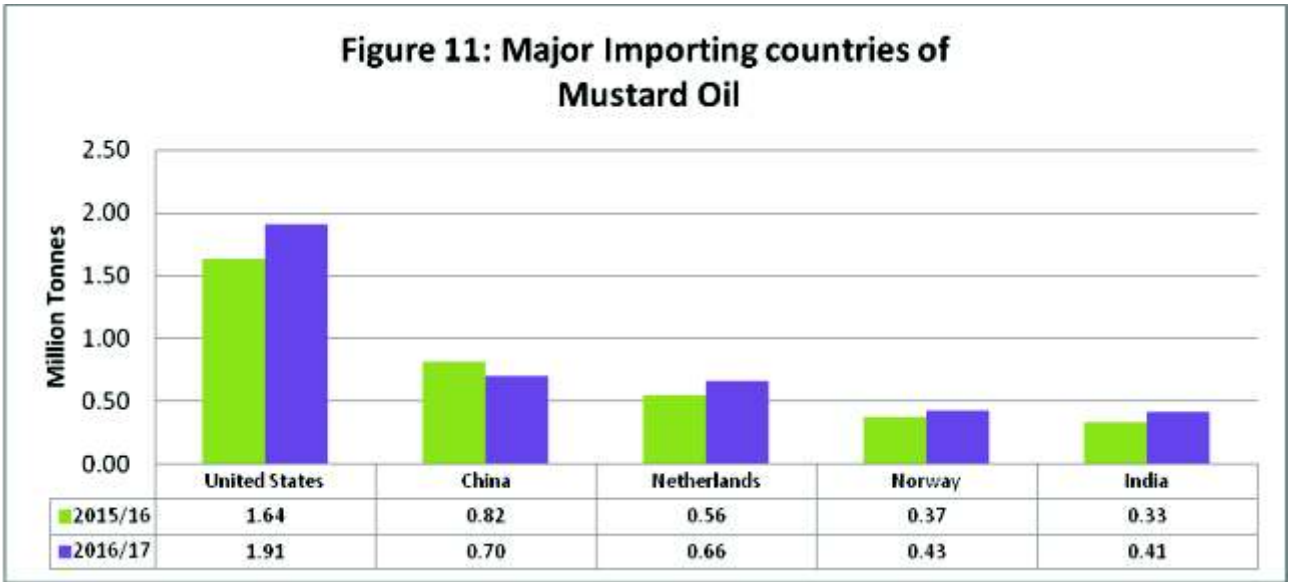
- China and Italy were the major importing country of groundnut oil in 2016-17.

## B. Mustard oil




Source: Comtrade

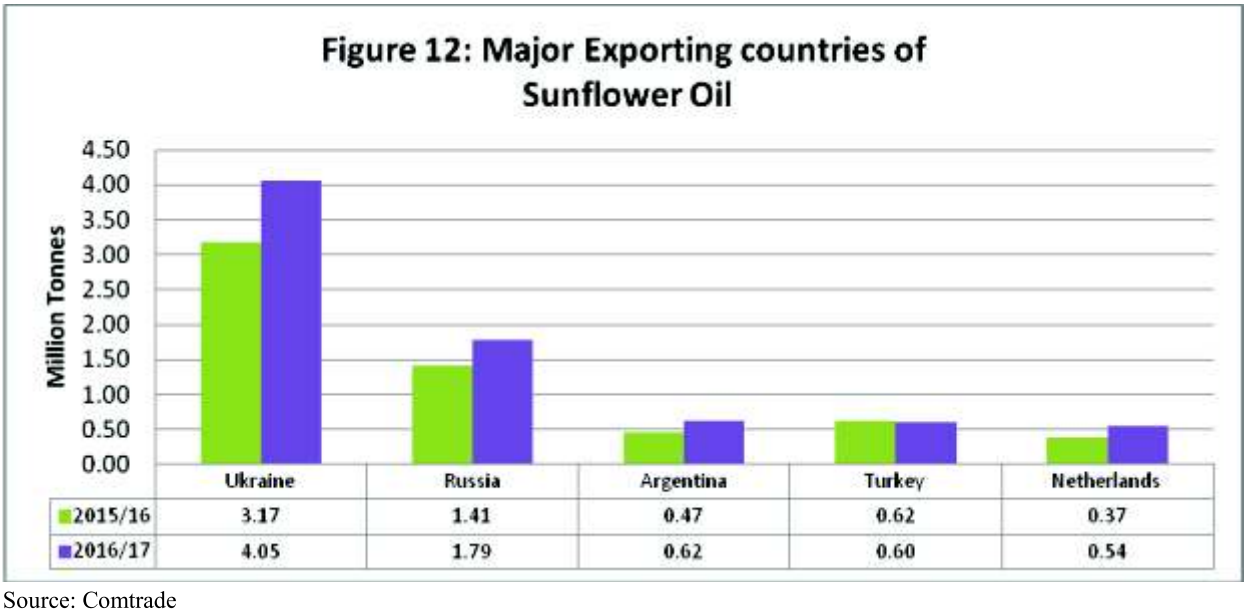
- Canada was the largest exporter of Mustard oil in the world followed by Germany and Czech Republic in 2016-17.




Source: Comtrade

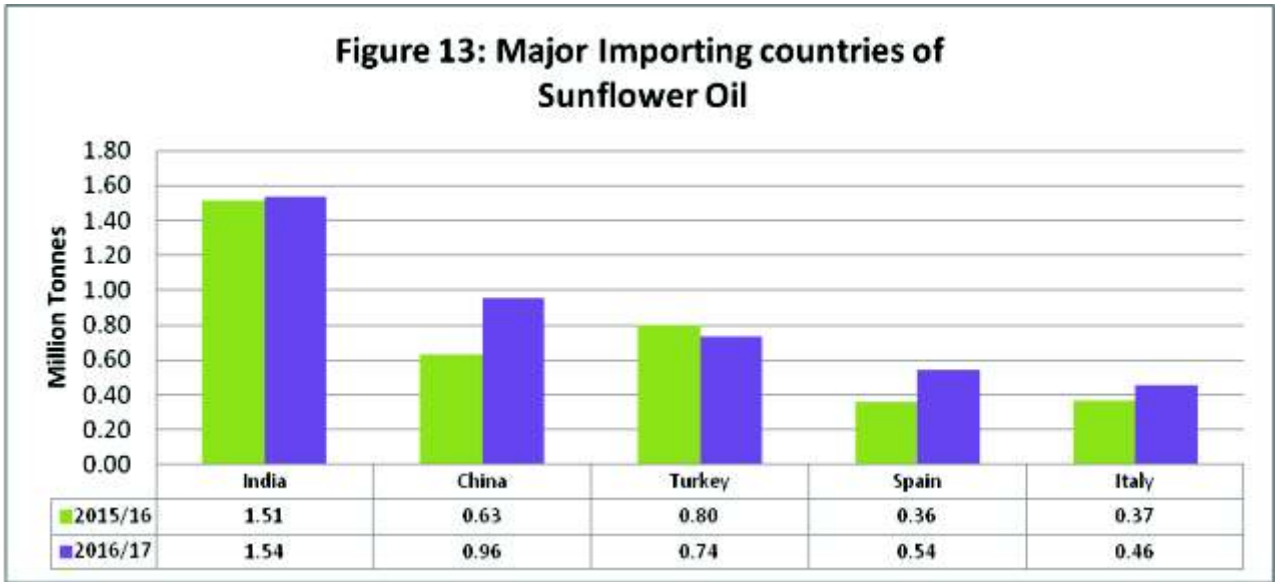
- The USA and China were the leading importing countries of Mustard oil in the world. India was the 5$^{th}$largest importing country in 2016-17.

### C. Sunflower oil




Source: Comtrade

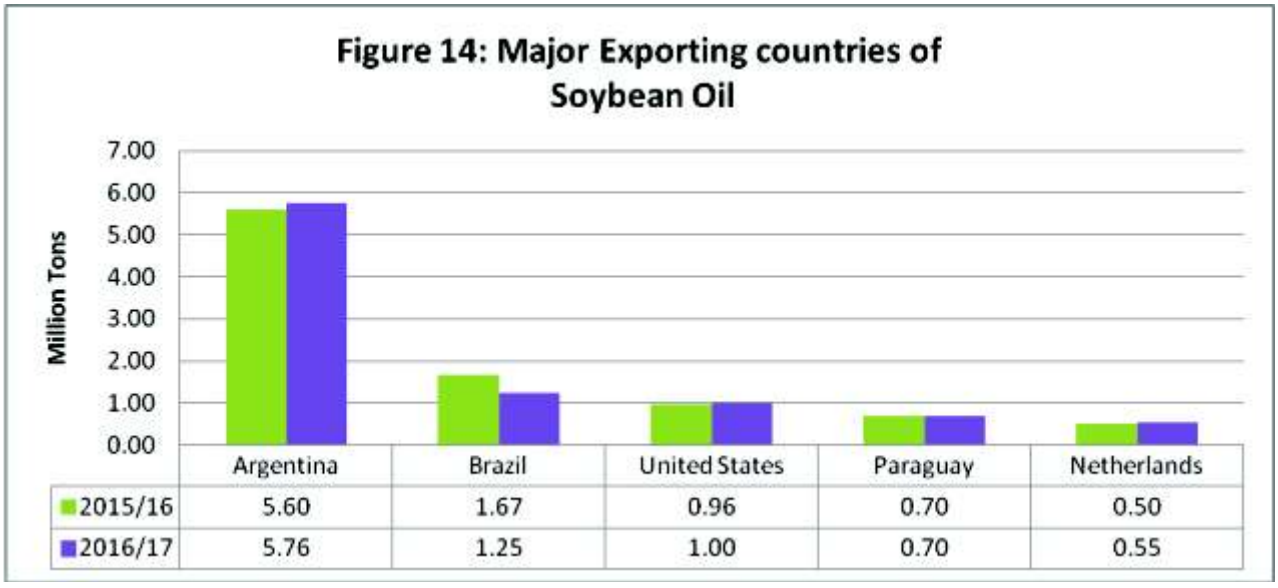
- Ukraine and Russia were the top two global exporters of sunflower oil during 2016-17.




Source: Comtrade

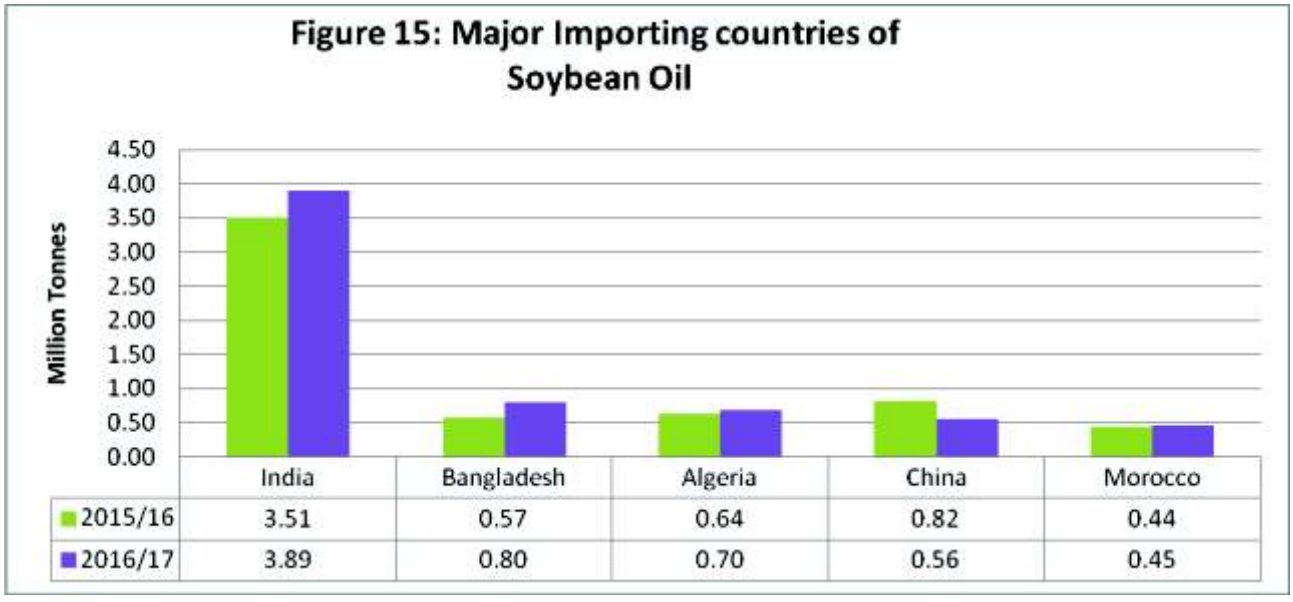
- India was the largest importer of Sunflower oil followed by China, Turkey, and Spain during 2016-17.

