LIPID UNIVERSE

Volume-8 January - December, 2020

Importance of Lipids & Lipid constituents in Nutrition & Health

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Oil Technologists' Association of India (North Zone)

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Editor's desk

India imports little less than two third of its edible oils domestic demand. In year 2018-19 India imported around 15 MMT of edible oil, out of its total demand of 22 MMT. Due to COVID pandemic, edible oil consumption reduced to 21 MMT in year 2019-20. Usually, the growth in demand of edible oil is 2-3% per year but, in this year, it reduced by almost 5%. Due to pandemic, the prices of CPO, Palmolein, Soyabean and Sunflower oil, went to record low during March and April, but gained almost 50% by the month of December 2020.

During lockdown the consumption of soft oil such as soyabean, sunflower increased over palm oil, as consumption in hotels, restaurants and catering shifted to household consumption. In the beginning of year, government placed, RBD palm oil, in restricted category, and that reduced the share of imported refined oil from 20% to 1%. Indian refineries used their full production capacity.

AS our country spend huge amount of valuable foreign exchange, the self-sufficiency or "Atmanirbharta", in edible oil will save this amount and create huge opportunity for Indian agriculture and edible oil sector. The self-sufficiency in edible oils production can be achieved by adopting measures like use of high yielding variety and draught resistant seed, optimum use of agrochemicals, better farm management practices and area specific oil crop & seed varieties. The edible oil availability can further improve by promoting use of rice cultivating land bank for growing oil seeds, promoting palm oil production which has higher per unit area yield, full use of availability of rice bran and cotton seed for edible oil production. The margin of oil sector can be increased by using forest and tree origin oil, use of exotic variety of oils and fats for cosmetics, manufacturing of protein isolates from deoiled cake, extraction of value added pharmaceutical and nutraceutical products from various oils and seeds by-products.

A structured and well defined long-term policy on edible oil and oil seeds will encourage Indian agricultural stake holders to take long term planning. The grass root level farmers groups, organizations and cooperatives can play a major role.

Yours truly
C S Joshi
Editor

Oil Technologists' Association of India
(North Zone)

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Contents

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Importance of Lipids & Lipid constituents in Nutrition & Health

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The high incidence of diet related disorders has led to worldwide interest in healthy foods. High fat intake, especially saturated fat has been implicated in cardiovascular disorders including atherosclerosis (blocking of cardiac arteries), thrombosis (blood clotting), certain cancers and diabetes. On the other hand, there is increasing evidence that diets containing higher levels of certain lipid components are associated with reduced incidence of several diseases.

Fatty acid profiles :

There is accumulating evidence that diets with fat intake high in MUFA such as in olive oil, and high omega –3 PUFA from certain fish including salmon, tuna and mackerel help prevent heart disease. One of the major factors involved in cardiovascular disease is low density lipoprotein (LDL) cholesterol in the blood stream. In contrast high density lipoprotein (HDL) cholesterol is linked to a reduced risk of coronary heart disease . Salmon oil which contains the omega –3 PUFA eicosapentaenoic acid and docosahexaenoic acids, lowers LDL cholesterol to a lesser or similar degree as the plant omega –6 fatty acid, linoleic acid. Salmon oil, however, dramatically lowers very low density lipoprotein (VLDL) cholesterol and triacylglycerol levels without altering HDL Cholesterol, the form of cholesterol which has beneficial effects on the cardiovascular system. Linolenic acid, the omega –3 fatty acid in plant oils, also reduces LDL cholesterol. Omega –3 fatty acids also reduces plasma triacyl glycerols, another factor in cardiovascular disease.

Antioxidants :

An increasing body of literature implicates antioxidants in a wide range of health promoting benefits including reducing some forms of cancer and cardiovascular disease. A large number of antioxidants occur in edible oils derived from plants. They include polyphenols (also flavonoids such as proanthocyanidins), carotenoids, tocopherols and phytosterols. The most widespread and biologically active of the tocopherols is alpha –tocopherol(5,7,8-trimethyltocol). Other common tocopherols are beta –tocopherol , gamma- tocopherol and delta-tocopherol. The structurally related tocotrienols are less widespread but occur in large quantities in wheat germ oils, corn oil and palm oil. The only difference between the two series is that the trienols have a long side chain at carbon-2 which consists of 3 isoprene units instead of the saturated side chain in the tocol series. The major carotenoids found in vegetable oils have an all trans-configuration.

Antioxidants may prevent oxidation of polyunsaturates in the blood stream and thus protect LDL cholesterol from oxidation, a key factor in the development of atherosclerosis lesions.

Olive oil has been reported to lower blood pressure, but not through its high oleic acid content. This could be due to the presence of antioxidants. Olive oil has higher polyphenol content than macadamia, avocado, sesame, canola, soy, grapeseed, sunflower, walnut, peanut and almond oils.

Plant Stanols and Sterols :

Phytosterols inhibit cholesterol absorption in humans and can lower total blood serum cholesterol and LDL cholesterol by 10-15 %. High levels of phytosterols in corn oil are a major factor in its LDL cholesterol lowering properties. Stanols occur in low amounts in oils and are equally effective in lowering plasma cholesterol and, unlike the sterols are not readily found in plasma.

PHYTOSTEROLS : highly promising compounds

Phytosterols are structurally related cyclic alcohols found in the unsaponifiable fractions of fats and oils derived from plants.. Phytosterols, or phytosterol derivatives, present a wide range of properties and uses.

Occurrence :

The great majority of plants contain sterols represented by beta-sitosterol which is basic phytosterol. Some higher plants, including members of the cucurbitaceae (cucumber) and Theaceae (tea) families for example, contain spinasterol.

Sterols are found in highest concentrations in the seed fruits of oleaginous plants but they are also present in the leaves and seeds of edible plants such as legumes and vegetables. They are commonly found in our food and drink, in quantities depending on the type of diet. It is well – known that the phytosterol composition depends on the growth conditions, ripeness, harvest and storage conditions of the plant material.

The deodorizer distillates from vegetable oil refining of Soybean, corn, rapeseed, sunflower, cottonseed, peanut and palm are the major sources of phytosterols, They generally contain 10-30% unsaponifiable matter which is composed of 40% phytosterols and 15% tocopherols. Economically speaking, tall oil, a by-product resulting from the process used in papermaking, is the second most important raw material for phytosterol recovery.

Properties of Phytosterols :

Scientists cannot claim to have identified all the properties of phytosterols but those that are already known can justify their utilization.

The activity of phytosterols, that makes them most interesting at present is their ability to control moderate hypercholesterolemia by decreasing the synthesis of cholesterol and entering into competition with its binding sites. The mechanism of their action in cholesterol regulation is not fully clarified. Some phytosterols, for instance beta- sitosterol, show an anti-inflammatory activity and are known to play an anti-aging role through their action on the synthesis of fatty acids. Others are able to regulate the secretion of sebaceous glands and are used in the treatment of prostatic adenoma.

Phytosterols are not only interesting for their biochemical activities but also for their physicochemical properties. They are mainly lipophilic products with a hydroxyl group, which makes them slightly hydrophilic, This combination of hydrophobicity and hydrophilicity in the same structure implies an emulsifying property. This property could be improved by chemical modifications of the hydroxyl group. A consequence of this feature is that phytosterols have ability to control and regulate trans-membrane fluidity that finds an application in the pharmaceutical and cosmetics industries.

Squalene :

Squalene is a hexaisoprenoid or triterpene widely found in plant and animal tissue and is precursor of sterols, olive oil appears to have a cancer protective effect and this may be the result of its squalene content. There is some evidence that squalene reduces colon cancer and skin cancer. There are, however , reports that high levels of squalene intake increases total serum cholesterol and harmful LDL cholesterol, although other workers have shown that lower intakes of squalene had no effect on serum cholesterol.

Oryzanol :

Oryzanol is the ferulic acid ester of triterpene alcohols. Rice bran oil is the only vegetable oil which contains this unique micronutrient having beneficial biological effects. Oryzanol has been shown to reduce blood cholesterol, anti dandruff & anti itching properties, accelerates human growth, stimulates hormonal secretion, alleviates blood circulation, retards ageing etc.

Designing a healthy edible oil :

Defining a precise composition of the ideal healthy oil to be used for cooking and other purposes is difficult .However, fatty acid content should be dominated by monounsaturates such as oleic acid. Polyunsaturated fatty acids can also improve blood cholesterol profiles, although their susceptibility to oxidation (in vitro) could accelerate atherosclerosis in vivo, a major factor in cardiovascular disease. Linolenic acid is not heat stable and undergoes trans isomerization when heated. On the best available evidence, linolenic acid levels should be kept to a minimum in a healthy oil if it is to be subjected to repeated heating.

HEALTH ATTRIBUTES OF CONSTITUENTS OF EDIBLE OILS

Constituent	Cardiovascular Benefit	Anti-cancer Benefit
Monounsaturated fatty acids	+	?
Polyunsaturated fatty acids	+ / –	?
Squalene	?	+
Phytosterols	+	?
Polyphenols	+	+
Tocopherols	+	+
Carotenoids	?	+
Proanthocyanidins	?	+

Better understanding of the functions and effects of dietary fatty acids and lipids will lead to development of food products to improve nutrition and the quality of life.

Functions of Food Lipids : The overriding concern about dietary fat as a source of excess calories, saturated fatty acids, and cholesterol is justified for many segments of the population . The overriding concern about the role of dietary fat in CAD has tended to disregard the importance of lipids in determining food quality and the metabolic diversity of food lipids by tending to classify dietary fats solely as saturated or polyunsaturated and simply judging fats on the basis of their effects on plasma lipids or lipoproteins. This has resulted in a negative image of food fats that overlooks many useful attributes.

The various components of food lipids perform many desirable organoleptic, physical, nutritional, and biological functions that must be considered in making broad recommendations regarding dietary lipids. An understanding of these attributes and their mode of action should be helpful in developing more effective and perhaps safer strategies for motivating public acceptance of reduced fat foods and in facilitating the fabrication of foods with less fat but comparable satisfaction.

Nutritional and Biological effects :

In context of diet & nutrition, food lipids serve as a source of energy, provide essential nutrients (Linoleic acid, linolenic acid, and vitamins A,D,E and K), and facilitate the absorption of fat-soluble vitamins.

Dietary lipids are hydrolysed by pancreatic lipases, and the fatty acids and monoglycerides are absorbed in the upper segment of the small intestine. These are mostly resynthesized to triglycerides in the mucosal, epithelial layer and assembled into chylomicrons, which enter the bloodstream via the lymphatic system. These chylomicrons are metabolized in liver and tissues. Following uptake by the liver, both exogenous and endogenous fatty acids and cholesterol are incorporated into very-low density and low-density lipoproteins (VLDLs and LDLs), secreted into blood and transported to peripheral tissues, where, via lipoprotein lipase, they provide fatty acids for the various tissues.

Once absorbed, dietary lipids perform many diverse metabolic structural and regulatory functions. Fatty acids are facilely oxidized via beta-oxidation in muscle, heart and liver mitochondria as a source of energy for these tissues.

SOME FUNCTIONS AND EFFECTS OF THE VARIOUS DIETARY FATTY ACIDS

Fatty acid	Function/Effect
Medium-Chain	Rapid source of calories (energy)
Saturated	
Lauric (12:0)	Hyperlipidemic, Hypercholesterolemic, Prothrombotic
Myristic (14:0)	
Palmitic (16:0)	
Stearic (18:0)	Neutral or Hypolipodemic, Precursor of oleic acid
Monounsaturated	
Oleic (18:1) n-9	Hypolipidemic/hypochlosterolemic, Precursor of eicosatrienoic
	acid (20;3 , n-9) in essential fatty acid insufficiency
Eladic 918:1 trans)	Analogous to 18 :0
Erucic (22;1 , n-9)	Impaired fatty acid oxidation in heart of rat
n-6 Polyunsaturated	
Linoleic (18;2 , n-6)	Essential FA (45 mg/kg/day) component of acylglucoceramides,
	Precursor of arachidonic acid (AA), Hypolipidemic compared to
	saturated fatty acid, Hypotensive? Increases membrane fluidity
Gamma linolenic, 18:3 n-6	Precursor of eicosatrienoic acid and AA
Gama- Homolinolenic	Precursor of PGE series of eicosanoids
20;3 n-6	
Arachidonic acid 20:4, n-6	Memberane fluidity, Precursor of eicosanoids
n-3 Polyunsaturated	
Alfa-linoleic 18:3 n-3	Hypolipidemic, memberane fluidity, Precursor of EPA & DHA
	(essential ?) reduces eicosanoid synthesis
Eicosapentaenoic 20:5 n-3	Hypolipidemic, Reduces AA synthesis & eicosanoids, Precursor
	of PGI3, TXA3, Precursor of TXB5
Docosahexaenoic 22:6, n-3	Hypolipidemic, essential for vision, neural membranes? Reduces
	AA synthesis, Reduces eicosanoid in some cells (macrophages)

Essential fatty Acids :

Both plants & animals can make fats using building blocks known as fatty acids. The fatty acids we humans can make are called nonessential fatty acids because we don't need to get them from the food we eat. However, there are certain fatty acids that we can not make ourselves, but which are essential to health. These are called the essential fatty acids and needs to be taken via the diet.