### D. Soybean oil




Source: Comtrade

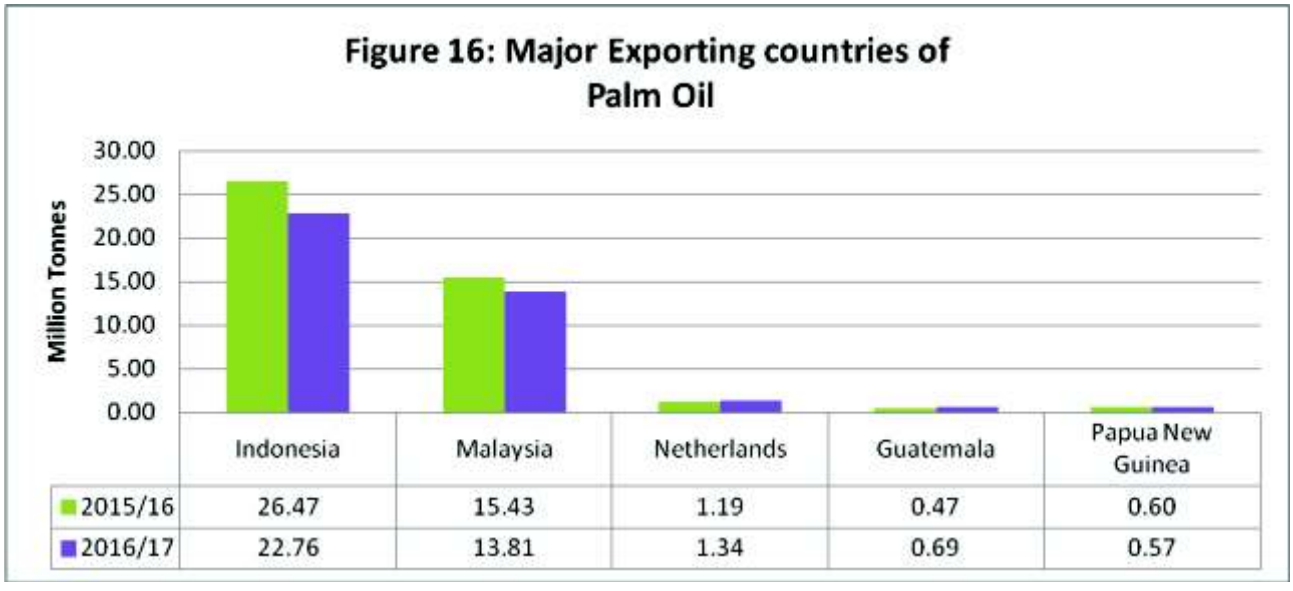
- Argentina was the largest exporting country in the world followed by Brazil, USA, and Paraguay during 2016-17.




Source: Comtrade

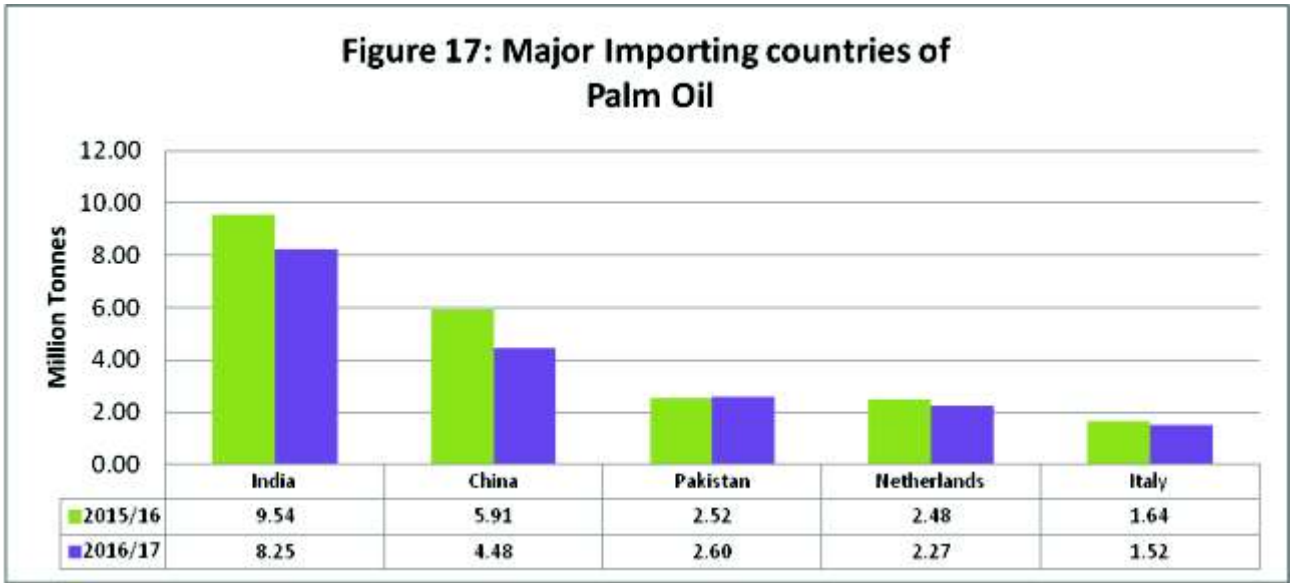
- India was the largest importer of soybean oil that constituted 29.89 percent of the global import in the year 2016-17.

## E. Palm oil




Source: Comtrade

- Indonesia and Malaysia hold both competitive as well as comparative advantage in exportation of Palm oil in the world.




Source: Comtrade

- India is the largest importer of Palm oil in the world followed by China, Pakistan and Netherland.

## 7. India's import of major edible oils

(Qty in lacs Tonnes)

| Table 3:India's Import of Major Edible Oils during 2013-14 to 2017-18 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **Soybean Oil** | | **Palm Oil** | | **Sunflower Oil** | | **all edible oils** | |
| | Crude | Refined | Crude | Refined | Crude | Refined | Crude | Refined |
| 2013-14 | 13.5 | 0.0 | 51.3 | 25.4 | 10.8 | 0.0 | 75.6 | 25.50 |
| 2014-15 | 23.2 | 0.0 | 69.7 | 11.9 | 17.1 | 0.0 | 110.0 | 11.91 |
| 2015-16 | 39.6 | 0.0 | 71.1 | 25.7 | 14.9 | 0.0 | 125.6 | 25.71 |
| 2016-17 | 34.6 | 0.0 | 53.6 | 29.4 | 17.3 | 0.0 | 105.5 | 29.43 |
| 2017-18 | 31.5 | 0.0 | 67.5 | 27.7 | 22.5 | 0.0 | 121.5 | 27.7 |
| 2018-19 (Apr-May) | 5.56 | 0.0 | 8.66 | 3.90 | 5.69 | 0.0 | 19.91 | 3.90 |

Source: Department. Of commerce

(Value in Rs. Crores)

| Table 4:India's Import of Major Edible Oils during 2013-14 to 2017-18 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **Soybean Oil** | | **Palm Oil** | | **Sunflower Oil** | | **all edible oils** | |
| | Crude | Refined | Crude | Refined | Crude | Refined | Crude | Refined |
| 2013-14 | 8308 | 0.05 | 26440 | 12915 | 6882 | 1.62 | 41630 | 12917 |
| 2014-15 | 12908 | 0.11 | 33055 | 5839 | 9552 | 1.07 | 55519 | 5841 |
| 2015-16 | 19419 | 0.50 | 27409 | 10390 | 8323 | 1.04 | 55151 | 10391 |
| 2016-17 | 18703 | 3.8 | 26381 | 14708 | 9791 | 2.41 | 54876 | 14710 |
| 2017-18 | 16488 | 4.2 | 30851 | 12804 | 11857 | 2.66 | 59196 | 12810 |
| 2018-19 (Apr-May) | 2994 | 4.9 | 3901 | 1777 | 3046 | 0.00 | 9941 | 1782 |

Source: Department. Of commerce

- India imports substantial amount of edible oils for its domestic consumption. Among all edible oils importation into India, Palm oil importation share is around 60 percent.

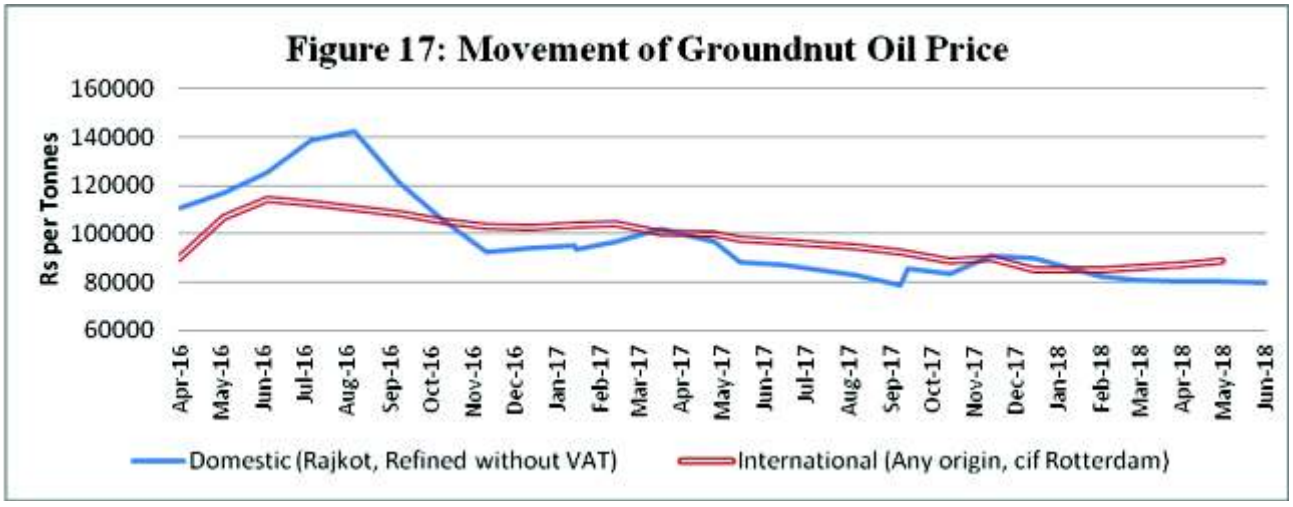
## 8. India's top import sources of Palm, Soya and Sunflower Oils

| Table 5: India's Top Import Sources of Palm, Soya and Sunflower Oils | |
|---|---|
| **Edible Oils** | **Import Source** |
| Soybean Oil | Argentina and Brazil |
| Palm Oil | Indonesia and Malaysia |
| Sunflower Oil | Ukraine and Argentina |

Source: Department of Commerce

## 9. Movement of Domestic and International Edible Oils Prices

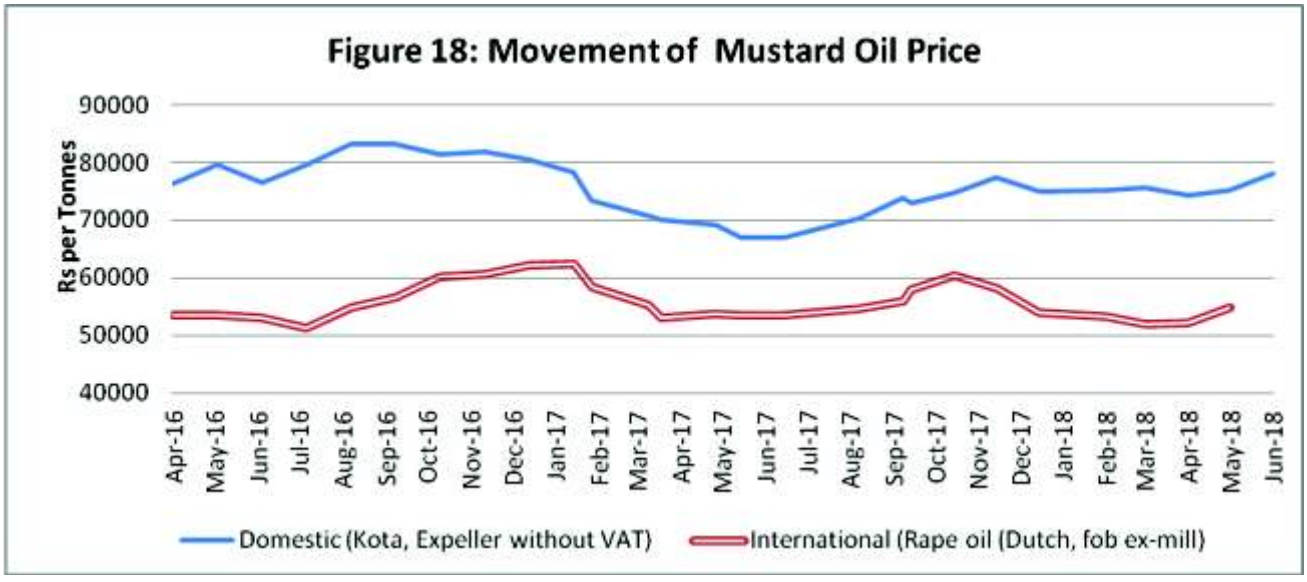
### I. Groundnut oil




Source: Domestic Price Agriwatch and International Price are FAO Prices.

- Domestic prices of Groundnut oil are showing decreasing trend from April, 2017.

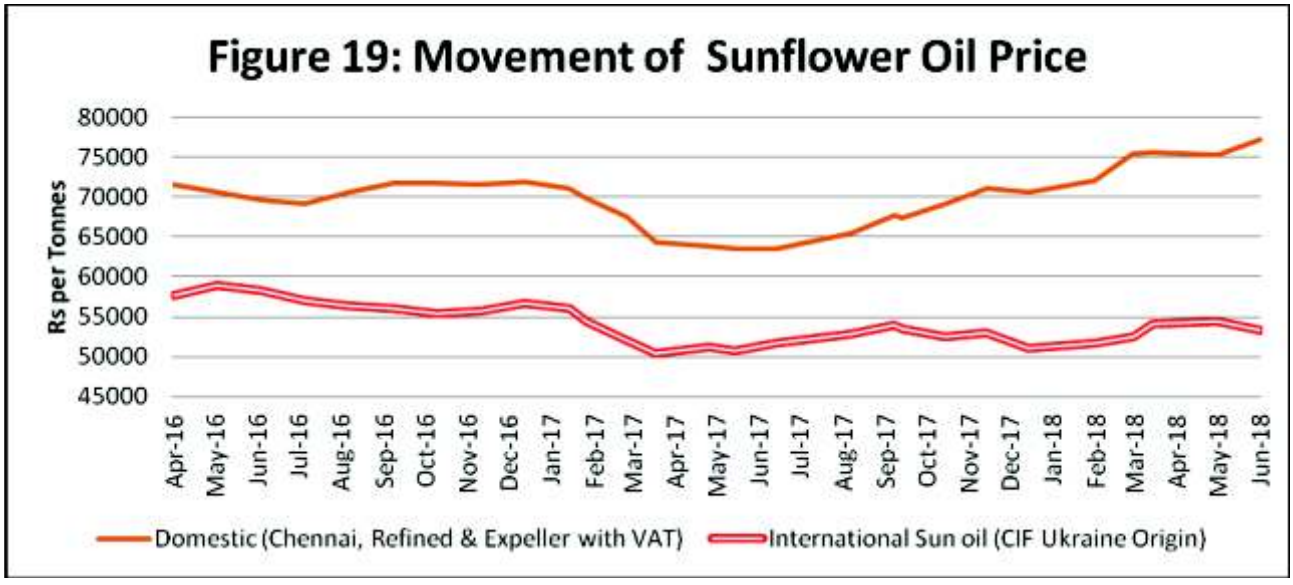
### II. Mustard oil




Source: Domestic Price Agriwatch and International Price are FAO Prices.