Burr & Burr (1930) demonstrated that linoleic acid (LA) at 1-20% of dietary calories cures symptoms of essential fatty acids (EFA) deficiency; however, most interest in dietary LA in the US has focused on its ability to lower plasma cholesterol. In the 1950s, it was surmised that heart disease might possibly be a reflection of EFA insufficiency. When PUFAs from vegetable oils instead of SFAs were fed, a reduction in plasma lipids was observed . To further test this hypothesis, fish oils (which contain PUFAs but not the essential PUFA, LA) were tested. The fish oils were more effective in supressing plasma lipids, apparently disproving the EFA hypothesis. In the 1960s and subsequently, research on dietary fatty acids became devoted mainly to the effects of vegetable oil PUFA on plasma lipids and their linkage to heart disease. However, some researchers continued research to elucidate the mechanism (s) whereby dietary

LA relieved or cured the diverse symptoms of EFA deficiency; these include renal dysfunction, excess transepidermal water loss, bleeding, mitochondrial swelling, reproductive failure, etc..

It has been shown that dietary LA by metabolic process in the body gets desaturated and elongated to arachidonic acid (AA) which has significantly higher EFA potency as compared to LA. AA relieved most symptoms of EFA deficiency except the excessive dermal water loss. Subsequently, it was shown that in addition to servings precursor of AA and as a structural component of membrane phospholipids, LA was a required component of acylglucosylceramides of the subepidermal layer in skin and as such controlled transepidermal water loss.

The Arachidonic acid produced by metabolic process from dietary linoleic acid also gets metabolized further to important class of compounds called Eicosanoids.

The eicosanoids (prostanoids and leukotrienes) are important signaling agents which affect cell behavior and cell-to-cell interactions. They modulate secretory, smooth-muscle (contraction or relaxation), and cascade –type reactions which are essential to normal health. A deficiency of these compounds results in progressive impairment of function, while excessive or imbalanced production may result in a number of pathophysiological states e.g. inflammation, immunosuppression, arthritis, and thrombosis. Eicosanoids are particularly involved in cardiovascular, renal, and pulmonary functions and are especially involved in the protective (phagocytotic, immune) roles of blood cells such as platelets, monocytes, macrophages and neutrophils. The balanced production of these eicosanoids modulates short term local responses to injury, perturbation or infection that are required for normal health.

Functions of the Omega Fatty acids

Why are the Omega fatty acids so important to health? There are a number of reasons. Because they form important components of cell membranes, Omega oils are needed to prevent drying and flaking of the skin. They are also needed to ensure proper growth and development in infants and children. But two of the Omega oils most important functions

involve regulating the body's use of cholesterol and the production of substances that regulate nearly all other bodily processes.

Omega oils and the Body's Regulators

The body also uses the Omega oils to create a variety of chemicals called eicosanoids, that regulate a wide variety of bodily processes. The omega-3 and the Omega-6 families each produce their own eicosanoids. The important role these chemicals play within the body helps to explain why the essential fatty acids are so essential.

One of the most important groups of eicosanoids is the prostaglandins. Medical interest in prostaglandins-extremely active biological substances made only from essential fatty acids-has grown. Prostaglandins as used in this article may also include other eicosanoids.
Prostaglandins operate in most tissues of the body to regulate just about every bodily function, including:
Cardiovascular and Kidney system function, including dilation or constriction of blood vessels and clot formation

- Digestive system function, including regulation of stomach secretions.
- The healing and repair process, including regulation of cell division.
- Immune system function including allergy responses.
- The inflammatory process including fever and pain regulation.
- Nervous system function including regulation regulation of neural circuits in the brain.
- Reproductive system function, including induction of labor or menstrual cramps.
- Thermoregulation, or the maintenance of a constant body temperature.
- Various other functions, including control of fluid pressure in the eyes, ears and joints.

Prostaglandins constitute a local tissue hormone like system. They work with hormones, such as insulin, that are released directly into the bloodstream and act widely throughout the body. The prostaglandins translate the directives of hormones into local instructions for local cells and tissues. In this way, prostaglandins implement hormone function on the local level, in addition to carrying out other regulatory activities.

The Omega-6 and Omega-3 fatty acid groups each produce separate distinct prostaglandins with different functions. For good health, both types of fatty acids are needed, and in the right ratio. That vital balance is hard to achieve because Omega-3 is often missing from the modern diet. When optimal amounts of essential fatty acids are added to the diet many of the body's organs-including the skin heart and the body's ability to fight both cancer and infections is improved.

Prostaglandin imbalances can also lead to a loss of the body's ability to protect itself. For example, certain prostaglandins in the stomach govern the secretion of a protective stomach coating that prevents digestive acids from acting on the walls of the stomach. Without this coating, the stomach would digest itself. People may be more susceptible to stomach ailments when

prostaglandin imbalance's cause this safeguard to fail. Such imbalances are also believed to be responsible for similar safeguard failures in other parts of the digestive system

Sources of Omega-3 fatty acids

Plankton, a class of microscopic ocean plants at the base of the marine food chain, is rich in the first member of the Omega-3 family, ALA. Both fin fish and shell fish feed on the plankton and use the ALA to create the longer-chain DHA and EPA. Therefore, fish oils do not supply the similar ALA, which the body also needs. But flaxseed yields an oil that is very high in ALA.

Flaxseed oil and flaxseed from which it is made have been used in both cooking and health remedies since the days of ancient Greece and Rome. Until World war II, freshly squeezed flaxseed oil was delivered weekly to homes in Northern Europe as a cooking oil. Some families have a tradition of spreading a teaspoon of flaxseed over their breakfast cereal.

Although flaxseed oil has been used for centuries, it is not as popular in the United States as are some other vegetable oils, including some-walnut, soybean and wheat germ-that contain moderate amounts of Omega-3 ALA. However oil has the most ALA-50 to 60%. This makes it an ideal oil for cooking and for use as a diet supplement, especially if a medical condition already exists.

Flaxseed oil has some advantages over fish oil. Flaxseed oil is far more palatable than fish oil, especially when taken in large therapeutic quantities. Unlike fish oil, flaxseed oil can be used for cooking and in salad dressings, which provide easy ways to take large doses when needed. And unrefined flaxseed oil, unlike fish oil, is a source of lignin, a special kind of plant fiber that is associated with reduced incidence of breast, colon and prostate cancers.

The body can normally use ALA to make the EPA and DHA found in fish oils. However, there are indications that some individuals cannot produce enough EPA and DHA from dietary flaxseed oil. In such cases, fish-oil supplements may be needed. Also when flaxseed oil is the major Omega-3 in the diet of a pregnant woman, she may not be able to convert ALA into enough EPA and DHA to meet her own increased needs plus those of the fetus. Because these Omega-3 fatty acids are so important to the fetus's growth and brain development, supplements of fish oils for the mother may be necessary if she is unable or unwilling to eat seafood.

How do we get the omega-3 we need

Not all vegetable oils are alike. The Omega-6 fats have been restored via oils and margarine-often in too great abundance-to many American diets, but most diets still lack the crucial omega-3 oils. Moreover, the presence in our tissues of trans-fatty acids that interfere with cell membrane function requires additional Omega-3 fats just to undo that damage.

The most popular food oils are safflower, corn, sunflower, cottonseed and peanut oils, all of which are high in Omega-6 fatty acids- but none contain more than traces of Omega-3 fats. Soybean oil, normally a good source of both Omega-3 and Omega-6, seemed to be the answer. However, because of hydrogenation and the development of a soybean with little Omega-3, it has been a nutritional disappointment.

Chemist's now have the technology to reduce rancidity and still preserve essential fatty acids. I hope this technology will be used on a large scale as the public demand for Omega-3 increases.

With Omega-3 essential fatty acids stripped from our diets, do most of us get the nutrition we need?

Heart Disease and Omega-3

Only a disturbance in the body,s prostaglandin regulatory system, which depends on a proper balance of Omega fatty acids, can explain such a complex set of heart-attack triggers. For example, angina pectoris-acute chest pain caused by spasms that squeeze the coronary arteries- is related to prostaglandin-controlled spasms in other tissues, such as the spasm of the esophagus that cause choking or the spasm of the colon that causes diarrhea.

There is also evidence that prostaglandins are involved in maintaining a normal rhythm in the beating of the heart, and that Omega-3 fatty acids help prevent potentially fatal disturbances-called arrhythmias in the heartbeat. Such arrhythmias, which cause thousands of deaths each year, can occur even when a person does not have atherosclerosis. Arrhythmia is another potential danger of having too much thromboxane in the bloodstream, since a surplus of thromboxane can promote disturbances in the heartbeat. Since Omega-3 tends to reduce thromboxane levels, it can help keep the heartbeat regular. Omega-3 can also help keep a proper amount of calcium, an important heartbeat regulator, in the heart muscle. While there is no statistical evidence that Omega-3 can help prevent arrhythmias, this is the subject of intense research.

The Omega-3 fatty acids play diverse protective roles in keeping our hearts healthy. For example studies using fish oils that are high in the Omega-3 oils EPA and DHA show the following effects:

Reduction in levels of thromboxanes, the prostaglandin that promotes artery constriction and blood clotting

Increase in levels of a substance, produced by the blood vessels, that helps keep the arteries relaxed and inhibits abnormal platelet clumping

Increase in levels of clot-dissolving factors

Inhibition of a substance that promotes the growth of muscle within artery walls, a growth that leads to plaque buildup

Decreased production of a chemical responsible for causing the inflammation that contributes to plaque buildup

Thinner blood, leading to improved circulation

Increased flexibility of red blood cell membranes, which makes it easier for blood to flow through tiny capillaries

Often,the beneficial effects of Omega-3 oils produce noticeable results. For example, viscous or sludgy blood is often associated with diseased blood vessels in the feet, legs and hands. Pain in the legs after walking a short distance-a condition called intermittent claudication-is a frequent sign of the problem. Researchers suggest that the Omega-3 fatty acids improve sludgy blood by making the red blood cell membranes more flexible, which allows the cells to travel more freely through narrowed blood vessels.

A 1965 study showed that flaxseed –oil supplements, which are high in the Omega-3 essential fatty acids, significantly reduced the incidence of heart disease and related deaths. And other studies show that when flaxseed oil, or flaxseed meal baked into bread, is introduced into the diet, there are beneficial changes in the blood, as well as smoother functioning of the cardiovascular system-similar in many respects to the improvements seen with increasing the amount of fish in the diet, or with fish-oil supplements. And a 1974 report in the British journal Lancet found that an ALA-rich diet reduced deaths from cardiovascular disease by 70% over a 2 year period.

Diabetes and Omega-3

Although it was known in ancient times, diabetes has been an increasingly common problem in this century. It is now among the leading causes of death from noninfectious disease in the United states.

Two hormones produced by the pancreas-insulin and glucagon-cooperate to keep blood sugar, called glucose, at the correct level. When glucose levels are too high, the pancreas sends out insulin to force glucose from the blood-stream into the body's cells. If glucose levels are too low, glucagon sends glucose into the bloodstream for additional energy.

Diabetes occurs in two forms. The most serious form-called juvenile or Type 1 diabetes-usually strikes in childhood. It may arise from an attack by the immune system on either the insulin-producing cells of the pancreas or on the insulin receptors within the tissues.