- Domestic price of Mustard Oil is higher than that of International prices throughout the years.

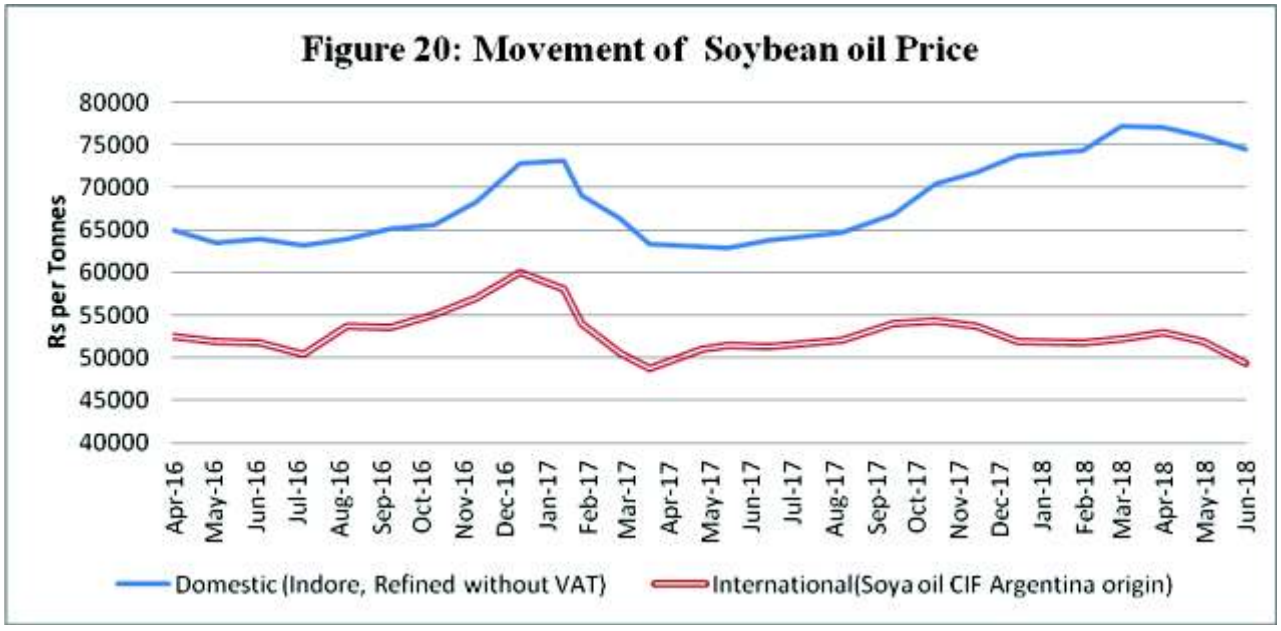
### III. Sunflower oil




Source: Domestic Price Agriwatch and International Price are CIF Ukraine origin Prices.

- Domestic prices of Sunflower oil are higher that International prices throughout.

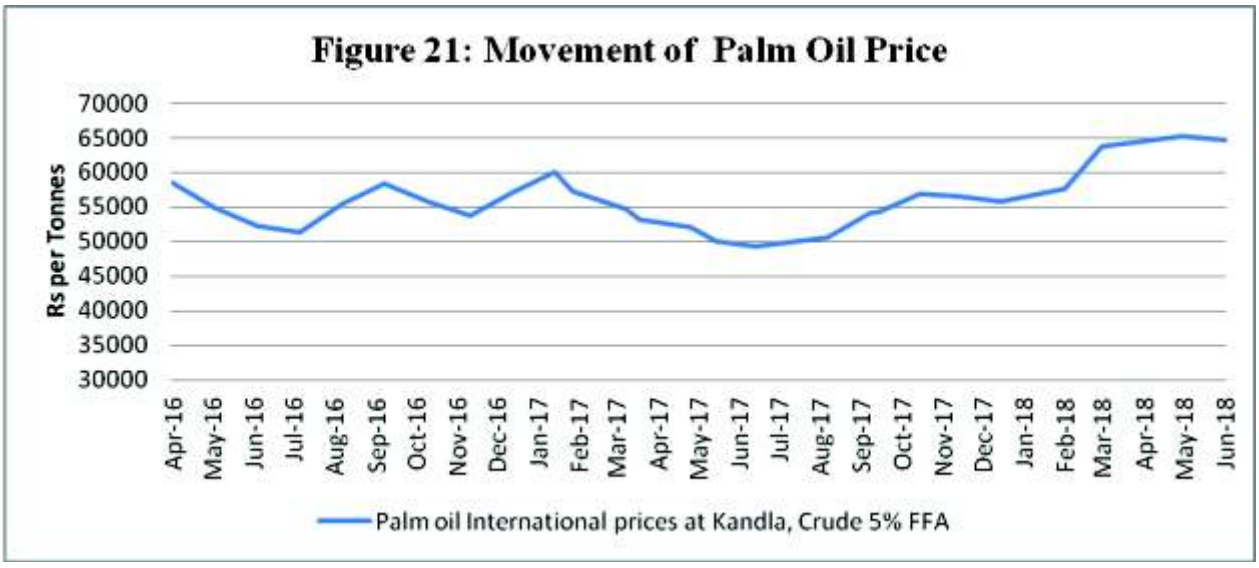
### IV. Soybean oil




Source: Domestic Price Agriwatch and International Price are CIF Argentina origin Prices.

- Domestic price of soybean oil are higher than International prices throughout period.

## V. Palm oil




Source: International landing Price at Kandla, Agriwatch.

- International price of palm oils are showing a positive trend.

## 10. Domestic future prices of Soya bean and Palm oil

Unit: Rs/Quintal

| Table – 6: Soya bean oil future prices | | | | | | | |
|---|---|---|---|---|---|---|---|
| Contract Month | As on 18.07.18 | Week ago 11.07.18 | Month ago 18.06.18 | 3 Months ago 18.04.18 | 6 Months ago 18.1.18 | Year ago 18.07.17 | % Change over previous year |
| July-18 | 7,442 | 7,542 | 7,511 | 7,784 | 7,387 | 6,353 | **17.14** |
| Aug-18 | 7,393 | 7,585 | 7,564 | 7,784 | 7,387 | 6,436 | **14.87** |
| Sept-18 | 7,373 | 7,590 | 7,555 | 7,784 | 7,387 | 6,459 | **14.14** |

Source: National Commodity & Derivatives Exchange Limited

- Domestic future price for Crude Soya bean oil is expected to increase over the previous year.

Unit: Rs/Quintal

| Table – 7: Crude Palm oil future prices | | | | | | | |
|---|---|---|---|---|---|---|---|
| Contract Month | As on 18.07.18 | Week ago 11.07.18 | Month ago 18.06.18 | 3 Months ago 18.04.18 | 6 Months ago 18.1.18 | Year ago 18.07.17 | % Change over previous year |
| July-18 | 6,140 | 6,313 | 6,403 | 6,445 | 5,637 | 4,838 | **26.91** |
| Aug-18 | 6,061 | 6,242 | 6,375 | 6,445 | 5,637 | 4,799 | **26.30** |
| Sept-18 | 6,043 | 6,214 | 6,375 | 6,445 | 5,637 | 4,774 | **26.58** |

Source:Multi Commodity Exchange of India Ltd

- Domestic future price for Crude Palm oil is expected to increase over the previous year.

## 11. International future prices of Soya bean and Crude Palm Oil

Unit: USD/Ton

| Table – 8: Soya bean oil future prices | | | | | | | |
|---|---|---|---|---|---|---|---|
| Contract Month | As on 18.07.18 | Week ago 11.07.18 | Month ago 18.06.18 | 3 Months ago 18.4.18 | 6 Months ago 18.1.18 | Year ago 18.07.17 | % Change over previous year |
| **Aug-18** | 621.04 | 628.75 | 657.85 | 705.25 | 722.23 | 731.27 | **-15.07** |
| **Sept-18** | 623.02 | 630.74 | 661.6 | 708.34 | 723.11 | 733.91 | **-15.11** |
| **Oct-18** | 627.65 | 635.37 | 669.1 | 711.87 | 726.64 | 736.12 | **-14.73** |
| **Dec-18** | 627.65 | 635.37 | 669.1 | 711.87 | 726.64 | 740.53 | **-15.24** |

Source: CME Soybean Oil Prices

- International future prices of Soya bean are expected to decrease over the last year.

Unit: USD/Ton

| Table – 9: Palm oil future prices | | | | | | | |
|---|---|---|---|---|---|---|---|
| Contract Month | As on 18.07.18 | Week ago 11.07.18 | Month ago 18.06.18 | 3 Months ago 18.4.18 | 6 Months ago 18.1.18 | Year ago 18.07.17 | % Change over previous year |
| **Apr-18** | 537.11 | 546.6 | 585.09 | 618.93 | 760.31 | 602.76 | **-10.89** |
| **May-18** | 540.32 | 548.34 | 584.58 | 619.44 | 760.31 | 590.38 | **-8.48** |
| **June-18** | 540.57 | 550.57 | 589.84 | 616.1 | 760.31 | 586.17 | **-7.78** |

Source: BMD Malaysian Palm Oil Prices

- International future prices of Palm oil are to decrease over the last year.

## 12. Trade Policy

### 12.1 Export Policy

At present, export of edible oils is prohibited*. The following exemptions are permitted from prohibition on export of edible oils:

a) Castor oil
b) Coconut oil from all EDI Ports and through all Land Custom Stations (LCS) on Indo-Nepal, Indo-Bangladesh, Indo-Bhutan and Indo-Pakistan borders.
c) Deemed export of edible oils(as input raw material) from DTA to 100% EOUs for production of non-edible goods to be exported
d) Edible oils from Domestic Tariff Area (DTA) to Special Economic Zones (SEZs) to be consumed by SEZ units for manufacture of processed food products, subject to applicable value addition norms
e) Edible oils produced out of minor forest produce, ITC (HS) Code 15159010, 15159020, 15159030, 15159040, 15179010 and 15219020.
f) Organic edible oil subject to export contacts being registered and certified as 'Organic' by Agricultural & Processed Food Products Export Development Authority (APEDA).#
g) Rice Bran oil bulk.**
h) Groundnut oil, Sesame oil, Soyabean oil and Maize (Corn) oil in bulk.##

*i) DGFT's Notification No 22 (RE – 2013)/2009-2014 dated 18 June, 2013)

ii) Export of edible oils in branded consumer packs of upto 5 Kgs is permitted with a Minimum Export Price of USD 900 per MT(vide DGFT's Notification No. 108 (RE–2013)/2009-14 dated 6th Feb, 2015)

iii) The prohibition will not apply to export of Peanut Butter, ITC (HS) Code 15179020.
(Source: DGFT)

** iv) Bulk export of rice bran oil is allowed vide DGFT's notification no. 17/2015-20 dt 6th Aug 2015.

## (v) DGFT's Notification No. 43/2015-2020 dated 27th March, 2017.

# (v) DGFT's Notification No. 3/2015-2020 dated 19th April, 2017.

### 12.2 Import Duty - Bound Duty, Standard Duty and Current Applied Duty

**Table 10: Bound Duty, Standard Duty and Current Applied Duty**

| HS Code | Description | Bound Duty | Standard Duty | Current Applied Duty# |
|---|---|---|---|---|
| 15071000 | Soya- bean Crude Oil | 45 | 45 | 35^ |
| 15079010 | Soya- bean Edible grade | 45 | 45 | 45^ |
| 15079090 | Soya- bean Other | 45 | 45 | 45^ |
| 15081000 | Groundnut oil crude | 300 | 100 | 35^ |
| 15089010 | Groundnut oil Deodorized | 300 | 100 | 45^ |
| 15089091 | Groundnut edible Grade | 300 | 100 | 45^ |
| 15089099 | Groundnut oil Other | 300 | 100 | 45^ |
| 15091000 | Olive oil virgin | 45 | 45 | 35^ |
| 15099010 | Olive Edible grade | 40 | 40 | 40^ |
| 15099090 | Olive Edible Other | 40 | 40 | 40^ |
| 15111000 | Palm Crude Oil | 300 | 100 | 44# |
| 15119010 | Other refined bleached palm oil | 300 | 100 | 54# |
| 15119020 | Other refined bleached Palmolein | 300 | 100 | 54# |
| 15119090 | Other refined palm oil | 300 | 100 | 54# |
| 15121110 | Crude sunflower-seed oil | 300 | 100 | 35^ |
| 15121120 | Crude safflower oil | 300 | 100 | 35^ |
| 15121910 | Sunflower oil edible Grade | 300 | 100 | 45^ |
| 15121920 | Sunflower oil Non-edible | 300 | 100 | 45^ |
| 15121930 | Saffola oil Edible | 300 | 100 | 45^ |
| 15121940 | Saffola Oil Non edible | 300 | 100 | 45^ |
| 15121990 | Saffola Oil Other | 300 | 100 | 45^ |
| 15122100 | Cotton Seed oil Crude | 300 | 100 | 35^ |
| 15122910 | Cotton Seed oil Edible | 300 | 100 | 45^ |
| 15122990 | Cotton Seed oil Other | 300 | 100 | 45^ |
| 15131100 | Crude coconut oil | 300 | 100 | 35^ |
| 15131900 | Other coconut oil | 300 | 100 | 45^ |
| 15141110 | Low erucic Colza oil | 75 | 75 | 35^ |
| 15141120 | Low erucic rape oil | 75 | 75 | 35^ |

| | | | | |
|---|---|---|---|---|
| 15141190 | Low erucic other oil | 75 | 75 | 35^ |
| 15141910 | Refined colza oil of edible grade | 75 | 75 | 45^ |
| 15141920 | Refined rapeseed oil of edible grade | 75 | 75 | 45^ |
| 15141990 | Refined other rapeseed & Colza oil of edible grade | 75 | 75 | 45^ |
| 15149110 | Crude other Colza oil | 75 | 75 | 35^ |
| 15149120 | Crude other mustard oil | 75 | 75 | 35^ |
| 15149190 | Crude other Rapeseed oil | 75 | 75 | 35^ |
| 15149910 | Refined other colza oil of edible grade | 75 | 75 | 45^ |
| 15149920 | Refined other mustard oil of edible grade | 75 | 75 | 45^ |
| 15149930 | Refined other rapeseed oil of edible grade | 75 | 75 | 35^ |
| 15149990 | Refined other oil | 75 | 75 | 45^ |
| 15151100 | Linseed oil Crude | 300 | 100 | 35^ |
| 15151910 | Linseed oil Edible | 300 | 100 | 45^ |
| 15151910 | Linseed oil other | 300 | 100 | 45^ |
| 15153010 | Castor Oil Edible | 100 | 100 | 45^ |
| 15153090 | Castor Oil Other | 100 | 100 | 45^ |
| 15155010 | Seasame oil Crude | 300 | 100 | 35^ |
| 15155091 | Seasame oil Edible | 300 | 100 | 45^ |
| 15155099 | Seasame oil Other | 300 | 100 | 45^ |

Source: DGFT, Department of Revenue, Government of India and World Trade Organisation (WTO)

# Current Applied Duty on Crude Palm has been increased from 30% to 44% and on refined Palm oil from 40% to 54% by Department of Revenue vide Notification No. 29/2018-Customs dated 01.03.2018.

^Current Applied Duty on Crude sunflower oil has been increased from 25% to 35%, refined sunflower oil from 35% to 45%, refined olive oil from 35% to 40%, from 30% to 35% on crude groundnut oil, olive oil, other oils obtained solely from olive oil, Soyabean oil, safflower oil, cotton seed oil, coconut oil, palm kernel oil or babassu oil, rapeseed oil, colza oil, mustard oil, linseeds oil, maize (corn) oil, castor oil, seasame oil and other fixed vegetable fats & oils and its fractions and from 35% to 45% on refined groundnut oil, other oils obtained solely from olive oil, Soyabean oil, safflower oil, cotton seed oil, coconut oil, palm kernel oil or babassu oil, rapeseed oil, colza oil, mustard oil linseeds oil, maize (corn) oil, castor oil, seasame oil and other fixed vegetable fats & oils and its fractions by Department of Revenue vide Notification No. 47/2018-Customs dated 14.06.2018.

## 13. Significant Changes for the month: NIL

**Disclaimer:** The information and opinions contained in the document have been compiled from various sources believed to be reliable. This Department will not be liable for any losses and damages in connection with the uses of the information provided in the commodity profile.

# Health News

## Eating walnuts, soybean can ward off diabetes risk

Eating a diet rich in omega-6 polyunsaturated fats, particularly found in walnuts, fish, soybean and sunflower oils, can significantly reduce a person's risk of developing Type-2 diabetes, suggests a recent study.

These findings shed a new light on the potential health benefits of omega-6, which is found in bean and seed oils such as soybean and sunflower oils and in nuts, and support clinical recommendations to increase dietary intake of omega-6 rich foods.

The results indicate that the individuals, who had the highest blood level of linoleic acid, the major omega-6 fat, were 35 per cent less likely to develop Type-2 diabetes in the future than those who had the least amount.

Lead author Dr. Jason Wu from The George Institute for Global Health in Sydney said that a simple change in diet might protect people from developing Type-2 diabetes, which has reached alarming levels around the world.

Senior study author Dariush Mozaffarian from the Tufts University in Massachusetts stated that the people involved in the study were generally healthy and were not given specific guidance on what to eat. Yet those who had the highest levels of blood omega-6 markers had a much lower chance of developing Type-2 diabetes.

The team analysed data from 20 studies involving 39,740 adults from 10 countries, in whom 4,347 new cases of diabetes occurred over time.

They tested the participants for two key omega-6 markers - linoleic acid and arachidonic acid.

Linoleic acid was associated with lower risk, while levels of arachidonic acid were not significantly associated with either higher or lower risk of diabetes.

Dr. Wu noted that they the major omega-6 fat is linked to lower risk of Type-2 diabetes.

Linoleic acid is not formed in the body and can only be obtained from the diet.

The results suggest that eating foods rich in linoleic acid may lower risk of Type-2 diabetes.

The research appeared in the Lancet Diabetes and Endocrinology journal.

Courtesy: Newkerala.com

## Oil in Salads increases absorption of Nutrients:

Because nutrients in food work synergistically, eating a combination of certain foods is often more beneficial than eating them alone, and such is the case with drizzling oil over your salad. The oil boosts the absorption of eight micronutrients, according to new research published in the American Journal of Clinical Nutrition.

The best way to explain it would be to say that adding twice the amount of salad dressing leads to twice the nutrient absorption.

While soybean oil was used in the study, olive oil would be a better choice because of the numerous health benefits associated with it.

Lead author Wendy White, an associate professor of food science and human nutrition also found that eating a salad without oil reduced the likelihood that the nutrients in the vegetables would be absorbed.

The eight nutrients involved are needed for good health. They include four carotenoids: alpha-carotene, beta-carotene, lycopene, and lutein. The remaining three are vitamin K and two forms of vitamin E.

The oil also aided in the absorption of vitamin A, which is made in the intestines from alpha and beta-carotene. Increased absorption of the nutrients produces important wellness advantages such as vision preservation and cancer prevention.

Absorption of the nutrients correlated with the amount of oil added to the salad. This means that the more oil used, the better the nutrients were absorbed.

“The best way to explain it would be to say that adding twice the amount of salad dressing leads to twice the nutrient absorption,” White said.

Despite the findings, consumers shouldn’t drench their greens with dressing, White cautioned. Instead, she recommends following the U.S. dietary guideline of including two “ table spoons of oil per day” in the diet.

In the study, 12 college-age women ate salads with different amounts of soybean oil, which is a standard ingredient in salad dressings. Afterwards, the levels of nutrients in their blood were measured to determine how much was absorbed. The results showed those who consumed the most oil, which was a little over two tablespoons, absorbed the maximum amount of nutrients.

“For most people, the oil is going to benefit nutrient absorption,” White said. “The average trend, which was statistically significant, was for increased absorption.”

Although the study clearly showed that drizzling oil over salads presents an advantage, soybean oil may not be the best choice. According to Joseph Mercola, noted natural health practitioner, olive oil would be far more

healthful. He warns that soybean oil contains highly processed omega-6 fatty acids, which promote inflammation, the condition underlying most chronic disease.

Conversely, olive oil, a fat rich in antioxidants and important vitamins, has anti-inflammatory properties and may reduce the risk of chronic diseases like cardiovascular disorders and diabetes. In addition, since olive oil is also associated with weight loss, even dieters can pour a liberal amount over their greens.

Courtesy: Olive oil Times

## Microalgae: A tiny ingredient packing a macro punch for food makers

Today's food menu is receiving a partial makeover from an unlikely source. Breakfast staples, beverages, snacks and other food items are being enhanced by the nutritional power-packed punch coming from a tiny single-celled organism known as microalgae.

Take a closer look at food and beverage labels and chances are microalgae will show up in one form or another. It's become a major player in the food revolution due to its impressive nutritional profile. Microalgae are loaded with ascorbic acid, protein and omega-3 fatty acids — all areas sought after by consumers who are looking to eat healthier and more natural foods.

The market for micoalgae oil alone was estimated to be worth about $1.38 billion in 2015, according to the most recent data from Grand View Research. The oil is among the most popular uses for the ingredient. In addition, varieties high in DHA omega-3 fatty acids are found in some infant formula and supplements — particularly for pregnant women — as well as certain food items for adults.

As more companies use microalgae in their products, sales are expected to grow rapidly. The global market for the single-celled organism is forecast to reach $44.7 billion by 2023 — growing at a CAGR of more than 5.2% from 2016-2023, according to a recent report from Credence Research.

Big name food manufacturers have already incorporated microalgage into their products. Mondelez is using it in some baking items, while Dean Foods' Horizon Organics milk line has omega-3s in the form of algal oil. Even Mars is reportedly considering whether to use algae-derived colors for some of its candy and gum products.

“With accelerating consumer interest in healthier eating, people like to talk about the hottest new superfood, but it all starts with algae,” Jonathan Wolfson, executive chairman of algae food products company TerraVia, told Food Business News. "Before there were foods like chia, acai, kale or quinoa, there was algae. Nothing can be more heirloom, more ancient or more original."

### Wide range of products

Microalgae can be made into powder, oil, butter and flour. It can be incorporated into all types of food products — baked goods, burgers, beverages, ice cream, infant formula or snacks. The additive also can be consumed by itself, or with other ingredients to enhance flavor.

As one example, TerraVia's AlgaVia algal flour can replace dairy fats, vegetable fats and egg yolks, resulting in products that are lower in saturated fat, calories and cholesterol. The flour is already being added to non-dairy creamers, powdered beverages and gluten-free baked goods commercially available in the U.S.

TerraVia, which recently was purchased out of bankruptcy by biotechnology company Corbion, was unable to comment in time for this story, citing the closing of the transaction.

Microalgae also has the advantage of being allergy friendly, enabling brands such as Mondelez's Enjoy Life Foods to use it in its brownie and other baking mixes in place of soy, peanuts or eggs.

“Algae is the most sustainable protein available on Earth,” Joel Warady, chief marketing officer for Enjoy Life Foods, told Food Dive. We added it "into a line of baking mixes. We’re still providing an indulgent dessert, but marrying functionality into this indulgence. We look at that as true innovation.”

Microalgae butter could be showing up on store shelves after TerraVia received a generally recognized as safe letter from the Food and Drug Administration in March. The plant-based product, a joint venture between TerraVia and Bunge, is being marketed as faster to melt, easier to spread, having a neutral taste and being free from palm oil — enabling it to contain half the saturated fat.

"We believe our product delivers the same or better performance than other structuring fats including shea stearin and cocoa butter and offers superior nutrition and sustainability attributes," he told Food Navigator.

### Is something fishy going on?

Some U.S. consumers may shy away from buying products containing algae due to the perception that it will smell or taste fishy, but today's developers and manufacturers say they have solved that problem by limiting oxidation. Algae oil goes through a deodorizing procedure using nitrogen gas and nitrogen liquid to remove all oxygen during processing.

"Like baking soda in the refrigerator," Philip Bromley, CEO of California-based Virun Nutra-BioSciences, told Food Dive. "You can remove the bad flavor and get fresh oil."

Microalgae is even more valuable because of its environmentally friendly characteristics. Bromley credits

microalgae's sustainability to the controlled growth that's possible, comparing it to that of a sourdough starter. Researchers can create one tank with a sugar source, water and the actual organism, which then keeps growing and expanding — even if it's split up and moved to different locations — where the process continues.

Algal oil has several advantages compared to palm oil, which is commonly found in baked goods, margarine and ice cream. The ingredient is not linked to deforestation, habitat destruction, climate change and indigenous rights abuses in the countries where it's produced. Algal oil also is far more productive — producing about 70,000 pounds of oil per acre compared to palm oil's 4,465 pounds per acre.

Another environmental benefit is that microalgae can be grown without the use of chemicals, according to Ben Kelly, who is a co-founder of Algarithm, an algal oil firm based in Saskatchewan, and business development manager for POS Bio-Sciences.

## Is it good for you?

Microalgae has many backers who claim it has beneficial nutritional properties. Probably the best-known type of microalgae, spirulina, contains 60-70% complete protein, meaning it possesses all eight amino acids and 10 non-essential ones that support good health. In dried form, a single teaspoon of spirulina powder is loaded with 4 grams of protein and only 20 calories, putting it in the running to be "the single most nutritious food on the planet," according to Joe Leech, an Australian dietitian who writes for Heathline.com.

Other benefits are much more anecdotal. Bromley said he takes 1,500 mg of DHA omega-3 derived from microalgae every day and no longer has eczema. Other advocates contend it aids in weight loss, boosts heart health, reduces inflammation and lowers cholesterol.

Omega-3s are arguably one of the most scientifically studied nutrients out there, Kelly noted. However, researchers say challenges remain to quantify the benefits and understand how harvesting, storing and food processing techniques impact algae's nutritive value.

But for now, microalgae has found a niche in helping pregnant womenbecause omega-3 fatty acids are considered critical for fetal neurodevelopment. Fish and other seafood are a major dietary source of these fatty acids, but pregnant women are advised not to eat more than two or three servings per week. That opens the door for other food sources that provide similar health benefits.

## More products on the way

More innovative microalgae products are poised to enter the market in the coming years, illustrating the continued interest and investment in the nutrient.

New Wave Foods has a plant- and algae-based "shrimp" product that it is rolling out to foodservice operators with the hope of expanding it into retail outlets in northern California and Nevada early next year. The San Francisco company also is developing products to take the place of lobster, crab and fish fillets. In addition, French startup Algama will soon introduce in the U.S. its line of low-fat vegan mayos made with microalgae under The Good Spoon label.

Hugo Lercher, a partner and sales officer with Algama, told Food Dive his company already is partnering with the U.K. foodservice firm Compass Group and French retailer Carrefour on the European launch. It expects the product to be in New York City before the end of the year.

"These are the first-ever vegan mayos made from microalgae. They are also low in fat and incredibly unctuous," Lercher said.

Algama's leading product — an antioxidant drink made with spirulina called Springwave — attracted an investment of 3.5 million Euro (about $4.1 million) last year from Hong Kong billionaire Li Ka-shing. The company plans to release the blue-colored beverage in the U.S. in 2018.

Many predict that food and beverage products containing microalgae will continue to appear in the U.S. and other markets. While broad consumer acceptance may remain elusive, manufacturers and their investors are betting it will grow over time. The hope is that familiarity, education and creative marketing about the perceived advantages microalgae can bring to human health will attract more consumers and businesses to the space.