In juvenile diabetes, an essential fatty acid deficiency can cause the immune system to turn against the body instead of defending it.

The more common form-called adult-onset or type 2 diabetes-usually appears later in life. In people who are predisposed by heredity to this form of diabetes, a diet high in sugar and fibreless carbohydrates can eventually stress the insulin production mechanism. Hypoglycemia or low blood sugar, may represent an early phase of diabetes, in which a hair-trigger response from the overworked pancreas sends out too much insulin. Eventually, the body stops responding to the pancreas's signals and blood levels of both insulin and sugar go up.

As we've seen, all hormones, including insulin and glucagon, exert their control over the cells by stimulating production of local regulatory chemicals called prostaglandins of local regulatory chemicals called prostaglandins. In turn, the prostaglandins pass the message of the hormones to the individual cells. The prostaglandins are made from essential fatty acids. Therefore, a deficiency of essential fatty acids or of the vitamins or minerals they need to be effective, interferes with prostaglandin production. This can intensify adult-onset diabetes even though adequate insulin is produced.

The essential fatty acids also affect the ability of the body's cells to respond to insulin. In a 1993 study, Australian researchers learned that insulin resistance is related to what kinds of fatty acids make up the cell membranes. The more Omega-3 and Omega-6 fatty acids there are in the cell membranes of adult diabetics, the more their tissues respond to insulin.

Omega Antiaging benefits

Most of us would like to fight the effects that age has on our bodies, and many of us go to great lengths in order to do so. But an antiaging regimen does not have to be either time-consuming or expensive. Here are four ways to help fight the aging process:

Make sure you get enough Omega-3 oil. Increase your fish consumption to at least one serving a week. Older people may benefit especially from fish-oil supplements containing the Omega-3 ultra polyunsaturates EPA and

DHA. Also supplement your diet with flaxseed oil.

Take a complete multivitamin and multimineral supplement every day. This supplement should include the antioxidants-beta carotene, vitamin C, Vitamin E and selenium.

Make sure you eat enough fiber-have a fiber appetizer before breakfast, lunch and dinner. Fiber not only prevents constipation, but it can also help clear out unneeded cholesterol from the body. Use flaxseed or flaxseed meal as a source of both the anticancer fiber called lignan and the essential fatty acids.

Participate in a program of aerobic exercise suitable to your strength and health. Aerobic exercises, which strengthen the heart and lungs include walking, jogging and cycling.

Within these guidelines, try eating different ratios of protein, carbohydrate, and fat over a three-week period. Note your reactions by keeping a food diary-it will help you find your optimum diet. High protein meals are often used as supplemental diets before surgery or to give debilitated people a boost. Avoid high-protein diets, however, if you have liver or kidney disease, because the body's processing of proteins places an additional burden on these organs.

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Oil Sources of Omega fatty acids (Grams per 100 gram)

Sources	Omega-6 EFA 1	**Omega –3 EFA**				
	Linoleic	Alfa Linolenic	EPA	DHA	Total EFA	Total fat
FISH OIL						
Cod, Atlantic	1.2	0.8	12.4	21.9	41.7	100
Halibut, pacific	0.9	0.3	10.1	7.9	26.9	100
Mackerel	1.1	1.3	7.1	10.8	29.3	100
Rockfish	1.6	0.8	11.7	17.4	36.1	100
Salmon, Chinook	1.1	0.9	8.2	5.9	20.6	100
Salmon, coho	1.2	0.6	12.0	13.8	33.6	100
Sole, lemon	0.7	2.0	14.7	6.8	36.6	100
Tuna, albacore	0.7	0.6	6.5	17.6	25.4	100
Tuna, Bluefin	1.3	Treces	6.6	20.8	28.7	100
FISH LIVER OIL						
Cod, atlantic (3)	1.5	0.9	8.0	14.3	29.7	100
SHELLFISH OIL						
Oyster. Pacific	1.2	1.6	21.5	20.2	51.7	100
Scallop, sea	0.6	0.3	21.3	26.2	55.7	100
Vegetable oil, omega 6 Sources Tropical to temperate climates						
Cashew	16	0.4	0	0	16	100
Coconut	3	N/A	0	0	3	100
Corn	57	0.8	0	0	58	100
Cottonseed	48	0.4	0	0	48	100
Evening Primrose$	72	0.2	0	0	81	100
Olive						
Peanut	9	0.7	0	0	10	100
Poppy seed	29	1.1	0	0	30	100
Pumpkin seed	69	N/A	0	0	69	100
Safflower	51	N/A	0	0	51	100
Sesame	58	N/A	0	0	58	100
Sunflower	42	0.5	0	0	42	100
	53	N/A	0	0	46	100
Vegetable oil Omega-3 Sources-temperate to polar climates						
Canola, rapeseed	22	11	0	0	33	100
Chestnuts, European	35	4	0	0	39	100
Flaxseed, Linseed						
Hempseed	15	55	0	0	63	100
Perilla	62	19	0	0	81	100
Soybean	16	67	0	0	83	100
Walnut	53	7	0	0	60	100
Walnut, black	67	4	0	0	71	100
Walnut, English	62	7	0	0	69	100
Wheat germ	55	11	0	0	66	100
	54	7	0	0	61	100
ANIMAL FAT						
Beef tallow	4	0.7	N/A	N/A	4.2	100
Butter	1.8	1.2	N/A	N/A	3.0	80
Chicken fat	17	1.1	N/A	N/A	17.6	100
Lard	10	1.4	N/A	N/A	11.8	100
Mutton fat	5	2.9	N/A	N/a	8.1	100

1 EFA=Essential fatty acids. Total EFA includes these listed plus others if any are not listed here.
3 Toxic at high dosages
5 Contains 8.6 grams of Omega-6 gamma linolenic acid (GLA)

Dietary Cholesterol

The original simple story in the 1950s was that high cholesterol levels increase heart disease risk. Cholesterol shuttles through the blood in an array of packages. Low-density lipoprotein particles (LDL, the bad cholesterol) deliver fat and cholesterol from the liver to tissues that need it. Including the arterial cells, where it can lead to atherosclerotic plaques. High-density lipoproteins (HDLs, the good cholesterol) return cholesterol to the liver. The higher the HDL, the lower the heart disease risk. Then there are triglycerides, which contain fatty acids, and very low density lipoproteins (VLDLs), which transport triglycerides.

All of these particles have some effect on heart disease risk, while the fats, carbohydrates, and protein in the diet have varying effects on all these particles. The 1950s story was that saturated fats increase total cholesterol , polyunsaturated fats decrease it, and monounsaturated fats are neutral. By the late 1970s – when researchers accepted the benefits of HDL-they realized that monounsaturated fats are not neutral. Rather, they raise HDL, at least compared to carbohydrates, and lower LDL. This makes them an ideal nutrient as far as cholesterol goes. Furthermore, saturated fats can not be quite so evil because, while they elevate LDL, which is bad, they also elevate HDL, which is good. Stearic acid raises HDL level but does little or nothing to LDL.

It has been shown that in a majority of people, homeostatic mechanisms operate to maintain blood cholesterol within a certain range. This occurs by feedback inhibition of cholesterol biosynthesis in the liver by dietary cholesterol. When dietary cholesterol is abundant, liver biosynthesis is shut down. conversely when there is little cholesterol in the diet, the enzymes of cholesterol biosynthesis increase in activity to maintain a supply of cholesterol for membrane structures, synthesis of bile acids and steroid hormones.

Importance of Cholesterol :

Cholesterol plays a key role in regulating the flexibility of muscles. It is also important for the formation of bile salts which behave as emulsifiers, solubilizing the dietary fats so that they can be digested and absorbed in small intestines. It is the starting point for the formation of a multitude of steroid hormones such as the male and female sex hormones. It can also be converted, in the presence of the sun's ultra violet light into Vitamin D in the skin.

Trade News

The World's Commercial Olive Groves Are Shrinking

The shift to super-intensive cultivation, low prices for olives and olive oil, and the surplus on the international market were identified as factors that led to the reversal of a decades-long trend. For the first time in 22 years, the global surface area of olive trees that are cultivated for commercial purposes has decreased. The largest drop has been noted in Italy, Spain, Greece, Jordan and Syria, all of which are countries where the internal consumption of olives and olive oil have decreased.

"The international olive cultivation surface area has grown over the last two decades with more than a million hectares (2.47 million acres), mainly with modern cultivation – intensive and super-intensive – and the countries in which olives are cultivated grew from 46 to 65," Juan Vilar Hernández, an industry analyst and professor at the University of Jaén, told Olive Oil Times. "In 22 years, this is the first year in which the international olive tree surface decreased," he added.

Benítez, an olive oil consultant and professor of agronomy, found this reversal in the decades-long trend while updating their co-authored olive cultivation manual, International Olive Growing: Worldwide Analysis and Summary.

Vilar clarified that for the purposes of the study, the global surface area is where olive trees are cultivated for commercial purposes. Olive trees that have been abandoned or not used for commercial purposes are not included in the international tree surface area figure, even if the trees are still alive. One of the main reasons for the shrinking surface area is that growers are switching to more profitable options, such as growing almond and walnut trees. "Now (that) international oliviculture is a mature market… companies are increasing the surface in which they are cultivating almond trees," he said.

Vilar expects the market for almonds to continue increasing for the next eight to 10 years. The second factor that Vilar and Pereira identified as causing the world's commercial olive groves to shrink is that modern olive tree cultivation is overtaking traditional oliviculture.

Traditional olive cultivation – which makes up 70 percent of the global olive tree surface area – cannot compete with intensive and super-intensive olive tree cultivation. "More than 70 percent of the international olive tree surface is losing money," Vilar said. The third reason for the decrease that the pair identified is that the international stock of olive oil in the world is at its highest point ever.

When the manual was finalized in 2018, 58 olive-growing countries were noted. Vilar said that despite the decrease of the global surface area, the number of olive-growing countries, which were noted by the more than 300 researchers that contributed to the manual, has increased to 65 countries this year.

San Marino, Canada, Eritrea, Oman, the United Arab Emirates and Ukraine are among the most recent countries to be added. Pereira said that there was not a sudden increase in olive producing countries. In fact, some of these countries have been growing olive trees for a few years, but the researchers for the reference guide only recently became aware of them.

He added that in some parts of the world, more commercial olive groves are also being grown, such as in North Africa, China, the United States and Brazil. Vilar explained that the general increase in olive growing countries is due to the availability of cheap land for agriculture outside of Europe. "None of the largest olive tree farms are in Europe," he said.

The sheer scale of these farms coupled with the low cost of production made them highly profitable. Vilar added that in some of these newly minted olive grove hubs oliviculture is introduced by the people moving from countries, such as Greece, Spain and Italy.

One of the factors that the guide does not identify is impacting global olive grove surface area was Xylella fastidiosa, in spite of the havoc it has brought to Puglia. "The influence of Xylella fastidiosa is mainly in the south of Italy," Vilar said.

He added that Xylella poses a more serious threat when olive trees are abandoned. These give the insect vectors the opportunity to spread the disease from olive tree to olive tree unimpeded, which he said is a real risk. However, Pereira said that Xylella played a direct role in the decrease of the olive grove area in Italy. "Between five and eight million olive trees have been lost in the Puglia region," he said, "which together with the climatic effects, has led to the production of olive oil that is 40 percent lower than previous years."

Looking to the future, both Pereira said that this decrease in commercial olive grove surface area will last as long as olive oil prices remain low in major producing countries, such as Spain. "Prices are the incentive for crop development," Pereira said. "The trend in Spain is low prices, so there are producers who abandon olive groves. As prices improve and the crop becomes more profitable, the trend may change." Vilar added that he believes the decrease in the global olive surface area is temporary. "In traditional olive-growing countries many

olive farmers are either retired people or people with other jobs who farm commercially over weekends and holidays," he said.

"When prices for olive products recover, these farmers will once again start cultivating their groves," he added. "[However], some groves, for instance, those located in the mountain and so forth, will be permanently abandoned."
Courtesy: Olive Oil Times

Catching sesame oil adulteration, with machine learning

Sesame oil is a popular condiment in China and other Asian countries, but its premium price has led to fraud by the sale of cheap vegetable oil adulterated with sesame oil essence. One of the drivers for sesame oil's popularity is its role as a flavour enhancer, but it is also viewed as a health ingredient. Sesame oil is rich in fatty acids, sesamin, sesamolin, sesamol, tocopherols and inorganic elements, that have been linked to positive health benefits, and opened up lucrative export markets for Chinese producers in other regions of the world including the US and Europe.