Lercher said his company's long-term vision is to help address the problem of feeding the planet. For now, the French company's mission is to provide more people with better food, which is where microalgae come in.

"Our food system is broken and we need to take action," he told Food Dive in an email. "Amongst other diseases, obesity and diabetes are growing in developed and non-developed countries. In this context, Algama is pioneering a sector of the future: microalgae. A unique, abundant and sustainable super food brought into delicious daily foods."

Courtesy: Food Dive

## Alternative Milk:

That almond milk latte may be delicious, but a study just published in theJournal of Food Science and Technology suggests that the trendy beverage also has some drawbacks. When researchers compared the nutritional profiles of four popular “alternative” milks, they found that soy milk came out on top—and that almond, rice and coconut “milks” all lacked essential nutrients important

for overall health.

Plant-based "milks" are often marketed as wholesome and appropriate substitutes for the real thing. To find out if these claims measured up, scientists at McGill University in Canada studied the nutrition labels of several unsweetened almond, soy and rice milks, plus coconut dairy-free beverages, on grocery-store shelves.

Cow's milk, the researchers say, is still the most complete and balanced source of protein, fat and carbohydrates. Soy milk, a popular alternative option for more than four decades, was found to be the most comparable to cow's milk in terms of overall nutrient balance. It's also the highest in protein of all the alternative milk options studied, with about 7 to 12 grams (and about 95 calories) per 8-ounce serving.

Soy milk also contains phytonutrients known as isoflavones, which have been shown to have cancer-fighting properties. It's not a perfect substitute, though; some people complain about its "beany flavor," the authors wrote, and some scientists have expressed concerns about "anti-nutrient" substances naturally found in soy, like phytic acid, which can make it harder for the body to absorb and digest important vitamins and minerals.

Almond milk, on the other hand, is low in calories (about 36 per serving) and rich in monounsaturated fatty acids. Getting more of these healthy fats may be beneficial to weight loss and weight management, the authors wrote, and they have also been shown to reduce LDL—or "bad"—cholesterol. But almond milk is also low in protein and carbohydrates, making it less nutritionally balanced than cow or soy milk.

Meanwhile, dairy-free coconut beverages have no protein. And although it's low in calories (about 45 per serving), most of that energy comes from saturated fat. On the plus side, the report states, drinking this type of beverage has been associated with increases in HDL—or "good"—cholesterol and reductions in LDL cholesterol.

Sweet-tasting rice milk can serve as an alternative for people with allergies to soybeans and almonds, but it's high in calories (133 per serving) and relatively low in beneficial nutrients. Research suggests that "consumption of rice milk as an alternative to cow's milk without proper care can result in malnutrition," the authors wrote, "especially in the case of infants."

Cow's milk, by comparison to the dairy alternatives, contains about 158 calories per 8-ounce serving, along with 8 grams of protein, 9 grams of fat (5.5 of it saturated fat), and 11.5 grams of carbohydrates. That's the "perfect composition of nutrients" for baby cows, the authors wrote in their paper, and it's similar to the composition of human breast milk.

Milk is also an important source of vitamins and minerals—including calcium, which the body needs for bone health, especially during childhood and adolescence. Most milk substitutes are fortified with calcium to mimic the levels in cow's milk, although the authors point out that "further research is needed to establish the consequences of added calcium in the human body."

So why the need for alternatives? For one, dairy is one of the most common allergens among infants and children. Between 2% and 4% of children have a milk allergy (that's more than peanuts or tree nuts), although as many as 80% may outgrow them by age 16. Plus, milk—especially raw, unpasteurized milk—has been linked to outbreaks of pathogens such as salmonella and E. coli around the world, suggesting that it's not always the safest beverage for children or for adults.

Then there's the issue of lactose intolerance. Somewhere between 15% and 75% of adults—depending on race, food habits and gut health—lack sufficient amounts of the enzyme needed to properly digest dairy products, according to the report. It's even been estimated that up to 80% of people of African origin, and up to 100% of people of Asian and Indigenous American origin, are lactose intolerant.

Finally, while studies suggest that dairy products—even full-fat versions—can be a healthy part of a balanced diet, some people may not want to overdo it on high-calorie, high-fat cow's milk. For all of these reasons, the authors say, consumers should know how popular milk substitutes compare.

"It is quite clear that nutritionally soy milk is the best alternative for replacing cow's milk in human diet," they concluded in their paper.

They acknowledge, though, that more people may enjoy the flavor of almond milk. Those who choose the latter should make sure they're getting enough essential nutrients, like carbs and protein, through other sources in their diet, they write.

That should be easy enough for adults, says lead author Sai Kranthi Kumar Vanga, a PhD candidate in McGill's department of bioresource engineering, since they can also get protein from meats, nuts and beans, and healthy fats from sources such as olive oil. It can be more difficult, he adds, for babies and young children with dairy allergies. "Parents have to monitor their diet and provide them with appropriate alternatives for the lost nutrients, which is not easy," he wrote in an email.

And while swapping out a few tablespoons of milk in your coffee every day won't make a big difference in overall nutrition, Vanga says there could be implications for adults who consume considerably more milk—like every morning with their cereal. "Just replacing your cow's milk with one of the plant-based milks and assuming it's fulfilling the nutritional requirement could lead to health complications in the long run," he says.

Courtesy: Time

# Fatty acids profile and stability of Camelina (Camellna saliva] seed oil as affected by extraction method and thermal oxidation

Camelina (Camelina saliva) seed oil was extracted using two different methods including hexane extraction to obtain hexane-extracted oil (HEO) and cold pressing extraction to obtain cold-pressed oil fCPO). The major tatty acid was linolentc acid (C18;3) that accounted for 34.5% and 33,9%, in CPO and HEO, respectively. Both extracted camelina oils showed high amounts of linoleic acid (C18:2), eicosanoic acid (C20:1) and oleic acid (C18:1). The oxidative stability was compared for both camelina oils as affected by thermal oxidation, High and moderate temperature experiments were used to determine the resistance of both oils to accelerated oxidation. Randmat test was applied at 110"C, wherein the oxidation stability index (OSI) value for HEO (7.23 h) was higher than CPO (3.37 h). The increase rates in peroxide value (PV) and conjugated rJiene (CD) of HEO were higher than CPO during storage at moderate temperature (60"C). The initial PV of CPO and HEO was 3.57 and 4.32 rneq 0,/kg, but after 10 days of storage at 60°C PV reached up to 107,30 and 11.26 rneq G\/kg, respectively. At the end of storage, CD values of CPO and HEO increased from 1.46,1,73 to 1 Q.08, 2.62, respectively. The volatile oxidation compounds including hexanal, 2,4-heptadienai, and (E,E)-2,4-heptadienal were identified in the head-space of CPO at trie 10th day of storage at 60°C. It could be concluded that the extraction methods influenced significantly Cameiina sativa seed oil oil stability and quality.

**Keywords:** Rancidity, oxidative stability, volatile oxidation compounds, solvent extraction, cold pressed oil.

## 1. INTRODUCTION

Camelina {Cameiina saf/va) is a member of the Cruciferae family and known as false flaxseed, German sesame, gold-of-pleasure, Siberian oilseed, linseed dodder or wild flax [1]. Camelina is an oilseed crop in vast areas of the world. The plant contains high amount of oil with a unique fatty acid composition [2, 3). Camelina oil has been applied in different industries such as biofue!s: jet fuel, feed, pharmaceutical, and cosmetics. This oil is also used in food applications such as salad, cooking oil, margarines, sauces, and dressings [4, 5). Camelina oil is rich in a-linolenic (ALA, 018:3, 32.5%), linoleic (C18:2, 18.1%), gondoic (C20:1, 16.9%), and oleic (C18:1, 14.8%) acids as reported by Singh et al. [6j. Due to the high levels of ALA, camelina oil has potential health-promoting properties [7]. In addition, camelina oil contains about 15% gondoic acid (20:1 n-9) and about 3% erucic acid (22:1 n-9). These two fatty acids are typical of oils that are obtained from seeds of plants belonging to the Cruciferae family [3]. EJecause of its unique composition and beneficial health impacts, camelina oil has good potential to be used in the production of functional foods and nutraceuticals.

Oxidation is the main cause of loss of quality in fatty foods. The two compositional factors of lipids that determine their susceptibility to oxidation are their fatty acid composition and the presence of antioxi-dants. Due to the high content of unsaturated fatty acids in camelina oil, its oxidative stability is an important factor [3]. Despite the health aspects of omega fatty acids: polyunsaturated fatty acids (PUFA) especially ALA in oil tends to oxidise with heat, oxygen, and light [8, 9], Therefore, the assessment of lipid oxidation in camelina oil is important when formulating and producing foods with camelina oil [7]. Accelerated oxidation tests including Rancimat test (110°C) and Shaal oven test (GO/'C) were often used to detect lipid oxidation [10-12]. There have been several studies carried out on camelina oil, whereas some studies related to oxidative stability of the oil [5, 8,13]. Cold pressed oils refer to oils that are extracted by cold pressing of plant seed with a screw press or hydraulic press. Cold pressing is used to extract oil from seeds instead of conventional solvent extraction method because cold pressing does not require the use of organic solvents or heat. Moreover, cold pressing is able to retain bioactive compounds like fatty acids, phenolics, fiavonoids and tocois in the oils [14-16].

Despite Camelina sativa is an old oilseed crop, this plant is newly introduced to the semi-arid regions of Turkey. The adaptation trials of these seeds have begun in Field Crops Central Research Institute, Ministry of Food,

Agriculture, and Livestock (Ankara, Turkey) since 2015 and the seeds are officially registered as 'Aslanbey'. Possible applications of seeds have been investigated. First technical application area of seeds is to produce oil and to study some physico-chemical properties of the oil. The aim of this study was to evaluate the fatty acid composition and oxidative stability of cold-pressed Camelina sativa seed oil (CFO) and hexane-extracted Camelina sativa seed oil (HEO). Oxidative stability of both oils was determined using two oxidation conditions including high temperature at 110°C (Rancimat test) and moderate temperature at 60°C (Schaal oven test). The oxidation at moderate temperature (60°C) was followed by the determination of peroxide value (PV), conjugated diene value (CD) and volatile compounds content of the anah/sed oils.

## 2. MATERIALS AND METHODS

### 2.1 MATERIALS

The cameiina oil used in this study was extracted from seeds of Camelina sativa plants grown in 2015 in the Ankara region (Turkey).

### 2.2 METHODS

2.2.1 Extraction of hexane-extracted oil (HEO) and cold-pressed oil (CPO)

The oil was obtained by two methods including solvent extraction and cold pressing. In the solvent extraction, the seeds were extracted with n-hex-ane using the Soxhlet apparatus for 4 hours. In the cold-pressing extraction, the seeds were directly pressed with screw press at room temperature. The oils were placed in brown glass bottles, flushed with nitrogen, and stored in a refrigerator at 4°C for further analysis.

2.2.2 Fatty acids composition

Fatty acid methyl esters (FAME) were prepared according to IUPAC [17]. FAME were identified by Shirnadzu (Kyoto, Japan) gas chromatography equipped with Rtx-2330 capillary column (60 m x 0.25 mm i.d, 0.20 um film thickness) and FID (flame ionizaiion detector). The temperature for the injector was 250°C and the temperature for the detector was 260°C. The oven temperature was held at 140°C for 5 min, then increased to 240°C at 4°C/min and held at 240°C for 20 min. Helium at a flow rate of 1.0 mL/min was used as a carrier gas. A sample of 1 uL was injected by the autosampler with a split mode (split ratio of 1:100). FAME were identified by comparison with standards and were quantified by the area percentage of each FAME. FAME standards were purchased from Sigma (Sigma-Aldrich GmbH, Steinheim, Germany).

2.2.3 Thermal oxidation experiments

2.2.3.1 Rancimat test

Stability of tested oils was determined by the Rancimat test using a 743 F&ncimat Metrohm apparatus (Switzerland) according to the official AOCS method Cd 12b-92 [18]. The test was carried out at a constant temperature (110°C) with air flow of 20 L/h, using 3 g oil sample and 0,06 L distilled water in a conductornetric vessel.

2.2.3.2 Schaal oven test

Oil samples (20 g) were transferred to glass brown bottles (100 mL) and the bottles were closed, The oxidation was carried out in a forced-draft air oven at the temperature of 50"C for 10 days. The peroxide value (PV), conjugated diene (Kzsz) and volatile compounds released from both oils were analysed at the end of every twin-day up to the end of the tenth day of storage under thermal oxidation conditions (60°C).

2.2,3.3 Peroxide value (PV) and conjugated diene (CD) determination

Peroxide value (PV) of oils were iodometrically defined with respect to AOCS method Cd 8-53 [18], The oils were analysed for the conjugated diene (K>32) according to AOCS method Cd 18-90 [18].

2.2.3.4 HS/SPME-GC/MS analysts of volatile oxidation compounds

Two grams of oil sample was placed in 20 m!_ headspace vial and subjected to balance for the duration of 15 min at the constant temperature of 35°C [19]. The headspace of samples was extracted for 45 min at 35°C with the aid of a CTC Combi PAL (CTC Analytics AG, Zwingen, Switzerland] autosampler with 75 urn carboxen/poiydimethylsiloxane (CAR/POMS) solid phase micro extraction (SPME) fibre. The volatile compounds were directly desorbed by inserting the fibre

for 10 min into the injection port of the gas chromatography maintained at the constant temperature of 250'C.

An Agilent model 7890 Series (Agilent Technologies, Santa Clara, CA, U.S.A.) gas chromatograph in combination with a CTC Combi PAL autosampler and an Agitent 5975 N (Agiient Technologies, Santa Clara, CA, U.S.A.) mass selective detector was used to analyse volatile oxidation compounds. The compounds were separated in a capillary column of DB-624 (30 m length x 0.25 mm ID x 1.4 urn film thickness, Agilent Technologies, Santa Ciara, CA, USA) with the following temperature program: hold for 5 min at 40"C; 3°GAnin up to 110°C; 4°C/min up to 150°C; 10°C/min up to 210°C and hold for 12 min. The temperatures for the injection port, ion source, quadru-pote, and interface were set to be 250°C, 230CC, 150°C, and 240CC, respectively. Mass spectra were recorded in full scan mode at the electron impact of 70 eV with the scan range from m/z 41 to 400. The identification of compounds was detected by comparing mass spectra and Kovats index (Kl) with the authentic standards and published data, as well as by comparing their mass spectra with tine mass spectrometry library of NistOS (National Institute of Standards and Technology, Gaithersburg MD, USA) and Wiley7.0 (Wiley, NY, USA). The parameters of Kl were calculated using the series of n-hydrocarbons (C4 to C20).