Now, researchers from Yanshan University in China have developed a technique to speed up the testing of sesame oil samples based on a combination of 3D fluorescence spectroscopy and machine learning using AlexNet, a convolutional neural network or CNN.

3D fluorescence spectroscopy is already becoming a go-to technology for analysing oil samples, but is somewhat compromised because vegetable oils have limited fluorescence spectra, making differentiation of one type from another challenging.

Adding the machine learning element to the analysis has improved the accuracy – in fact, the researchers suggest that their technique was able to identify whether a sample was counterfeit with 100 per cent accuracy, whilst simultaneously predicting the concentration of sesame oil essence.

Importantly, the testing doesn't destroy the sample, and the AlexNet CNN analysis "provides ideal and abundant data information for statistical analysis" with a short experiment time, as it sidesteps a "cumbersome tuning process and…dependence on high-performance computers."

"This provides a new method for the field of food safety and quality identification, which is important for maintaining the normal operation of the oil market," say the scientists. "Once the counterfeit sesame oil is sold in the market, the health of consumers and the normal operation of the market will be damaged considerably."
Courtesy: journal Food Chemistry.

Palm Oil: Local Consumption Down, Export Picks Up During Pandemic

Jakarta. The Indonesian Palm Oil Association, or Gapki, has reported higher export of palm oil but lower domestic consumption of the commodity during the coronavirus pandemic.

Domestic consumption in March decreased by 3.2 percent – from 786,000 tons in February to 721,000 tons in March. During the same period, local food consumption also fell by 8.3 percent, while sales of palm oil for oleochemical products rose by 14.5 percent. "Palm oil consumption fell as food consumption fell. People are uncertain when the pandemic will be over.

Meanwhile, hand sanitizer producers need more palm oil to ramp up production," Gapki director Mukti Sardjono said in a press release on Wednesday. He said out of 68,000 tons of palm oil sold to the oleochemical industry, 55 percent was for hand sanitizers.

Palm oil export rose by 3.3 percent or 185,000 tons from 2.53 million tons in February to 2.72 million tons in March. Meanwhile, CPO export rose by 113,000 tons from 524,000 tons in February.

Bangladesh, South Africa and the third-largest global palm oil consumer, China, were responsible for the highest export surges in the period. "The export surge to China started happening once they managed to get a handle on Covid-19," Mukti said.

Meanwhile, exports to Pakistan and the United States – the current global pandemic epicentre – had gone down. Exports to Europe, the Middle East and India were normal.

However, India had recently adopted import restrictions on refined palm oil products, which might put pressure on the industry later down the line.

The price of crude palm oil (CPO) also dropped from $722 per ton in February to $636 per ton in March, mainly thanks to lower food consumption as restaurants close up shops during the pandemic.

Malaysian palm oil producers told Reuters on Tuesday the outlook for the industry this year is grim as a full recovery is not expected to happen until the last quarter next year. They said countries shifting to biodiesel might help to slow stock build-up. Indonesia began mandatory use of B30 – diesel fuel made up of 30 percent biofuel from palm oil – last month and is already preparing to use the upgraded version, B40, starting in July 2021.

Mukti said palm oil production is still running normally despite the pandemic, but physical distancing is in place at factories. "We have to improve productivity and efficiency to keep the industry viable," he said. Dry

season in most parts of Indonesia will start in May and peak in August, and drought is expected in several places. "People say it's not going to be as bad as last year's drought, but forest fires could still happen. Gapki has issued a forest fire prevention protocol to protect the plantations," Mukti said.
Courtesy: Jakarta Globe News

Safflower oil hailed by scientists as possible recyclable, biodegradable replacement for petroleum

Australian scientists may have achieved a decades-long quest to find a plant-based alternative to petroleum-based engine oils, one that can be recycled, reused and breaks down in the environment.

Key points:
- Researchers have hailed Australian safflower oil as a potential replacement for petroleum
- Scientists are developing new varieties of safflower to be used specifically as a biofuel
- Interest from the US could mean export opportunities for Australian producers

The answer, they say, lies in a field of brown prickly thistles called safflowers.

The first commercial field trials have now been harvested at a range of sites, from northern New South Wales to southern Victoria. Initial studies show safflower oil to be a superior lubricant that has lower emissions than conventional petroleum-based products, and reduces friction and wear on engine components.

Agronomist David Hudson, a 40-year veteran of Australia's cropping industry, has been overseeing the safflower field trials and believes the oil offers unique benefits when it comes to sustainability.

"We can take it back, add another additive into it and we can actually recycle it back into our motor mowers, chainsaws and those types of oils, which can then be broken down in the environment," he said. "So you virtually have a net zero carbon cycle." Victorian grain grower David Jochinke, who participated in the trials, said the prospect of pioneering a biofuel was exciting.

"To have a product that needs very little refining, is biodegradable, is a bio-energy, is a bio-fuel, is something that displaces petroleum, something that's been traditionally used in high-temperature, high-pressure applications, it's very exciting," he said. "As a farmer, it's a great thing to use that technology and be very proud to have been a part of the bigger picture."

The science behind the golden oil

The biofuel is produced from specially-bred safflower with high levels of oleic acid, the culmination of 18 years of work by CSIRO plant scientists. Oelic acid is a lubricating compound with a range of uses, from heart pacemakers to cosmetics.

Conventional safflower, one of humanity's oldest crops, contains low levels of the acid, but Australian scientists have re-engineered it using gene silencing. The result is a variety which yields up to 93 per cent oil, the highest level of purity in any currently available plant oils. The CSIRO-developed variety is being constantly improved to suit a range of growing conditions, although safflower is a naturally hardy crop.

It has a giant tap root, so its ability to find deep moisture gives it enormous drought tolerance, and an advantage over crops like canola, wheat and lentils. It also thrives in salty and sodic soils, a problem across much of Australia's temperate cropping zone. Scientists at Melbourne's La Trobe University are screening and assessing countless varieties of the crop. "[They] all have a variety of traits, including different types of oil content, days to flowering and other traits, like disease resistance, that are going to be desirable," said Ulrik John, a plant molecular biologist working on safflowers. "We're going to try and use the diversity within that 400 plants to set up a new germplasm collection to generate the varieties of tomorrow." Dr John is also attempting to navigate safflower's agronomic quirks. "Without exception, no matter what time you plant the variety during the year, it will always flower on the 21st of December," he said. "We're trying to trick the plant into believing that it can flower three times a year by increasing the day length so that the plant gets deceived."

Hailed as a 'gamechanger' in the US

Researchers at Montana State University's Advanced Fuel Centre in the United States have been comparing safflower oil's performance under heat and pressure with conventional oil in a large diesel engine. Senior researcher Randy Maglinao said the results were more than promising. "It's a breakthrough, a gamechanger for bio-based lubricants," Dr Maglinao said. "It's better than what we see in petroleum." Watching these results closely is Michael Kleinig, the CEO of Go Resources, the Australian company with the commercial rights to the hybrid safflower variety.

Michael Kleinig sees great potential in Australia's safflower crops for export. He is excited about the commercial possibilities for export. "We're not turning the Queen Mary around from petroleum-based oils, but it can go into every aspect of where petroleum oils are used, so it's a massive market," he said.

The US has mandated all government departments, including the military, must move to using plant-based lubricants by 2025, and Go Resources is aiming to

secure some supply contracts. "This will be great export money for Australia," Mr Kleinig said. "Royalties go back to CSIRO to invest in further fantastic plant research."
Courtesy: ABC News

Rhamnolipids rise as a green surfactant

Advances in manufacturing are bringing a biosurfactant up to commercial scale. A facial cleanser is being launched in the market based on a new surfactant: rhamnolipids.

Booni Doon's Calm Cleansing Capsules are one of the first consumer products in the US to feature the promising biosurfactant. Last year in Chile, Unilever launched a variety of its Quix dish soap based on rhamnolipids from Evonik Industries. And earlier this year, in another sign of confidence, the surfactant maker Stepan purchased the NatSurFact rhamnolipid business from Logos Technologies.

Industry insiders say the time is right for rhamnolipids after years of promise but little use in consumer applications. New production technology is starting to operate that can produce them at commercial scale. At the same time, consumer demand is increasing for milder ingredients that are biobased, biodegradable, and sustainable. "Not many ingredients tick all the boxes," says Hans Henning Wenk, vice president of R&D Care Solutions at Evonik, but rhamnolipids do.

A surfactant, short for surface active agent, is any molecule that attracts both polar and nonpolar substances, decreasing the surface tension between them and allowing them to mix. Soap is one type, as are conventional semisynthetic surfactants such as sodium laureth sulfate, which is made by chemically modifying tropical oils.

The biggest market for surfactants is home and personal care, accounting for three-quarters of the $40 billion in annual surfactant sales, according to industry veteran Neil Burns. Other large markets include cosmetics, agriculture, enhanced oil drilling, and environmental remediation.

The industry defines biosurfactants as natural surfactants excreted by an organism. Commercially, they're made by large-scale fermentation of oil, sugar, or a combination of the two. In the case of rhamnolipids, they don't need any chemical processing or derivatization once isolated from the fermentation broth, though extensive purification is required.

Rhamnolipids consist of one or two rhamnose sugar groups attached to one or two fatty acid chains. The sugar groups provide attraction to water; the fatty acids help the surfactants grab onto oils and other nonpolar substances.

Rhamnolipids are mild on the skin, have a low carbon footprint, work well in hard or soft water, and are effective cleansers with a satisfying foam, according to Dan Derr, who helped develop NatSurFact for Logos and is now consulting. Formulators can use rhamnolipids as a mixture or select for specific properties by dialing in the length of the carbon chain and the number of rhamnose units, says Jason Keiper, chief technology and sustainability officer at Stepan.

"For me, it was really important that any surfactant that we use is not just good for the skin, but also very friendly and almost kind to the environment," says Pooja Ganesan, founder and CEO of Booni Doon. She also needed a powder for Booni Doon's cleanser, a dry formulation that you mix with water in your hand, and rhamnolipids were one of the few biosurfactants available dry.

Although rhamnolipids were first characterized in the 1950s and 1960s, until now, no one has been able to make them at a scale and efficiency good enough that they could compete in large-volume markets such as personal care. "Rhamnolipids are one of these industries that for at least 30 years has been five years away," Derr says.

A smattering of rhamnolipid patents date back to the 1980s, but activity picked up around 2007 with patents or applications from Logos, Evonik, the US Department of Agriculture, fermentation firm Jeneil Biotech, and rhamnolipid specialist AGAE Technologies.

Most producers use Pseudomonas aeruginosa, a Gram-negative, pathogenic bacteria, to make their rhamnolipids. "P. aeruginosa is a voracious organism. It'll eat anything." Derr says. "If you put it in an oil-rich environment where it doesn't have other carbon sources to eat, it'll produce rhamnolipids to emulsify the oil, then it can ingest the oil and consume it."

Optimized fermentation strategies and improved extraction and concentration methods are now offering rhamnolipids on a larger scale. The patents that Stepan bought from Logos describe using small amounts of sugar along with the oil to help the microbes synthesize rhamnose, shifting the pH of the broth to toggle the rhamnolipids' water solubility, and methods for semicontinuous product extraction.

Evonik's patents describe inserting genes from P. aeruginosa into the related bacteria P. putida. Evonik made the switch, according to Wenk, because unlike its aeruginosa cousin, P. putida is not a pathogen, which means it is less risky—and costly—to handle. P. putida is also a common organism in the biotech world, he says, so it is well characterized and not difficult to manipulate.
But customers in personal and home care may not be keen on a product produced by a genetically modified organism. Stepan is taking a cautious approach to

genetic modification as it optimizes production, Keiper says. "We want to make sure that for the markets we have ambitions to supply and grow into, we're mindful of the requirements of not only our customers but also the end consumers."

Wenk counters that Evonik's process leaves no organisms and no detectable DNA, and uses no genetically modified feedstock crops. Another advantage, he says, is it allows the firm to use sugars as the only carbon source. "Getting away from oils as a feedstock was a big step," he says. Large-scale oil-based processes often end up using unsustainably harvested tropical oils, he notes, whereas sugars come from a wider variety of crops.

Evonik has a long history of making specialty chemicals by fermentation, such as amino acids and omega-3 fatty acids. A surfactant with strong foaming action was a new challenge. "In the early stages, we had more than one 'foam party' in the lab," Wenk recalls. The team later struggled with purification and removing color and odor.

Evonik is now regularly making commercial quantities of rhamnolipids at a site in Slovakia and is designing a dedicated plant that will produce "low double-digit kilotons" starting in 2023. Stepan is supplying NatSurFact's existing customers with samples and making plans for expanded production; Keiper says the firm expects its rhamnolipids to be in consumer products within the next few years.

Beyond these two big chemical companies, a number of smaller players have been quietly honing their rhamnolipid processes for years. In some cases, they have fewer patents protecting their methods, relying instead on trade secrets. "Fermentation has more tricks of the trade that aren't patentable than in traditional reactant chemistry," Burns tells C&EN.

Jeneil Biotech got into the rhamnolipids game almost by accident, president Neil Gandhi says. Jeneil is a fermentation specialist that primarily makes flavor molecules and probiotics. One way to get to strawberry flavor is through rhamnose, a high-value sugar in its own right, and one way to get rhamnose is through rhamnolipids.

A collaboration with the University of Arizona brought Gandhi's attention to the antifungal properties of rhamnolipids. The firm's biggest rhamnolipid product is Zonix, an organic-certified biofungicide. Jeneil sells other grades of rhamnolipids for home and personal care, seafood equipment degreasing, and bioremediation.

AGAE Technologies, which started in 2011, is spread across four sites in Corvallis, Oregon, and just signed a lease on a fifth location. Marketing and sales director Dustin Nelson says AGAE already produces high-purity rhamnolipids at commercial scale. The firm is working to boost production of lower-purity grades and bring down its pricing overall.

Depending on purity and volumes, rhamnolipids cost 10–30 times as much as conventional surfactants, according to industry players. Although that's high, it's a big drop from just a few years ago, when they were 1,000 times as expensive as their conventional counterparts, Nelson says. "This is now an economically viable large-scale project." A good surfactant can be effective even if it makes up only a small percentage of the final product, making price differences less impactful than they might be for other ingredients.

If prices continue to come down, rhamnolipids could proliferate. Each firm has a different answer when asked about its biggest market for rhamnolipids. When Logos launched NatSurFact, Derr says, cosmetics and personal care product makers called him the most. Keiper says agriculture and oil field applications are Stepan's priority markets. AGAE cites bioremediation, Jeneil has its biofungicide line, and Evonik is doing large volumes in cleaning products.

Pairing different biosurfactants opens up even more options. For example, Derr and his team experimented with a water-based all-purpose cleaner that was 1% rhamnolipids and 2% sophorolipids—related, low-foaming biosurfactants—and found it was excellent at cleaning oily surfaces. "Sophorolipids are better emulsifiers than rhamnolipids, and rhamnolipids are better cleansers," Derr says.

Rhamnolipids are attracting investment now precisely because the surfactant world has been aware of them for so long, according to Burns. "They're interesting because they're not new. New is hard," he says. "Old chemicals have a lot of history and scrutiny. Something truly brand-new has none of that."

Booni Doon and Quix are at the forefront of what could be a wave of rhamnolipids in personal and home care. Booni Doon's Ganesan says she was nervous about bringing a "new" ingredient through safety testing and onto the market. "I think most people just don't know what rhamnolipids are," she says.

The moves by big firms like Stepan and Evonik are signs that rhamnolipids' time has come, Burns says. "If you see a surfactant take its place in a decent-size brand . . . that's thousands and thousands of tons. That says it's cost-competitive, widely available, and it's been scrutinized to death with respect to environmental impact and toxicology."

Jeneil's Gandhi agrees. "It's really the beginning of this exploration," he says, "to see where formulators can take this and find practical, innovative ways to use it."
Courtesy: c&en

Important Figures

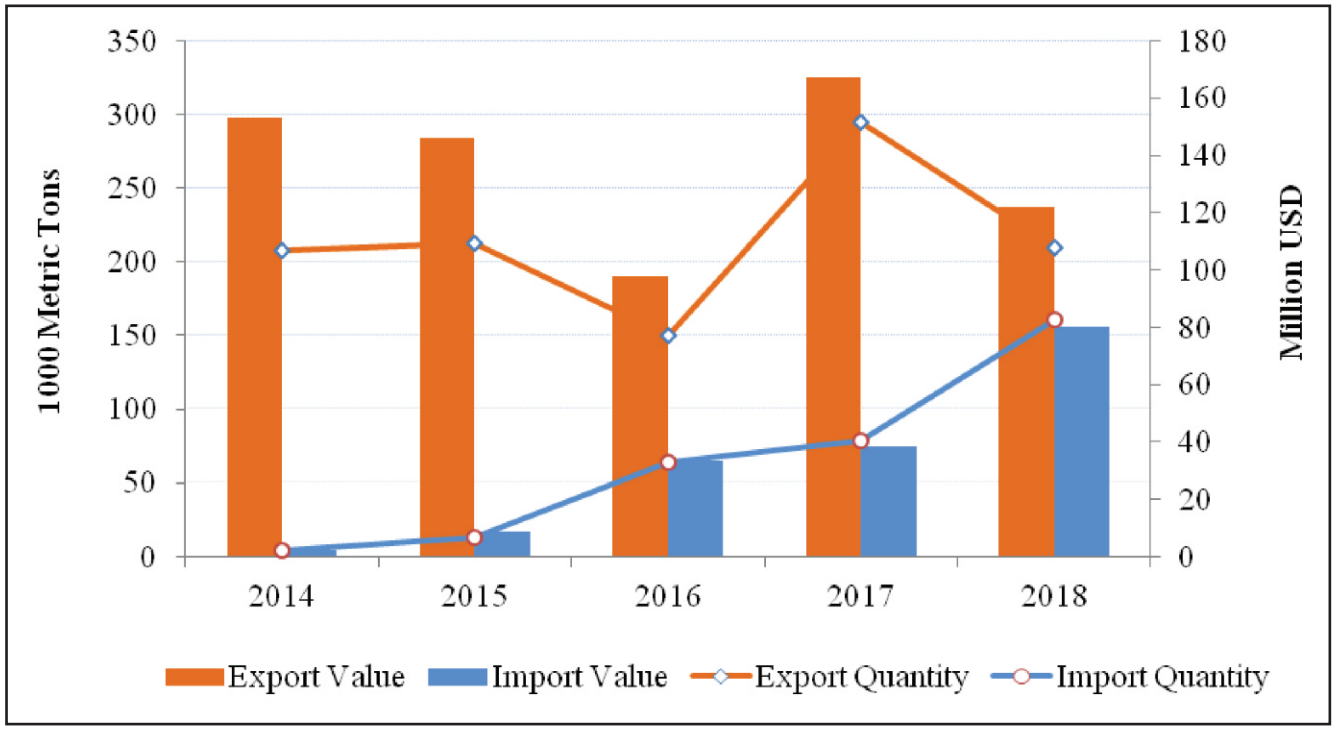
Oilseeds and Products

Commodities :
Oilseed, Soybean, Rapeseed, Peanut, Cottonseed, Sunflowerseed, Copra

Table 1. INDIA: TOTAL OILSEEDS PSD

OILSEEDS (1000 metric tons)	MY 2017/18	MY 2018/19	MY 2019/20
	Revised	Estimate	Forecast
Area	37150	37045	38250
Beginning Stocks	2337	1609	1297
Production	34785	35350	38100
MY Imports	1181	1138	1070
Total Supply	38303	38097	40467
MY Exports	782	779	920
Crush	28175	28580	30280
Food Use Dom. Cons.	2600	2350	2640
Feed Waste Dom. Cons.	5137	5091	5450
Total Dom. Cons.	35912	36021	38370
Ending Stocks	1609	1297	1177
Total Distribution	38303	38097	40467
Yield	0.94	0.95	1.00

Figure 1. India: Soybean Trade in Last Five Years



Source: Global Trade Atlas

Table 2. India: Open Market Prices vis-à-vis Minimum Support Price

Commodity (Fair Average Quality)	**Minimum Support Price (INR/100 kg)**			**Market Price* in 2018/19**
	2018-19	2017-18	2016-17	
Soybean	3399	3050~	2775	2960-3865
Rapeseed, and Mustard	4200	4000^	3700	3300-3850
Peanut (in shell)	4890	4450 ^^	4220	NA
Sunflower seed	5388	4100*	3950	3500-4750

Bonus of ^: INR 100, ^^: INR 200, *: INR 100 and ~ INR 200 included
Source: Directorate of Economics and Statistics and Directorate of Agricultural Marketing, GOI.

Production, Supply and Demand Data Statistics

Table 3. India: Commodity, Oilseed, Soybean, PSD
(Area in 1000 hectares and production in 1000 metric tons)

Oilseed, Soybean	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct 2017		Oct 2018		Oct-2019	
India	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted	10550	10600	11500	11000	0	11600
Area Harvested	10400	10600	11000	11000	0	11600
Beginning Stocks	880	880	189	129		149
Production	8350	8800	11000	11300	0	12000
MY Imports	166	166	80	70	0	0
Total Supply	9396	9846	11269	11499	0	12149
MY Exports	217	217	250	250	0	300
Crush	7700	8300	9000	9600	0	10000
Food Use Dom. Cons.	420	300	440	400	0	450
Feed Waste Dom. Cons.	870	900	880	1100	0	1200
Total Dom. Cons.	8990	9500	10320	11100	0	11650
Ending Stocks	189	129	699	149	0	199
Total Distribution	9396	9846	11269	11499	0	12149
Yield	0.8029	0.8302	1	1.0273	0	1.0345

Table 4. India: Commodity, Oilseed, Rapeseed, PSD
(Area in 1000 hectares and production in 1000 metric tons)

Oilseed, Rapeseed	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct 2017		Oct 2018		Oct-2019	
Indias	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted	6600	6700	6500	6940	0	7200
Area Harvested	6000	6700	6000	6940	0	7200
Beginning Stocks	439	439	419	304	0	194
Production	6450	6500	6600	7200*	0	7800
MY Imports	0	0	0	0	0	0
Total Supply	6889	6939	7019	7504	0	7994
MY Exports	0	15	0	20	0	15
Crush	5500	5600	5600	6200	0	6500
Food Use Dom. Cons.	650	700	650	750	0	890
Feed Waste Dom. Cons.	320	320	325	340	0	375
Total Dom. Cons.	6470	6620	6575	7290	0	7765
Ending Stocks	419	304	444	194	0	214
Total Distribution	6889	6939	7019	7504	0	7994
Yield	1.075	0.9701	1.1	1.0375	0	1.0833

*: this figure was valid until March 2019. Any subsequent revision will appear in next quarterly update.