## 3. RESULTS AND DISCUSSION

### 3.1 FATTY ACID COMPOSITION OF HEO AND CPO

Fatty acid composition of camelina oils is presented in Table I. Sixteen fatty acids were identified in camelina HEO and CPO. It could be noted form the results in Table I that the extraction method did not affect the fatty acids profile in camelina HEO and CPO. In both oils, the major fatty acid was linolenic acid (C18:3) tha! accounted for 34.56% and 33.92% in CPO and HEO, respectively. The levels of C18:3 were slightly lower than that reported by Raczyk ei al. [20] who detected 35-35-37.64% of linolenic acid in camelina oil. The results were similar to those reported by Vollmann et al. [21] who detected 25.2-42.5% of linotenic acid, Angelini et a!. [22] who detected 21.6-34.8% of linolenic acid, and Budin et al. |23] who detected 27.0-34.7% of linolenic acid in camelina oil. Both types of camelina oils showed high levels of Bnoleic-acid (C18:2), eicosanoic acid (C20:1) and oteic acid (C18:1). The content of C18:2, C20:1 and C18:1 in CPO and HEO were generally close to the results reported by Vollmann et ai. [21], Gugel and Falk [24], Szterk et al. [13], and Raczyk et al. [5]. Erucic acid

Table I - Fatty acid composition % of HEO and CPO*

| | RT | Fatty acid | CPO | HEO |
|---|---|---|---|---|
| 1 | 13.531 | Myhsticacid(C14:Q) | 0.05 1 0.01 | 0.05 ±0.01 |
| 2 | 17,411 | Palmitic add (C16:0) | 5.12 ±0.01 | 5.24 ± 0.03 |
| 3 | 18.504 | Palmitotetescid (C16;1) | 0.07 ±0.01 | 0.07 ± 0.01 |
| 4 | 19.263 | Heptadecairoc acid {C17.0) | 0,04 ±0.00 | 0.04 ±0.01 |
| 5 | 20297 | cis- IQtewadecanoic acid (C17:1) | 0.02 ± 0.00 | 0.02 ± 0.00 |
| 6 | 21.184 | StearicacxJ (C1B.O) | 2.66 ± 0.01 | 2.70 ± 0.01 |
| 7 | 22.172 | Oteicadd (C18:1) | 14.90 ± 0,02 | 14.92 ±0.02 |
| 6 | 23.639 | Ltnote*C3C«J(C1&2) | 17.11 ±0.02 | 17.66 ±0.01 |
| 9 | 24.729 | i Arachklieadd(C2Q:Q) | 1.54 + 0.00 | 1,58 ±0.00 |
| 10 | 25.360 | LinoterK3Ctd(Cie:3) | 34.56 ± 0.05 | 33.92 ± 0.08 |
| 11 | 25.656 | ciiM 1 -etcosenoic acid (C20: 1 ) | 16.67 ±0.03 | 16.53 ±0.05 |
| 12 | 26.936 | Haneicosanoic acid (C21:0) | 2.07 ± 0.01 | 2.06 ± 0,00 |
| 13 | 27.376 | Behenic acki (C22:Q) | 0,30 ± 0.00 | 0.30 ±0.00 |
| 14 | 28.492 | eis-8,1 1 ,14-eicosairienok: add (C20:3) | 1.35 ±0.02 | 1.33 ±0.01 |
| 15 | 28.761 | EnjCicacid(C22:1) | 2.B2±0.02 | 2.30 + 0.01 |
| 16 | 30.025 | cis-13.16-docQ5adieno!c acid (C22:2) | 0.11 ±0.01 | 0.12 ±0.01 |
| 17 | 30.883 | Lignocericacid(C24:0} | 0.17 ±0.01 | 0.17 ±0.00 |
| 18 | 31.797 | Nervonicaid(C24:1) | 0.51 ± 0,00 | 0.52 ± 0.01 |

i of two determinations ± standard ttevial

(022:1) content in the CPO and HEO was 2.82% and 2.80%, respectively and these values of erucic acid is considered within the limit values (< 5%). Both cametina oils coufcf be suitable for human consumption as edible oils after performing nutritional studies.

### 3.2 RANCMAT TEST

Figure 1 shows the oxidation stability index (OSI) of CPO and HEO of camelina. The OSI value in HEO (7.23 h) was two-fold higher than in CPO (3.37 h). The obtained results could be explained because solvent-extracted oils usually contain high levels of antioxidsnts including tocote, sterols and polar li-pids (glycolipids and phosphoiipids) [9, 12]. The OSi value of oil samples were higher than the results of Frohlich et a). [25] for unrefined camelina oil (2.4 h). These differences could be related to use of flow rate in 10 L/h in Rancimat method. Raczyk et al. [20] obtained higher values for OSI in cold pressed oils (4.58-6.18 h) than those found in our study The dissimilarities in the OSI values of the samples were related to applied temperature (1CO°C) and sample amount (2.5 g) in the literature for Rancimat conditions.

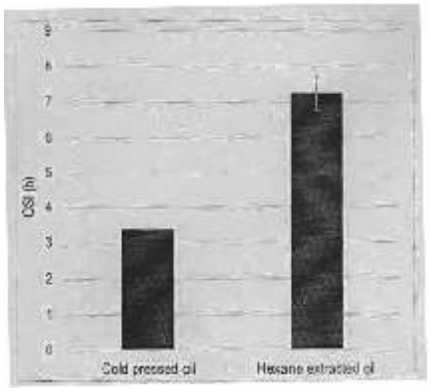



Figure 1 - OSI values of CPO and HEO stored at 110°C. Vauies are means of three determinations ± standard deviation.

### 3.3 SCHAAL OVEN TEST

Figure 2 shows the changes in PV in oils during storage at 60°C. The increase rates in PV of CPO were significantfy higher than HEO. PV in CPO increased dramatical^ during storage, while the PV in HEO increased stowly and showed a rough trend for the increase rate in the oil during storage at 6Q°C. The PV of fresh CPO and HEO were 3.57 and 4.32 meq Oj/kg, respectively. At the end of 10 days of storage at 60°C. the PV of CPO and HEO were 107.30 and 11.26 meq 0/kg, respectively. These results were in accordance with previously reported results for raw camelina oil [13], which mentioned that the changes in PV were in dynamic trend along thermal storage.

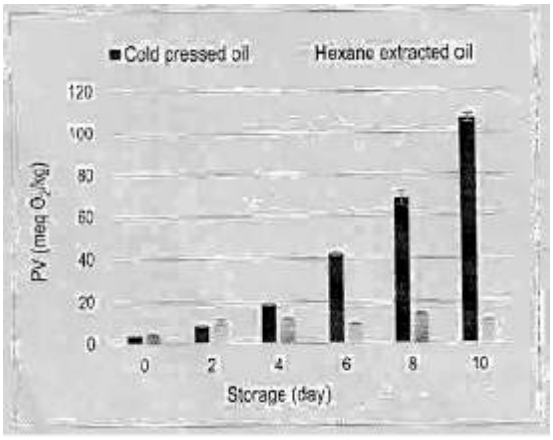



Figure 2 - Changes in PV of CPO and HEO during storage at 60"C. Values are means of two determinations ± standard deviation.

The other simterity with the literature was observed in the study by Ni Eidhri et al. [26] in which it is declared that the increase rate in PV of cold-pressed camelina oil occurred rapcfly. The obtained results could be exptained because extraction using organic solvent is more capable of extracting polar lipids (gfycolipids and phosphotpids) characterised by significant anli-oxidant properties under thermal oxidation [9].

Figure 3 shows the changes in K232 values of CPO and HEO during storage at 60°C. The increase trend of oils for K232 values was similar to PV along the storage period. Cold-pressed camelina oil had higher K232 values than hexane-extracted camelina oil. After 10 days of storage, the K232 value of CPO reached up to 10.08, while the K232 value of HEO was 2,62. The results for CPO agree with other findings previously reported by Ni Eidhin et al. [26] that mentioned that the K232 values of cold-pressed oils varied markedly during thermal storage.

According to the results of PV and K232 values during storage at 60°C, HEO had Ngher oxidative stability fhan CPO. These differences could be related to the

extraction technique. Solvent extraction is more capable and more powerful in extracting iipid bioactive compounds including polar lipids, sterote, tocols, that contribute to the oxidative stability of the oil [27, 28]. Crude camelina oil had high a tocopherol amount (especially y-isomers) and total phenolic content with potential antioxidative traits [3].

### 3.4VOLATILE OXIDATION COMPOUNDS

During storage at 60"C, the volatile oxidation compounds were analyzed. Only on the 10th day of storage at 60°C, three volatile oxidation compounds including

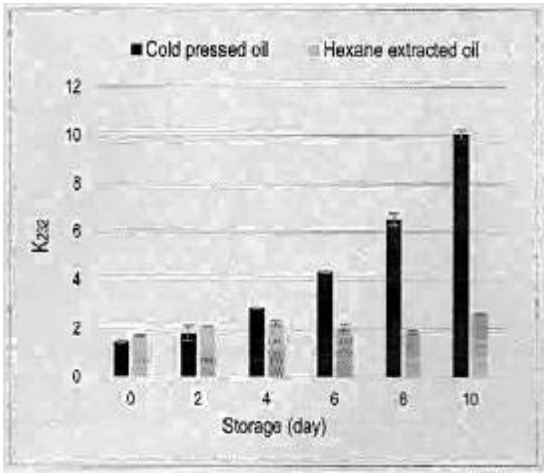



Figure 3 - Changes in Kra of CPO and HEO during storage at 60*C. Values are means of two determinations ± standard deviation.

hexanal, 2,4-heptadienal and (£,£}-2,4-heptadien-al were detected in CPO. The value of these compounds was not shown on a separate table or figure due to lack of data. The average value of these compounds mentioned above were determined as 3.99, 0.51 and 0.45 x 10s AU, respectively. Hexanal and (£,E)-2,4-heptadienats levels were increased with oxidation of linseed oil that is rich in linolenic acid like camelina oil [29]. These volatile oxidation compounds have been identified in our study.

## 4. CONCLUSION

interest in camelina oil was inspired by the recent search for natural antioxidants and for new vegetable sources of PUFA. The results of this study snowed that the extraction methods and conditions influenced greatly the oil quality. Hexane-extracted oil had a significantly higher OSl value than CPO according to Rancimat test. The results of PV and CD values of HEO were lower than CPO during storage at moderate temperature (60°C). Results showed that HEO had a higher resistance to oxidation compared to CPO. Even though coid-pressed oils are assumed as healthy oils, oxidative stability of these oils was lower when compared with solvent-extracted oils.

## REFERENCES


[1] F. Imbrea, S. Jurcoane, H.V. Halmajan, M. Duda, L. Botos., Camelina saliva: A new source of vegetal oifs. Romanian Bio-technological Letters, 76 (3), 6263-6270 (2011).

[2] J. Zubr, Oil-seed crop: Camelina sativa. !nd. Crops Prod. 6 (2), 113-119 (1997).

[3] H. Abramovic, B. Butinar, V. Nikoltc, Changes occurring in phenolic content, tocopherol composition and oxidative stability of Camelina sativa oil during storage. Food Chem. 704 (3), 903-909 (2007).

[4] M. Berti, R. Gesch, C. Eynck, J. Ander-son, S. Cermak, Camelina uses, genetics, genomics, production and management. tnd. Crops Prod. 94, 690-710 (2016).

[5] K. Ratusz, E. Popis, H. Ciemniewska-Zytk-iewicz, M. Wroniak, Oxidative stability of camelina (Camelina sativa L.) oil using pressure differential scanning calorimefry and Rancimat method. J. Thermal Anaf. Catortmetry 726(1), 343-351 (2016).

[6] B.K. Singh, M. Bala, P.K. Rai, Fatty acid composition and seed meal characteristics of Brassica and allied genera. Nat. Acad. Sci. Letters 37 (3), 219-226 (2014).

[7] D.N. Eidhin, D. O'Beirne, Oxidative stability of camelina oil in salad dressings, mayonnaises and during frying. Inter. J. Food Sci. Technol. 45 (3), 444-452 (2010).

[8] H. Abramovic, V. Abrarn, Physico-chemical properties, composition and oxidative stability of Camelina sativa oil. Food Technol. Biotechnol. 43 (1), 63-70 (2005).

[9] M.F. Ramadan, Antioxidant characteristics of phenolipids (quercetin-enriched lecithin] in lipid

matrices. Ind. Crops Prod. 35, 363-369(2012).

[10] E. Naziri, M.N. Mitic, M.Z. Tsimidou, Contribution of tocopherols and squalene to the oxidative stability of cold-pressed pumkin seed oil (Cucurbita pepo L.}. Euro. J. Lipid Sci. Technol, 7/8 (6), 898-905 (2016).

[11] A. Siger, M. Michalak, The long-term storage of cold-pressed oil from roasted rape-seed: Effects on antioxidant activity and levels of canolol and tocopherols. Euro. J. Lipid Sci, Techno!. 7 78 (7), 1030-1041 (2016).

[12] M. Kiratan, M. Ulag, A.G. Ozaydin, N. Ozdemir, G. Ozkan, A. Bayrak, M.F. Ramadan, Changes in hexanal, thymoquinone and tocopherols levels in blends from sunflower and black cumin oils as affected by storage at room temperature. Riv. Ital. Sostanze Grasse 63, 229-236 (2016).

[13] A. Szterk, M. Roszko, E. Sosihska, D. Derewiaka, P.P. Lewicki, Chemical composition and oxidative stability of selected plant oils. J. Amer. Oil Chem. Soc. 87 (6), 637-645(2010).