Table 5. India: Commodity, Oilseed, Peanut, PSD
(Area in 1000 hectares and production in 1000 metric tons)

Oilseed, Peanut	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct 2017		Oct 2018		Oct-2019	
India	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted	5000	5000	5200	4300	0	4500
Area Harvested	4925	5000	4700	4300	0	4500
Beginning Stocks	574	574	680	682	0	510
Production	6650	6800	4700	5000	0	5600
MY Imports	3	3	3	3	0	0
Total Supply	7227	7377	5383	5685	0	6110
MY Exports	747	545	750	500	0	600
Crush	3900	4000	3000	3000	0	3400
Food Use Dom. Cons.	1500	1600	1000	1200	0	1300
Feed Waste Dom. Cons.	400	550	400	475	0	480
Total Dom. Cons.	5800	6150	4400	4675	0	5180
Ending Stocks	680	682	233	510	0	330
Total Distribution	7227	7377	5383	5685	0	6110
Yield	1.3503	1.36	1	1.1628	0	1.2444

Table 6. India: Commodity, Oilseed, Cottonseed, PSD
(Area in 1000 hectares and production in 1000 metric tons)

Oilseed, Cottonseed	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct 2017		Oct 2018		Oct-2019	
India	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted (Cotton)	12450	12430	12250	12350	0	12450
Area Harvested (Cotton)	12450	12430	12250	12350	0	12450
Beginning Stocks	444	444	463	494	0	444
Production	12312	12380	11463	11600	0	12460
MY Imports	7	0	10	0	0	0
Total Supply	12763	12824	11936	12094	0	12904
MY Exports	0	0	0	0	0	0
Crush	9200	9000	9000	8500	0	9100
Food Use Dom. Cons.	0	0	0	0	0	0
Feed Waste Dom. Cons.	3100	3330	2800	3150	0	3370
Total Dom. Cons.	12300	12330	11800	11650	0	12470
Ending Stocks	463	494	136	444	0	434
Total Distribution	12763	12824	11936	12094	0	12904
Yield	0.9889	0.996	0.9358	0.9393	0	1.0008

Table 7. India: Commodity, Oilseed, Sunflowerseed, PSD
(Area in 1000 hectares and production in 1000 metric tons)

Oilseed, Sunflowerseed	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct 2017		Oct 2018		Oct-2019	
India	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted	330	360	350	255	0	250
Area Harvested	330	360	350	255	0	250
Beginning Stocks	0	0	0	0	0	0
Production	230	305	280	250	0	240
MY Imports	2	2	2	0	0	0
Total Supply	232	307	282	250	0	240
MY Exports	3	3	4	4	0	0
Crush	200	267	260	220	0	215
Food Use Dom. Cons.	0	0	0	0	0	0
Feed Waste Dom. Cons.	29	37	18	26	0	25
Total Dom. Cons.	229	304	278	246	0	240
Ending Stocks	0	0	0	0	0	0
Total Distribution	232	307	282	250	0	240
Yield	0.697	0.8472	0.8	0.9804	0	0.96

Table 8. India: Commodity, Oilseed, Copra, PSD
(Area in 1000 hectares and production in 1000 metric tons)

Oilseed, Copra	2017/2018		2018/2019		2019/2020	
Market Begin Year	May 2017		May 2018		Oct 2019	
India	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted	0	0	0	0	0	0
Area Harvested	2230	2060	2230	2200	0	2250
Beginning Stocks	0	0	0	0	0	0
Production	750	1010	750	1065	0	1070
MY Imports	0	0	0	0	0	0
Total Supply	761	1010	750	1065	0	1070
MY Exports	2	2	5	5	0	5
Crush	759	1008	745	1060	0	1065
Food Use Dom. Cons.	0	0	0	0	0	0
Feed Waste Dom. Cons.	0	0	0	0	0	0
Total Dom. Cons.	759	1008	745	1060	0	1065
Ending Stocks	0	0	0	0	0	0
Total Distribution	761	1010	750	1065	0	1070
Yield	0.3363	0.4903	0.3363	0.4841	0	0.4756

Table 9. INDIA: TOTAL OILMEALS PSD

OILMEALS (1000 metric tons)	MY 2017/18	MY 2018/19	MY 2019/20
	Revised	Estimate	Forecast
Crush	28175	28580	30280
Beginning Stocks	1185	1317	1226
Production	16265	17018	17962
MY Imports	373	310	345
Total Supply	17823	18645	19533
MY Exports	2429	2935	3240
Industrial Dom. Cons.	0	0	0
Food Use Dom. Cons.	266	311	361
Feed Waste Dom. Cons.	13811	14173	14793
Total Dom. Cons.	14077	14484	15154
Ending Stocks	1317	1226	1139
Total Distribution	17823	18645	19533

Table 10. India: Oilmeal Exports, In Thousand Metric Tons

	Soybean meal	Rapeseed meal	Peanut meal	Sunflower meal	Total
Oct-18	150,388	34,830	0	0	185,218
Nov-18	186,409	86,349	188	0	272,946
Dec-18	170,588	87,106	705	0	258,399
Jan-19	86,378	57,995	0	0	144,373
Feb-19	69,428	41,728	0	0	111,156
Road Transport	NA	NA	NA	-	-
Oct 18-Feb-19	663,191	308,008	893	0	972,092
Oct 17-Feb-18	597,825	206,669	6,223	0	810,717
% Change	11	49	(86)		20

Table 11. India: Commodity, Meal, Soybean, PSD
(Units in 1000 metric tons, Extraction rate in Percent)

Meal, Soybean	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct. 2017		Oct. 2018		Oct. 2019	
Crush	7700	8300	9000	9600	0	10000
Extr. Rate, 999.9999	0.8	0.8	0.8	0.8	0	0.8
Beginning Stocks	583	583	110	580	0	670
Production	6160	6640	7200	7680	0	8000
MY Imports	11	7	15	10	0	0
Total Supply	6754	7230	7325	8270	0	8670
MY Exports	1844	1500	1850	2000	0	2300
Industrial Dom. Cons.	0	0	0	0	0	0
Food Use Dom. Cons.	250	250	250	300	0	350
Feed Waste Dom. Cons.	4550	4900	5100	5300	0	5500
Total Dom. Cons.	4800	5150	5350	5600	0	5850
Ending Stocks	110	580	125	670	0	520
Total Distribution	6754	7230	7325	8270	0	8670
SME	4550	4900	5100	5300	0	5500

Table 12. India: Commodity, Meal, Rapeseed, PSD
(Units in 1000 metric tons, Extraction rate in Percent)

Meal, Rapeseed	2017 / 2018		2018 / 2019		2019 / 2020	
Market Begin Year	Oct. 2017		Oct. 2018		Oct. 2019	
Crush	5500	5600	5600	6200	0	6500
Extr. Rate, 999.9999	0.5971	0.59	0.5973	0.59	0	0.59
Beginning Stocks	486	486	229	320	0	278
Production	3284	3304	3345	3658	0	3835
MY Imports	0	0	0	0	0	0
Total Supply	3770	3790	3574	3978	0	4113
MY Exports	841	870	650	900	0	900
Industrial Dom. Cons.	0	0	0	0	0	0
Food Use Dom. Cons.	0	0	0	0	0	0
Feed Waste Dom. Cons.	2700	2600	2700	2800	0	2900
Total Dom. Cons.	2700	2600	2700	2800	0	2900
Ending Stocks	229	320	224	278	0	313
Total Distribution	3770	3790	3574	3978	0	4113
SME	1921.05	1849.9	1921.05	1992.2	0	2063.35

Table 13. India: Commodity, Meal, Peanut, PSD
(Units in 1000 metric tons, Extraction rate in Percent)

Meal, Peanut	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct. 2017		Oct. 2018		Oct. 2019	
Crush	3900	4000	3000	3000	0	3400
Extr. Rate, 999.9999	0.42	0.4	0.42	0.4	0	0.4
Beginning Stocks	0	0	0	0	0	0
Production	1638	1600	1260	1200	0	1360
MY Imports	0	0	0	0	0	0
Total Supply	1638	1600	1260	1200	0	1360
MY Exports	17	17	5	0	0	0
Industrial Dom. Cons.	0	0	0	0	0	0
Food Use Dom. Cons.	5	5	5	0	0	0
Feed Waste Dom. Cons.	1616	1578	1250	1200	0	1360
Total Dom. Cons.	1621	1583	1255	1200	0	1360
Ending Stocks	0	0	0	0	0	0
Total Distribution	1638	1600	1260	1200	0	1360
SME	1816.384	1773.672	1405	1348.8	0	1528.64

Table 14. India: Commodity, Meal, Cottonseed, PSD
(Units in 1000 metric tons, Extraction rate in Percent)

Meal, Cottonseed	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct. 2017		Oct. 2018		Oct. 19	
Crush	9200	9000	9000	8500	0	9100
Extr. Rate, 999.9999	0.4675	0.47	0.4678	0.47	0	0.4703
Beginning Stocks	0	116	0	281	0	141
Production	4301	4230	4210	3995	0	4280
MY Imports	15	0	15	0	0	0
Total Supply	4316	4346	4225	4276	0	4421
MY Exports	38	40	45	35	0	40
Industrial Dom. Cons.	0	0	0	0	0	0
Food Use Dom. Cons.	0	0	0	0	0	0
Feed Waste Dom. Cons.	4278	4025	4180	4100	0	4225
Total Dom. Cons.	4278	4025	4180	4100	0	4225
Ending Stocks	0	281	0	141	0	156
Total Distribution	4316	4346	4225	4276	0	4421
SME	3466.46	3261.45	3387.05	3322.2	0	3423.517

Table 15. India: Commodity, Meal, Sunflowerseed, PSD
(Units in 1000 metric tons, Extraction rate in Percent)

Meal, Sunflowerseed	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct. 2017		Oct. 2018		Oct. 2019	
Crush	200	267	260	220	0	215
Extr. Rate, 999.9999	0.485	0.4794	0.4846	0.4682	0	0.4791
Beginning Stocks	0	0	0	0	0	0
Production	97	128	126	103	0	103
MY Imports	123	122	180	200	0	225
Total Supply	220	250	306	303	0	328
MY Exports	2	2	2	0	0	0
Industrial Dom. Cons.	0	0	0	0	0	0
Food Use Dom. Cons.	0	0	0	0	0	0
Feed Waste Dom. Cons.	218	248	304	303	0	328
Total Dom. Cons.	218	248	304	303	0	328
Ending Stocks	0	0	0	0	0	0
Total Distribution	220	250	306	303	0	328
SME	145.406	165.416	202.768	202.101	0	218.776

Table 16. India: Commodity, Meal, Copra, PSD
(Units in 1000 metric tons, Extraction rate in Percent)

Meal, Copra	2017/2018		2018/2019		2019/2020	
Market Begin Year	Oct. 2017		Oct. 2018		Oct. 2019	
Crush	759	1008	745	1060	0	1065
Extr. Rate, 999.9999	0.3623	0.3601	0.3624	0.3604	0	0.3606
Beginning Stocks	0	0	0	136	0	137
Production	275	363	270	382	0	384
MY Imports	244	244	180	100	0	120
Total Supply	519	607	450	618	0	641
MY Exports	0	0	0	0	0	0
Industrial Dom. Cons.	0	0	0	0	0	0
Food Use Dom. Cons.	10	11	10	11	0	11
Feed Waste Dom. Cons.	509	460	440	470	0	480
Total Dom. Cons.	519	471	450	481	0	491
Ending Stocks	0	136	0	137	0	150
Total Distribution	519	607	450	618	0	641
SME	229.8135	207.69	198.66	212.205	0	216.72

Health News

Trans Fats, Bad for the Heart, May Be Bad for the Brain as Well

People with high levels of trans fats in the blood were at higher risk for Alzheimer's disease and other forms of dementia. Trans fatty acids, known to increase the risk for heart disease, stroke and diabetes, have now been linked to an increased risk for dementia.

Researchers measured blood levels of elaidic acid, the most common trans fats, in 1,628 men and women 60 and older and free of dementia. Over the following 10 years, 377 developed some type of dementia. Trans fats, which are added to processed food in the form of partially hydrogenated vegetable oils, increase levels of LDL, or "bad" cholesterol. Meat and dairy products naturally contain small amounts of trans fats, but whether these fats raise bad cholesterol is unknown.

After controlling for other factors, the scientists found that compared with those in the lowest one-quarter in blood levels of elaidic acid, those in the highest were 50 percent more likely to develop any form of dementia and 39 percent more likely to develop Alzheimer's disease in particular. Elaidic acid levels were not associated with vascular dementia considered alone.

The senior author, Dr. Toshiharu Ninomiya, a professor of public health at Kyushu University in Japan, said the study is observational so cannot prove cause and effect. "It is difficult to avoid trans fats completely, and the risk of a small amount of trans fats is unclear," he said. "But it would be better to try to avoid them as much as possible." Courtesy: The New York Times

Will Cultured Meat Soon Be A Common Sight In Supermarkets Across The Globe?

Up until now, plant-based food companies like Beyond Meat, Impossible Foods, and Quorn have almost singlehandedly worked to lessen the impacts of industrial animal agriculture.

Supermarket shelves and fast food restaurants across the US are serving up vegan burgers and meatballs and plant-based chicken nuggets are showing consumers there is an alternative to relying on animal-based protein. But a quiet revolution is also taking place in labs, where scientists are working to cultivate meat and seafood grown from cells, with the potential to reduce demand for industrial animal agriculture even further. Here's how the process works: Stem cells are taken from the muscle of an animal, usually with a small biopsy under anesthesia, then they're put with nutrients, salts, pH buffers, and growth factor and left to multiply. Finessing the technology and getting the cost to an affordable level is happening at a slower pace than the plant-based industry, but a number of start-ups are nevertheless aiming to get their products on the market soon.