[14] M.F. Ramadan, M.M.S. Asker, M. Tadras, Antiradical and antimicrobial properties of cold-pressed black cumin and cumin oils. Eur. Food Res. Technol. 234, 833-844 (2012).

[15] S.S. Teh, J. Birch, Physicochemical and quality characteristics of cold-pressed hemp, flax and canola seed oils. J. Food Compos, Anal. 30, 26-31 (2013).

[16] A. Siger, K. DwieckJ, W, Borzyszkowski, M. Turski, M. Rudziriska, M. Nogala-Kafucka, Physicochemicai characteristics of the cofd-pressed oil obtained from seeds of Fagus sylvatica L Food Chem. 225, 239-245(2017).

[17] IUPAC: Standard Methods for the Analysis of Oiis and Fats and Derivatives; Perga-mon Press: Toronto, Canada (1991).

[18] AOCS: Official Methods and Recommended Practices of the American Oil Chemists' Society, Vol. 5, AOCS Champaign, IL, USA (1997).

[19] G. Ozkan, M. Kiralan, £. Karacabey. G. Calik, N. Qzdemir, T. Tat, A. Bayrak, M.F. Ramadan, Effect of hazdnut roasting on the oil properties and stability under thermal and photooxidation. Eur. Food Res. Technol. 242, 2011-2019 (2016).

[20] M. Raczyk, E. Popis, B. Kruszewski, K, Ratusz, M. Rudzinska. Physicochemical quality and oxidative stability of linseed (U-num usitatissimum) and camelina (Cameii-na sativa) cold-pressed oils from retail outlets. Euro, J. Lipid Set. Technol. 118 (5), 834-839(2016).

[21] J. Vollmann, T. Moritz, C. Kargl, S. Baumgartner, H. Wagentristl, Agronomic evaluation of camelina genotypes selected for seed quality characteristics. Ind. Crops Prod. 26 (3), 270-277 (2007).

[22] LG. Angelin!, E. Moscheni, G. Colonna, P. Beioni, E. Bonari, Variation in agronomic characteristics and seed oil composition of new oilseed crops in central Italy. Ind. Crops Prod. 6 (3-4), 313-323 (1997).

[23] J.T. Budin. W.M. Breene, D.H. Putnam, Some compositional properties of camelina (Camelina sativa L. Crantz) seeds and oils. J. Amer. Oil Chem. Soc. 72 (3), 309-315 (1995).

[24] R.K. Gugel, K.C. Falk, Agronomic and seed quality evaluation of Camelina sativa in western Canada. Canadian J. Plant Sd. 86(4), 1047-1058(2006).

[25] A. FrohJich, G. O'Dea, R. Hackett, D. O'Beirne, D. Ni Eidhin, J. Burke, Stabilization of camelina oil with synthetic and natural antioxidants. J, Amer. Oil Chem. SOG. 89 (5), 837-847 (2012).

[26] D. Ni Eidhin, J. Burke, D. O'Beirne. Oxidative stability of w3-rich camelina oil and cameiina oil-based spread compared with plant and fish oils and sunflower spread. J. Food Sci. 63 (1), 345-353 (2003),

[27] B.M. Atta, Some characteristics of nigella (A/jpeffa sativa L) seed cultivated in Egypt and its lipid profile. Food Chem. S3 (1), 63-68 (2003).

[28] S.M, Ghazani, G. Garcia-Llatas, A.G. Ma-rangoni. Micro-nutrient content of cold-pressed, hot-pressed, solvent extracted and RBD canola oil: Implications for nutrition and quality. Euro. J. Lipid Sci. Technol. 776(4), 380-387(2014).

[29] B.2. Juita Dlugogorski, E.M. Kennedy, J.C. Mackie, Identification and quantitation of volatile organic compounds from oxidation of linseed oil. Ind. Eng. Chem. Res. 51 (16), 5645-5652 (2012).

Courtesy : **La Rivista Italiana Delle Sostanze Grasse**

Vol. XCV - October -December 2018

# Carrot Seed Oil

Carrot seed oil is the essential oil extract of the seed from the carrot plant Daucus carota. The oil has a woody, earthy sweet smell and is yellow or amber-coloured to pale orange-brown in appearance. The pharmocologically active constituents of carrot seed extract are three flavones: luteolin, luteolin 3'-O-beta-D-glucopyranoside, and luteolin 4'-O-beta-D-glucopyranoside. Rather than the extract the distilled (ethereal) oil is used in perfumery and food aromatization. The main constituent of this oil is carotol.

Pressed carrot seed oil is extracted by cold-pressing the seeds of the carrot plant. The properties of pressed carrot seed oil are quite different from those of the essential oil. It can be made into lotion, and helps heal boils and ulcers. It can treat the liver, gallbladder and lymph system.

There are four types of carrot oil:

1. **Carrot seed essential oil** – a concentrated essential oil got through steam distillation of carrot seeds from the plant Daucus carota (Queen Anne's Lace).
2. **Carrot seed carrier oil** – a carrier oil (or vegetable oil) got through cold pressing of carrot seeds of Daucus carota (Queen Anne's Lace).
3. **Wild carrot carrier oil or carrot root oil** – infusing wild carrot root from the plant Daucus carota (Queen Anne's Lace) in vegetable oil for a number of weeks, then strained to get the infused oil.
4. **Domestic carrot oil** – produced at home by infusing domestic carrot (the orange one we all know) from the plant Daucus carota subsp. sativus.

## 1. Carrot seed essential oil

Carrot seed essential oil is extracted by steam distillation, primarily from the dried seeds of wild carrot (Daucus carota) and also from the dried plant itself. The wild carrot is common in Europe, though it is often known by another name in that region, which is "Queen Anne's Lace".

Apart from its components like alpha pinene, beta pinene, gamma-terpinene, limonene, camphene, sabinene, myrcene, beta bisabolene, carotol, and geranyl acetate, carrot seed oil is also rich in carotene and vitamin A, both of which are very beneficial for the eyes and are effective antioxidants.

It protects skin from sun damage, rejuvenates sun damaged skin, renews skin cells, nourishes mature skin and helps lighten skin. It contains carotenoids, which give it a slight orange color.

Details of carrot seed essential oil:

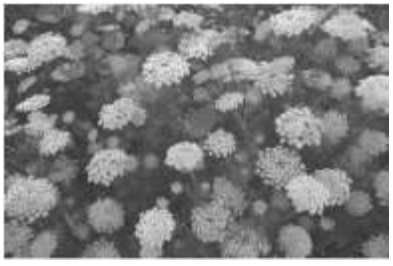
- **Scientific name:** Daucus carota
- **Part of plant extracted from:** Dried seeds of the Daucus carota (wild carrot) plant
- **Extraction:** steam distillation of wild carrot seeds
- **Color:** Yellow to amber
- **Smell:** Warm earthy woody aroma

**Quick facts:** It is an essential oil, meaning it is highly concentrated and must be diluted before use. Dilute 1-2 drops of carrot seed essential oil in 1 tsp of carrier oil.

Do not use during pregnancy or lactation.

**Benefits:** Carrot seed essential oil has a lot of therapeutic properties: from healing and revitalizing skin to treating gout, indigestion, arthritic and menstrual problems.

## 2. Carrot seed carrier oil



Carrot seed carrier oil is extracted by cold pressing carrot seeds to get a carrier oil or vegetable oil. It also contains carotenoids, just like the essential oil, which gives it a slight orange color. Carotenoids protect skin from UV damage, heal sun damaged skin, promote cell renewal, tone skin and help lighten dark marks.

This is the wild carrot plant. It has white lace-like flowers so it's also called Queen Anne's Lace. When those flowers dry and shrivel up, the seeds that remain are used to extract carrot seed essential and carrot seed

carrier oils

Can be applied 4 drops of it directly onto skin at night time for rejuvenation. It can also be added to your face cream or used as a base for essential oils to promote youthful skin.

## 3. Wild carrot carrier oil or carrot root oil

Carrot carrier oil is normally just called 'carrot oil'. It is a carrier oil, meaning it 'carries' essential oil safely onto your skin. You can also call it a vegetable oil. It is produced through maceration. The wild carrot is chopped into tiny pieces and infused into a vegetable oil. The oil is then filtered after a number of weeks and sold as carrot oil.

Wild carrot roots from the wild carrot plant (Queen Anne's Lace)

- **Scientific name:** Daucus carota
- **Part of plant extracted from:** Wild carrots
- **Extraction:** maceration of wild carrots
- **Color:** Clear orange
- **Smell:** Warm earthy woody aroma

**Quick facts:** It is a carrier oil.

It can be safely used directly onto the skin.

**Benefits:** Carrot carrier oil is a tonic for the skin. It helps relieve itchy skin and treats eczema and psoriasis. It possesses similar properties as carrot seed essential oil but much milder.

## 4. 'Domestic' Carrot-Infused Oil

Now this type of carrot oil can be produced right at home. It involves infusing domestic orange carrots we all know, in vegetable oil. You can infuse carrots by chopping them up in tiny pieces and immersing them in vegetable oil for 3-4 weeks. You can also, heat up carrots/carrot juice in oil.

DIY Carrot-infused oil.

This carrot-infused oil is orange in color, smells like carrots and has skin and hair benefits! It makes skin glow, and rejuvenates it. It promotes hair growth and makes hair soft and silky.

## Top 10 Benefits Of Carrot Seed Essential Oil:

The health benefits of carrot seed essential oil can be attributed to its properties as an antiseptic, disinfectant, detoxifier, antioxidant, and an anticarcinogenic. Moreover, it is a carminative, depurative, diuretic, emmenagogue, stimulant, cytophylactic, tonic, and a vermifuge substance.

## Health Benefits of Carrot Seed Essential Oil:

### Antioxidant Properties

Carrot seed essential oil can help you retain your youth. Antioxidants in this essential oil repair the damages done to your tissues by oxidants (free radicals) and stop them from doing further harm. These antioxidants protect your skin from wrinkles, keep your hair from turning white, your joints from stiffening, your muscles from weakening and your eyesight from declining. They can protect you from macular degeneration, sexual weakness, weak digestion, some forms of cancer, and other problems related to aging.

### Cures Infections

This powerful essential oil can cure infections and protect against their effects, according to a research study by Jorge M. Alves-Silva et al. [1](Evidence-based Complementary and Alternative Medicine 2016). It has antiseptic properties, including its ability to prevent tetanus. When externally applied, carrot seed oil can cure infections on the skin and in open wounds. When ingested, it effectively helps to cure infections of the throat, mouth, colon, stomach, intestines and urinary system. It is extremely effective in curing sores, gangrene, psoriasis, ulcers, rashes, carbuncles, and other such problems. [2] It can even cure viral infections of the respiratory system, thus benefiting in the treatment of bronchitis. It is effective in fighting other viral infections as well, including the flu, mumps, coughs, colds, and measles.

### Detoxifies the Body

Carrot seed oil has the ability to detoxify the blood, tissues, muscles, and internal organs like the liver and kidneys. According to a study titled "Nutritional and Health Benefits of Carrots and Their Seed Extracts", an animal study conducted by Singh et al. [3] showed that

the oil extract had hepato-protective and cardioprotective properties. It can neutralize excess bile secreted by the liver and cure infections in cases of jaundice. It eliminates toxins like uric acid from the blood, tissues, muscles, and joints, thereby helping to cure edema, arthritis, gout, and rheumatism.

**Expels Gases**

Do you feel like you're ballooning up from all of the gas that you've accumulated in your system? If you've ever felt this way, then carrot seed oil can keep your feet firmly on the ground. It will help to expel gases from the intestines. You will probably feel so relaxed and light that you will think you can really fly!

**Diuretic Properties**

Carrot seed oil is diuretic in nature, meaning that it increases urination. It may seem that there is no apparent benefit of this property, but you will be surprised to see that urination alone can keep you safe from many ailments. Each time you urinate, fat (almost 4% of the volume), toxic substances like uric acid and bile, and microbes that cause infections in the urinary system and otherwise, are removed from the body with urine. Furthermore, it reduces blood pressure and cleans the kidneys. It is also helpful in clearing out the renal calculi.

**Emmenagogue**

When something is an emmenagogue, it means it eases the process of menstruation, making it less painful and more regular. This particularly helps when someone is suffering from irregular or obstructed menses.

**Stimulant**

We all know the meaning of a stimulant, and carrot seed oil delivers in this way as well. It stimulates both circulation and metabolic function. It also stimulates the secretion of hormones, enzymes, gastric juices, bile, and the peristaltic motion of the intestines, thus keeping all the organic systems active and efficient. It also stimulates brain functions and nerves, thus making you more alert and active.

**Eliminates Worms**

Carrot seed oil can kill, but not you, don't worry. More specifically, it can eliminate the worms in your intestines. It can help children get rid of this annoying problem, which can result in malnutrition and other harmful conditions.

**Acts as Tonic**

Something that tones the body is a tonic and carrot seed oil definitely falls into this category. It tones up tissues and muscles and increases their efficiency; it tones the liver, stomach, and the flow of digestive juices, thus bringing the entire digestive system to normalcy. It also tones the skin and prevents it from hanging loose or showing signs of aging.

**Stimulates Growth**

Carrot seed essential oil stimulates the growth of new cells and tissues.

**Other Benefits**

It is widely used in aromatherapy due to its mild and soothing earthy aroma which is very effective in relieving stress and anxiety and giving a refreshing feeling. It is good for the skin and protects it from developing wrinkles. Carrot seed oil also relieves muscle aches, cures anorexia, enhances the production of erythrocytes, and improves your eyesight.

**Application:** You can use the oil in an aromatherapy diffuser. If you are planning to use it topically, it is best to combine it with other essential and carrier oils. Coconut oil, jojoba oil, and olive oil are all good carrier oils. Although there are different blends for different purposes, carrot seed oil mixes well with Bergamot, Juniper, Lavender, Lemon, Lime, Orange, Avocado, Cedar Wood and Geranium oil..

Word of Caution: There are no known risks of the essential oil, but pregnant women should avoid it since research has not been conducted to tell which attributes and stimulating qualities are passed to the fetus. According to "Aromatherapy Science: A Guide for Healthcare Professionals", carrot seed essential oil contains terpinen-4-ol, which has a diuretic effect. [4] Excessive use can cause irritation to the kidneys. It is advised to always consult your medical doctor before using essential oils.

# Laugh Out Loud

- “2 GET and 2 GIVE” CREATS MANY PROBLEMS So just double it

“ 4 GET and 4 GIVE “ SOLVES MANY PROBLEMS

**********

A child asked his father, "How were people born?" So his father said, "Adam and Eve made babies, then their babies became adults and made babies, and so on." The child then went to his mother, asked her the same question and she told him, "We were monkeys then we evolved to become like we are now." The child ran back to his father and said, "You lied to me!" His father replied, "No, your mom was talking about her side of the family."

**********

Sherlock Holmes and Dr. Watson went on a camping trip. After a good meal and a bottle of wine, they laid down for the night, and went to sleep. Some hours later, Holmes awoke and nudged his faithful friend. "Watson, look up at the sky and tell me what you see." Watson replied, "I see millions and millions of stars." "What does that tell you?" Watson pondered for a minute. "Astronomically, it tells me that there are millions of galaxies, and potentially billions of planets. Astrologically, I observe that Saturn is in Leo. Horologically, I deduce that the time is approximately a quarter past three. Theologically, I can see that God is all powerful and that we are small and insignificant. Meteorologically, I suspect that we will have a beautiful day tomorrow. What does it tell you?" Holmes was silent for a minute, then spoke. "It tells me that someone has stolen our tent.

**********

A psychoanalyst shows a patient an inkblot and asks him what he sees. The patient says: “A man and woman making love.”

The psychoanalyst shows him a second inkblot, and the patient says: “That’s also a man and woman making love.”

The psychoanalyst says: “You are obsessed with sex.”

The patient says: “What do you mean I’m obsessed? You’re the one with all the dirty pictures.”

Q: How do astronomers organize a party?

A: They planet.

**********

Q--Why did the chemist sole and heel his shoes with silicone rubber?

A: To reduce his carbon footprint.

Q: Why are Helium, Curium, and Barium the medical elements?

A: Because if you can't heal-ium or cure-ium, you bury-um.

**********

Science teacher tells his class, "Oxygen is a must for breathing and life. It was discovered in 1773." A blonde student responds, "Thank God I was born after 1773! Otherwise I would have died without it

A teacher asked her students to use the word "beans" in a sentence. "My father grows beans," said one girl. "My mother cooks beans," said a boy. A third student spoke up, "We are all human beans."

Don't break anybody's heart; they only have 1. Break their bones; they have 206.


# Member's PAGE

## DEEP FRIED NAMKEEN SNACKS

**Satish Checker (General Manager - Technical)**
**Standard Analytical Laboratory (N.D. ) Pvt. Ltd., 69, Patpar ganj ( F.I.E ), Delhi-110092**

### QUALITY CONTROL OF INGREDIENTS USED FOR PROCESSING

### INTRODUCTION:

The Indian Namkeen Snack Industry 1s all set for huge growth increasing the contribution to the Indian food Trade Industry every year. In India, food sector is emerging as a high growth profit sector due to endless potential. In the last decade, the consumption of Fast Moving Consumer Goods ( FMCG ) of Namkeen Snacks food has changed drastically. The consumer is moving towards commercialization and is looking for a products with better Quality, Value, Performance and Acceptability. The Namkeen snacks Food Industry Manufacturers / Processors must offer Snacks with good Appeal, Look and Quality which force the consumer to pick the Namkeen. The consumer is getting more coconscious to purchase a Namkeen Snack which has good taste, texture, crispness, and also available in food grade sealed pouches with a reasonable Price Tag.

To offer the Namkeen Snacks as mentioned above, the manufacturer / Processor must have a control on the quality of the Ingredients being used in the processing.

The basic Food Ingredient used in the processing of Namkeen Snacks or deep fried Snacks which require strict Quality Control measures to get Namkeen which may attract consumer to opt.

**BESAN ( Gram Pulse Flour )** :- Besan constitutes one of the major Ingredient or part of the deep fried Namkeens. All the Namkeens or Namkeen Mixtures, which constitutes part of the Namkens contains some part of Besan as a raw material Ingredient . Also, the Besan should have a good oil absorption capacity and shall conform to the standards laid down by FSSAI/ AGMARK/ BIS, specifically with respect to Food Safety Standards like metallic contaminants, crop contaminants , Micro logical requirements, Food additives Residual Pesticides etc.

**MAIDA ( Wheat Flour )** :- Maida is also a major Constituent or a part of the Namkeens like MATTHI, NAMAKPARA, KACHORI, SAMOSA SPRING ROLLS etc. The Maida used should be of good Quality to meet the requirements of FSSAI/AGMARK for Chemical Tests , Metallic contaminants, Microbiology Requirements, crop contaminants ,Food Additives, if any, and Residual Pesticides. Other miscellaneous ingredients like Tapir Beans, Flours, Soya bean Flour, Potatoes Powder, Edible Starches like Corn Flour, Topical Starch ,Arrowroot, etc, should conform to the FSSAI.

**EDIBLE REFIND OILS/ BLENDED OILS VANASPATI AND GHEE** :- edible Refind Oils or blends of various oils used in deep frying of the Namkeens and their Products should strictly quality controlled. The Quality of Edible oils used in deep frying plays a very important role in the quality and shelf life of the finished products. The acidity of Edible / Blended oils plays an important role on the taste, odor, aroma crispness, texture and Rancidity etc . The peroxide value also plays an important role in ascertaining the taste odor, spoilage he product and its Shelf Life. It is advised to use an edible Refined Oil which has Trans Fatty Acids less than 0.1 -0.2%. , Peroxide Value meq/ 1000 g less than 2.0 and the Kris Test for Rancidity , Negative. Also

the Refined oils used should have minimum of Saturated acids. Edible oils used should conforms to the standards laid down by FSSAI, BIS and AGMARK . They should also be Transfat , cholesterol free .

**COLOURING MATTER** :- The coloring matter , wherever used shall be permitted Synthetic Food Colours and conforms to the standard laid down by FSSAI/ BIS . Also it should be within the prescribed limits values as specified in Food Safety Standards.

**DRY FRUITS AND NUTS** :- General Dry Fruits Like Almond ( Badam ) , Cashew ( Kaju ),and Raisins ( Kishmish ) which are used in Namkeen Snacks, either as such or after deep fried, must be of good quality and shall conforms to the safety Standards laid down by FSSAI/BIS.

Nuts like Ground nut, Channa, Hazelnuts etc. are used in the Namkeen Snacks must be of Good Quality and shall conforms to the standards of FSSAI/BIS/AGMARK.

**SEEDS (BEEJ )**:- Some Namkeens contain seeds of Herbal Products like Water Melon , Musk Melon and any other such variety of seeds must be od Edible Quality and fit for Human consumption.

**VEGETABLE PRODUCTS** :- Potatoes are being regularly used as Potato Chips, Wafers, Lachha Potatoes etc. These should be of selected quality so that the chips do not get caramelized while frying.

Also, Peas ( Mutter ) should be of good quality should not get hard when used in Namkeens.

**FOOD ADDITIVES** :- Food Additives like Sodium Benzoate, Potassium Meta bisulphite , Sulphur Dioxide and others used shall confirm to FSSAI standards and also shall be within the prescribed limits of Food Safety Standards.

**CONCLUSION** :- The market is flooded with Namkeens , Snacks are available on the Roadside , Grocery Shops, Tea Dhabas, Pan Panmasala shops, pavements and other hut type outlets. Also these are available in MALLS where only Branded Products are sold. The Customer doubts whether these Namkeens / Snacks have been processed with Quality Ingredients as specified in the Food safety Standards. In view of this availability they may not Tarnish the Image of the genuine processor who are taking all necessary efforts to control the quality of the Ingredients and as well the Product.

# LIPID UNIVERSE

**Quarterly News Letter of Oil Technologists' Association of India, North Zone**


## Advertisement Tariff

| | |
|---|---|
| Back Cover (Colour) | Rs. 40000.00 per 4 insertions |
| Front inside cover (Colour) | Rs. 29000.00 per 4 insertions |
| Back inside cover (Colour) | Rs. 29000.00 per 4 insertions |
| Full page (Colour) | Rs. 25000.00 per 4 insertions |
| | (Service tax extra as applicable) |

**Mechanical data**

| | | |
|---|---|---|
| Frequency of publication | : | Quarterly |
| Finish size | : | 21cm x 28cm |
| Print area | : | 18cm x 25cm |
| No. of columns | : | Two |
| Paper | : | Art paper |

**All Correspondence to:**
**C. S. Joshi, Editor, LIPID UNIVERSE**
**C/o Secretariat**
**Oil Technologists' Association of India, North Zone**
L-17/3, DLF Phase-II, M. G. Road, GURGAON - 122002
**Phone : +91-124-4034205**
**Mobile : +91-9599056365**
**E-mail : lipiduniverse@gmail.com**
**: editorlipiduniverse@otai.org**
**Payment is to be made in advance by crossed cheque or demand draft in favour of "OTAI - Lipid Universe" payable at New Delhi or**
**Transfer to A/c No. - 048794600000692**
**Yes Bank, Cross Road Branch, DLF City Phase-IV, Gurugram - 122 002**
**IFSC No. : YEB0000487**
**All material to be send to the Editor, LIPID UNIVERSE.**

## Subscription Form

Yes, I/We want to avail the special offers and would like to receive "LIPID UNIVERSE" regularly from..... issue. Accept my/our subscription for one/two years and mail it to the address mentioned below :-

NAME : ..... DESIGNATION.....

ORGANIZATION..... .....

ADDRESS ..... .....

..... .....

DISTRICT..... CITY .....

STATE ..... PIN CODE .....

PHONE..... E-MAIL.....

I/We,am/are enclosing a Cheque / DD No ..... for Rs.....

drawn on ..... in favour of **"Oil Technologists' Association of India, North Zone"**. Add Rs.25.00 for cheques not drawn at New Delhi. Add Rs.250.00 per year for Courier / Registered Post delivery (optional).

**Mail the Subscription Form to :**
**C. S. Joshi, Editor, LIPID UNIVERSE**
**C/o Secretariat**
**Oil Technologists' Association of India, North Zone**
L-17/3, DLF Phase-II, M. G. Road, GURGAON - 122002
**Phone : +91-124-4034205**
**Mobile : +91-9599056365**
**E-mail : lipiduniverse@gmail.com**
**: editorlipiduniverse@otai.org**

**Subscription Tariff**

**1 year : Rs. 600.00**
**2 years : Rs. 1100.00**

## *MEMBERSHIP*

*For Membership Form & other Information Please visit our website "www.otai.org"*


The quarterly periodical is published by Dr. R. K. Singh on behalf of Oil Technologists' Association of India, North Zone, CD-3/304, Sagar Complex, LSC, Pitampura, Delhi-110088. India. Phone : +91-11-27315848, and printed by him at
SANSOM GRAPHICS, 68-A, Sector-7, Gurgaon (9810262689) (sansom31@gmail.com)
Editor - C.S. Joshi.

# SUMAN SYNDETS PVT LTD

## TURNKEY PROJECT SUPPLY FOR EDIBLE OILS, SOAPS AND DETERGENTS

SOAP PLANT

SOAP MACHINE: PLODDER

OIL REFINERY

SOAP FINISHING LINE

SIGMA MIXER:

3-ROLL MILL

DET SPRAY DRYING PLANT:

CONT. SAPONIFICATION PLANT:

LAB/MES SULPHONATION PLANT

**PROCESS PLANTS FOR :**

1. **SODIUM SILICATE MAKING AND DISSOLVING PLANT**
2. **LIQUID DETERGENT PLANT**
3. **COSMETICS CREAM, SHAMPOO, TOOTHPASTE PROCESS EQUIPMENT**
4. **COCOA BEANS PROCESSING FOR COCOA BUTTER, COCOA POWDER**
5. **METHYL ESTER MANUFACTURING PLANT**
6. **METHYL ESTER TOILET SOAP NOODLE PLANT**

OFFICE : B-144, FIRST FLOOR, DDA SHEDS, OKHLA INDUSTRIAL AREA PHASE-1, NEW DELHI-110020
WORKS: KH. NO. 53/20, MAIN BAWANA ROAD, PRAHLADPUR BANGAR, NEW DELHI-110042.
TEL : +91-11-41324739; M : +91-98-114-29350
Email : sumansyndet@gmail.com Website: www.sumansyndet.com

# FARELABS

FOOD ANALYSIS & RESEARCH LABORATORY

## A commitment for a better tomorrow

Research and Development

**Excellence**

Creative industry oriented solutions

Analytical Testing

**Accuracy**

Attention to detail

Credentials

**Trustworthiness**

Successful business relationships

Consultancy and Training

**Reliability**

Abundant & diverse experience

Founded in 1999, FARE Labs Private Limited is a leading NABL accredited, FSSAI authorised & MOEF recognised laboratory institution of India. It is based in Gurgaon, and is promoted by Dwijendra Mathur and Chandra Shekar Joshi, a team of chemical engineers with a combined industry work experience of over 51 years.

FARE Labs possesses world-class competencies in Analytical Testing and Research & Development. In addition, it also has a strong Consultancy and Training division to provide holistic solutions to its clients.

Water, Fuels & bio-fuels
Food & Agriculture
Fats, Oils & Allied products
Pollution & Environment
Essential Oils, Herbs & Cosmetics
Soaps, Detergents & Toiletries
Packing material, Petrolium & Lubricants
Industrial & Fine Chemicals
Wood Testing & Soil Strength

**FARE LABS Private Limited**
L-17/3, DLF Phase-II, IFFCO Chowk, M. G. Road, Gurgaon-122002, Haryana, INDIA.
Phone : +91-124-4223207-08, 4034205, Fax : +91-124-4036038, Cell : +91-93126 64533
Email : farelabs@farelabs.com, Website : www.farelabs.com