Cell-based meat (also known as cultured, cultivated, slaughter-free, cell-cultured, and clean meat) could be a common sight in supermarkets across the west in the next three years, according to the Institute of the Future in Palo Alto. California-based Memphis Meats made headlines for its world-first cell-based meatballs four years ago, and is currently building a pilot plant to produce its cultured beef, chicken, and duck on a bigger scale – with plans to launch more plants around the world. And it isn't the only cell-based meat start-up in the The Golden State. There's the recently formed San Francisco-based Artemys Foods, co-founded by biochemist Jess Krieger, who has spent the past six years working at Kent State University in Ohio growing cell-based meat in a lab, Berkeley-based Mission Barns, focused on creating animal fat, which it has mixed with other ingredients to make duck sausages, and San Diego-based BlueNalu, a startup developing seafood from fish cells through a process called "cellular aquaculture."

The innovation isn't limited to the US – it's happening across the world. The global cell-based meat market is predicted to be worth $15.5m by 2021 and $20m by 2027, according to analysis. One report estimates that 35% of all meat will be cultured by 2040. While estimates vary, one study found that cell-based beef is projected to use 95 per cent fewer global greenhouse gas emissions, 98 per cent less land use and up to half as much energy. It also significantly reduces the amount of antibiotics needed, which are widely used in agriculture and contribute hugely to worsening antibiotic resistance. And since the animal cells are extracted humanely and grown in a facility rather than within the animals themselves, cell-based meat has the potential to all but eliminate animal suffering.

The industry has made huge progress since the first cell-based hamburger was unveiled in 2013 in London by Dutch stem cell researcher Mark Post, chief scientific officer at Dutch company Mosa Meat. While this was a huge achievement, it also showed the world how far the industry had to go before commercially viable cell-based meat could be a reality. It cost $325,000 to make, and wasn't totally animal-free, as most of the burger's muscle strands were grown with fetal bovine serum, which comes from blood drawn from bovine fetuses.

In the intervening years, Mosa Meat has made several breakthroughs, and aims to bring the price down to a

commercial price. It now doesn't require fetal bovine serum, and has developed a process that allows industrial scale production. Also in the Netherlands, start-up Meatable has recently raised €9m to help reduce costs and scale-up production of its beef and pork. It aims to have an industry-scale plant by 2025, and will have a small-scale bioreactor – the machine where cell-growth takes place - this year. Meatable's cofounder Krijn de Nood hopes to unveil its first prototype this summer. Elsewhere in Europe, the UK's Higher Steaks is growing stem cells for the production of mince for pork sausages. Instead of using fetal bovine serum, the company uses protocols exclusively licensed to it by its collaborators, the University of Minnesota, that allow it to reprogram stem cells into muscle and fat tissues.

Instead of adult stem cells, it uses induced pluripotent stem cells, which means they have an infinite supply as the cells proliferate infinitely. With adult stem cells, researchers have to go to the animal every time they need a new batch. And Spain's Cubiq Foods is producing cell-based fat, which is used to enhance the flavor of food and enrich it with essential fatty acids, such as omega-3. But when it comes to cell-based meat, all eyes are on Israel, where a number of start-ups like Future Meat Technologies and SuperMeat are making huge progress. The country's interest in cell-based meat has also been attributed to its thriving vegan culture. Future Meat Technologies, founded in 2018, has shortened the manufacturing process to two weeks, with a patent-pending method they say allows for higher production yields of cell-based beef. The start-up's technologies enable producers, farmers and retailers to manufacture biomass and process it locally. The company hopes to get cost down to $10 per pound by 2022.

As for SuperMeat, it is developing cell-based meat from chicken cells (it claimed during its launch in 2016 that it was the first company to work on clean chicken products for mass production). One of Europe's largest poultry producers, PHW-Gruppe formed a partnership with SuperMeat in 2018. "We believe 2020 will be the tipping point for the cultivated meat industry, once the proof of scale will be introduced to the world," says Shir Friedman, Co-Founder and Chief Communications Officer of the company. "SuperMeat is excited to take a lead part in this historical event." Another Israeli start-up, Aleph Farms, created the world's first cell-based steak at the end of 2018. It was co-founded only one year prior together with The Kitchen Hub from the Strauss Group, and with Professor Shulamit Levenberg of the Technion Institute of Technology. And in fall of 2019, Aleph Farms successfully "3D printed" meat on the International Space Station. "Our experiment of bioprinting meat in space... consisted of printing a small-scale muscle tissue using 3D Bioprinting Solutions' bioprinting technology," says Yoav Reisler, External Relations Manager for the company. "The proof of concept sought to assess the potential of producing cultivated meat in a zero-gravity environment away from land and local water resources. Our approach for cultivating beef steaks is imperative to the experiment, as it relies on mirroring the natural process of tissue regeneration that

happens in a cow's body but under controlled and animal-free conditions. Our overarching goal is to produce meat products that have a significantly reduced ecological impact and this was a milestone in towards achieving that." Earlier this month, Aleph Farms announced plans to open an educational complex next to its production facility to provide the general public a more in-depth view of how cell-based meat is grown.

Also in Israel, BioFood Systems aims to produce beef products using bovine embryonic stem cells. It also hopes to scale up technology that it can license globally to enable meat manufacturers to produce their own cell-based meat. But other parts of the world aren't far behind Israel, including Asia. Singaporean Shiok Meats is working on bringing cell-based based crustaceans (shrimp, crab and lobster) to market, and says it's the first company of its kind in Singapore and South-East Asia. It hopes to have a commercially viable product in the next few years, and is currently researching and developing. And in Japan, meat producer Toriyama and its export agent, Awano Food Group has partnered with JUST to grow, distribute and sell its cell-based wagyu beef worldwide.

In-between Asia and Europe, innovation is also happing in Turkey. Biftek is the first and still the only company developing cultured meat in the country. It uses a plant-based formulation, made up of 44 proteins, in place of fetal bovine serum. Founder Can Akcali said in a recent interview that the media in Turkey is showing a growing interest in its work, and cell-based meat more widely. Since the first cell-based unveiling of a cell-based burger in 2013, scientists have been flocking to labs in a race to iron out numerous teething problems and be the first to make a commercially viable cell-based meat product. Meanwhile, private investment into the industry has soared. Last year, twelve companies raised $50 million in 14 deals – double the amount of 2018. US-based Memphis Meats raised $22 million, Spain's Cubiq Foods raised $14 million and Mosa Meat drew in $9 million. Memphis Meats now plans to build a pilot production facility, thanks to additional investments in January this year from Cargill and Tyson Foods, as well as high-profile investors Bill Gates, Richard Branson, and Kimbal Musk.

Ido Savir, SuperMeat's chief executive, said Mosa Meat introduced the concept of cell-based meat to the world, and that the main challenge start-ups are still facing is proof of scaling up production to a commercially viable size that's cost-efficient. Once these hurdles are overcome, it will be a much smoother process to get cell-based meat on shelves. At the moment, cell-based

products are being prototyped in labs - but once scientists have finessed the process and the cost, they're produced at scale and can grow in facilities like any other food.

Many cell-based start-ups expect to get their products to market in the next few years. Whether or not they are actually able to meet that projection is an open question. "I worry most start ups in the cultured meat space are overestimating their short-term timeline to get to market and underestimating their potential long-term impact on completely redesigning our food system from the cell-level up," says Max Elder, Research Director in the Food Futures Lab at Institute for the Future. "Regardless of the timeline, one thing is clear: we desperately need to undo the damage industrialized animal agriculture is wreaking on our communities, animals, and the planet." While it may indeed be unwise to count our cultured chickens before they hatch, especially in light of the urgent challenges we are facing, we can no doubt expect more innovation in the coming years. Perhaps one day - even if not in the near future - all the meat on our plates will indeed be slaughter-free.
Courtesy: Food & Drink

Mediterranean Diet, Linked to Healthy Aging

While the data continues to pour in on the benefits of the Mediterranean diet for cardiac health, the lack of information on how this diet affects the aging process has not gone unnoticed by the scientific community. As such, an international team of investigators, led by researchers at the

University of Cork, set out to determine the effects of the Mediterranean diet on older populations. Amazingly, the five-country study found that eating a Mediterranean diet for a year boosts the types of gut bacteria linked to "healthy" aging while reducing those associated with harmful inflammation in older people.

The researchers published their findings yesterday in Gut through an article titled "Mediterranean diet intervention alters the gut microbiome in older people reducing frailty and improving health status: the NU-AGE 1-year dietary intervention across five European countries."

"Aging is accompanied by deterioration of multiple bodily functions and inflammation, which collectively contribute to frailty. We and others have shown that frailty co-varies with alterations in the gut microbiota in a manner accelerated by consumption of a restricted diversity diet," the authors wrote. "The Mediterranean diet (MedDiet) is associated with health. In the NUAGE project, we investigated if a one-year MedDiet intervention could alter the gut microbiota and reduce frailty."

Previous research suggests that a poor/restrictive diet, which is common among older people, particularly those in long term residential care, reduces the range and types of bacteria (microbiome) found in the gut and helps to speed up the onset of frailty.

The researchers, therefore, wanted to see if a Mediterranean diet might maintain the microbiome in older people's guts and promote the retention or even proliferation of bacteria associated with "healthy" aging.

"We profiled the gut microbiota in 612 non-frail or pre-frail subjects across five European countries (U.K., France, Netherlands, Italy, and Poland) before and after the administration of a 12-month long MedDiet intervention tailored to elderly subjects (NU-AGE diet)."

They analyzed the gut microbiome of individuals aged 65 to 79, before and after 12 months of either eating their usual diet (n=289) or a Mediterranean diet (n=323), rich in fruits, vegetables, nuts, legumes, olive oil, and fish and low in red meat and saturated fats and specially tailored to older people (NU-AGE diet).

The participants, who were either frail (n=28), on the verge of frailty (n=151), or not frail (n=433) at the beginning of the study, lived in five different countries: France, Italy, Netherlands, Poland, and the U.K.

Interestingly, sticking to the Mediterranean diet for 12 months was associated with beneficial changes to the gut microbiome. Moreover, it was associated with stemming the loss of bacterial diversity; an increase in the types of bacteria previously associated with several indicators of reduced frailty, such as walking speed and handgrip strength, and improved brain function, such as memory, and with reduced production of potentially harmful inflammatory chemicals.

A more detailed analysis revealed that the microbiome changes were associated with an increase in bacteria known to produce beneficial short-chain fatty acids and a decrease in bacteria involved in producing particular bile acids, overproduction of which are linked to a heightened risk of bowel cancer, insulin resistance, fatty liver, and cell damage.

What's more, the bacteria that proliferated in response to the Mediterranean diet acted as "keystone" species, meaning they were critical for a stable "gut ecosystem," pushing out those microbes associated with indicators of frailty. The changes were largely driven by an increase in dietary fiber and associated vitamins and minerals—specifically, C, B6, B9, copper, potassium, iron, manganese, and magnesium.

Remarkably, the findings were independent of the person's age or weight (body mass index), both of which influence the make-up of the microbiome. And while there were some differences in the make-up of a person's gut microbiome, depending on the country of

origin to start with, the response to the Mediterranean diet after 12 months was similar and consistent, irrespective of nationality.

The study findings can't establish a causative role for the microbiome in health, added to which some of the implications are inferred rather than directly measured, according to the researchers.

"The interplay of diet, microbiome, and host health is a complex phenomenon influenced by several factors," the authors emphasized. "While the results of this study shed light on some of the rules of this three-way interplay, several factors such as age, body mass index, disease status, and initial dietary patterns may play a key role in determining the extent of success of these interactions," they explained.

Older people may have dental problems and/or difficulty swallowing, so it may be impractical for them to eat a Mediterranean diet, they added. But the beneficial bacteria implicated in healthy aging found in this study might yet prove useful therapeutic agents to ward off frailty.
Courtesy: Genetic Engineering & Biotechnology News

Microbes from humics lakes surprise – bacteria and algae produced omega-3 fatty acids from microplastics

Researchers used carbon isotope labeling to follow the fate of polyethylene in the food chain. Increasing abundance of plastic waste has alarmed the society, the environmental fate of microplastics has been difficult to trace. A research group used carbon isotope labeling to follow the fate of polyethylene in the food chain. To the researchers' surprise, plastic carbon was transformed into beneficial fatty acids, omega-3 and omega-6, by the microbes originating from humic lakes.

In the recently published study, Dr. Sami Taipale and his co-workers studied biodegradation of polyethylene, which is one of the most used plastics. Polyethylene was labelled with 13C-isotope, which enables the most sensitive technology for studying the fate of slowly degrading materials.

"We analyzed produced gases and microbial fatty acids using stable isotope mass spectrometry," says Taipale, who just received a 4-year project from Kone Foundation to continue his studies on microplastic degradation.

"We wanted to study whether microbes that have the ability to decompose complex humic compounds would also use recalcitrant microplastic polymers, continues Taipale. -And indeed, microplastic degradation was more pronounced by microbes originating from the humic lakes than from the clear water lakes.

"Fatty acids profiles also helped to identify the bacterial groups that were responsible for the decomposition," says the co-author, professor Marja Tiirola, who leads a new Academy of Finland project for discovering decomposers of recalcitrant materials. "The lack of labelled material limits the microplastic studies, so we welcome partners to synthesize other labelled plastic types."

Showing direct utilization of polyethylene carbon and its upgrading in the upper food chain is a methodological breakthrough. The method was sensitive enough to show that microplastic carbon was incorporated into essential fatty acids, omega-3 and omega-6, of flagellated eukaryotic species. In the further study, these essential fatty acids supported the growth and became integrated to the cell membranes of herbivorous zooplankton, next level in the aquatic food chain.

Previous studies have suggested that high concentrations of microplastics can inhibit the growth of algae and zooplankton. However, this study showed that growth-inhibition observed in high polyethylene concentrations (30 mg L-1) was fully neutralized by microbial decomposers.

"The plastic surface was covered by microbes, which utilized released chemicals or prevented physical contact to algae and zooplankton," says one of the co-authors professor Jussi Kukkonen specialized in ecotoxicology. Since microbes can cease the potential toxicity of microplastics in aquatic environments, ecorealistic testing should be performed in the presence of natural microbiomes.
Courtesy: Health News

Brief Notes on Health Benefits of Edible Oils and Fats

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Introduction

All vegetable oils have almost same fat content, energy content and are mixtures of various fatty acids esters. What broadly differ in various vegetables oil is a percentage of various fatty acids namely, Saturated Fatty Acids, Monounsaturated Fatty Acids and Polyunsaturated Fatty Acids. It has always been a controversial issue of discussion which single oil is healthy oil and criteria of selection of cooking oil for various intended uses have always been matter of debate and discussion. Actually, No single Oil has recommended / desired fatty acid composition.

Edible Oils and Fats have great significance in balanced human diet. It provides concentrated source of energy 9 Kcal per gram and helps absorption of fat soluble Vitamin A, D, E and K. Vegetable Oils are the good source Essential Fatty Acids (EFA) that cannot be synthesised by human body therefore we need to feed it to get its proven health benefits.

Fatty acids of edible oils and fats can be simplified by understanding of the following

- Saturated Fatty Acids:
- Monounsaturated Fatty Acids
- Polyunsaturated Fatty Acids

Relationship of Edible Oil and Fats and Chronic Diseases

Oils and Fat (Visible and Invisible) are necessarily a part of diet, only amount differs. It is our common knowledge and wisdom that our diet, energy requirement and habits play an important role in our health or we may be at risk of various chronic diseases. Leading causes of death are Heart diseases, Cancer, Stroke, Diabetes and arteriosclerosis.

Dietary Fat Intake had been constantly under scanner for all involved in medical sciences and it is a part of common questionnaire to patients related to oils and fats consumed, being treated for various diseases.

Essential Fatty Acids (EFA) PUFA, Omega-3 and Omega -6 have been continuously studied for their benefits in various diseases. Their ratios (Omega-6/Omega-3) , recommended 5-10 , had been continuously interesting to research further. Dietary Fats affects plasma lipids, Lipoproteins and therefore had relationship with Cardiovascular Diseases.

Brief Notes on Health aspects of edible oils and fats.

1. Vegetable Oils are most energy rich food i.e. 9 Kcal per gram amongst all five food groups of human diet , Cereal Grains and products, Pulses and Legumes, Milk, Fruits and Vegetable and Fats.
2. Biggest merit of edible oil (Richest source of energy) converts to the biggest demerit if more than recommended quantity of oils or fat are consumed and therefore it becomes cause of Obesity and that can cause lot of serious health issues.
3. As per guidelines of NIN, Hyderabad of ICMR, Government of India, 15%-30% of total energy requirements be met by oils and fats. Therefore, It is understood the importance of fats in human diet from both "visible Fat" and "Invisible fat". Visible Fats are Vegetable Oil, Vanaspati, Butter and Ghee and Invisible fats are those present as an integral part of food or in cereals.
4. Quantity of visible fat intake can be 25 grams per day for adult with sedentary lifestyle and for individuals with hard physical work may consume 30 to 40 grams of visible fats.
5. Ratio of Saturated Fatty Acid (SFA): Monounsaturated Fatty acids (MUFA): Poly unsaturated Fatty Acids (PUFA) ideally be appx. 1:1:1.
6. Trans Fats are not desirable and not considered healthy. It is needed to be avoided.
7. Vegetable Oils and Fats are good source of Vitamin A,D, E and K. These vitamins are Fat soluble and Health Benefits of vitamins in diets are well known and highly desirable. Vegetable Oils and Fats helps in absorption of these vitamins.

8. Vegetable Oils are very good source of Essential Fatty Acids (EFA) especially Omega-3 and Omega-6 and human body cannot synthesise them and therefore needed to be fed necessarily as EFA has potential health benefits. Ratio of Omega-6 /Omega-3 fatty acids are desirable in the range of 5 to 10
9. Mustard Oil, Rapeseed Oil and Soybean Oil are rich source of Alfa Linolenic Acid (ALA) and generally called Omega-3, This EFA, PUFA has many health benefits. Therefore, One of the oil is necessarily to be selected for Omega-3 health benefits.
10. Cholesterol: Broadly, It is of two type, One High Density Lipoprotein (HDL) , generally called "good cholesterol" and Low Density Lipoprotein (LDL) called "Bad Cholesterol".
11. Edible Oils and fats do not contain protein and carbohydrates
12. Mouth feel of vegetable oils cooked food is well accepted from our ancestor's time and we continue to enjoy its palatability of food cooked in edible oils and fats.
13. Animal origin fats may be rich in Cholesterol (Butter, Ghee and Lard). Vegetable Origin Oils and Fats have no cholesterol.

Dietary Fatty Acids and Health Effects : Association of Fats and Chronic diseases: There is wide scope for Research & development for conclusive evidences on role of edible oils and fats in various diseases prevention, causative and curative.

Clinical Studies of Oils and Fats consumption and their conclusive role on Heart Disease, Diabetes, Cancers, Obesity, Blood Pressure, and Hypertension are needed to be studied at length for different visible and invisible fats contents in the diet. Challenges in clinical studies are well known of being multifactorial issue and impact of other habits of participants on the results.

We are facing diagonally opposite problems , One side there is an energy deficient population that need fat for supplementation of various biological functions of the body and at another point we have increasing population that take excess fat than recommended intake per day to their matching lifestyle and therefore causing obesity. Obesity is necessarily linked with various illnesses and its causes. We need to deal it separately.

Rice Bran Oil is gaining day by day its popularity as Healthy oil because its being nearest to WHO recommended Fatty acid ratio and for its unique micronutrient called Oryzanol that has been found beneficial in prevention of Cardio Vascular Disease (CVD) and other many advantages.

Loose Edible Oil Sale: One of biggest Challenge to the Law enforcement agencies for ensuring purity of Edible Oils & Fats is to stop loose sale at retail end.

There are conclusive evidences that wilful adulteration / Mixing / Unhygienic storage and handling of edible oils and Fats are sold at various markets. Single actionable point that can have major impact on edible oils and fats purity is to stop loose oil sale immediately. Recent FSSAI move to issue directives to field staff to stop loose oil sale is indeed welcome.

In Refining of Rice Bran Oil, Scientist & Technologists are working closely to modify refining process so as to retain desirable constituents that are otherwise lost during refining i.g. Oryzanol in Refined Rice Bran Oil. There are some very successful examples available.

It is also appreciable that FSSAI is taking fast actions to solve industry issues and it will yield good results in coming time and results will be tangible and visible from all respects.

CONCLUSION AND RECOMMENDATIONS

Healthy Lifestyle and its awareness, right stress management, regular exercise, recommended dietary fat intake in quality and quantity is desirable for longevity and to remain fit.

Following actionable points may immediately be visible for health benefits as far as Edible Oils and Fats industry is concerned.

1. Purity of edible oil had been first choice of customers for ages in India and it can be ensured scientifically only with proper packaging of edible oils. Loose edible oil sale quality surveys suggest that majority of loose oil is either substandard or adulterated. There are chances of adulteration that may be injurious to health. FSSAI initiative to implement ban on loose oil sale is a n indeed welcome move to ensure Health of public.

2. As no single edible oil, BLENDED EDIBLE VEGETABLE OIL has potential to offer best solutions for most recommended and therefore healthy oil. Present regulation permit only two oil for blending. This needs to be extended to multiple oil at the choice of manufacturer to make their blends most healthy

Fatty Acid Composition of Common Edible Oil

Name of Edible Oil	Saturated Fatty Acids (SFA)	Monounsaturated Fatty Acids (MUFA)	Poly unsaturated Fatty Acids (PUFA)
Recommendations	27% to 33%	33% to 40%	27% to 33%
Rice Bran Oil	24	42	34
Ghee/Butter	67	30	03
Kardi Oil/Safflower Oil	09	13	78
Sunflower Oil	12	19	69
Soyabean Oil	15	24	61
Mustard Oil	03	68	29
Canola Oil	06	62	32
Olive Oil	16	73	11

*Solvent Extraction Association of India , Handbook, 2014

Almond Oil

The name "Almond" is believed to be a grouping of extractions from both the French word "almande" and the Greek word "amydala." The amygdala – the part of the brain that controls the ability to make decisions, develop memories, and process emotions – is also believed to have the same etymology. Known as the "King of Nuts," the Almond, as well as the oil it yields, are both believed to improve the role of this part of the brain. The Almond belongs to the same stone fruit family as plums, cherries, peaches, nectarines, and apricots.

Almond oil is extracted since ancient times. We know this since its usage is mentioned in several ancient and medieval books on medicine.

Almond oil is one of the greatest oils for hair and skin care. It has got lots of nutrients and useful properties which make it a powerful cosmetic ingredient. The results obtained by using almond oil on the skin can be comparable to that of various powerful skin care products, sans all the side effects. It helps one get rid of dark circles in weeks. Sweet almond oil is safe to ingest internally. In fact, it is well reputed as medicinal oil in the Unani system of Medicine.

Almond oil, transparent and in light yellow, with great fragrance, is not only good cooking oil but also good lubricating oil. It can resist the temperature under 20 ℃. Almond oil is an extremely important material to make some paint coatings, cosmetics, soaps and more. Besides, it can be used to extract essence & vitamins. Almond oil is rich in unsaturated fatty acid, vitamin, inorganic salt and trace elements necessary in the human body. It can moisten lungs, strengthen the spleen, supply energy and support important functions of the human body. The amygdalin contained in almond oil is a normal anti-cancer active substance.

Almonds are also valued in Ayurvedic medicine, according to which they and their oil effectively promote the health of the reproductive system, muscles, and bones. Considered to be a tonic for the brain, blood, and skin, they are often used to address or enhance cognitive functions, immunity, muscle strength, and virility.

Almond oil has been extracted from almonds. There are lots of varieties of almonds, but they are generally classified into two classes.

Bitter Almond: The Bitter variety is derived from the bitter almonds of the botanical known as Prunus dulcis, var. amara, which grows pink flowers. These Almonds are broad and short in shape, containing a compound called Amygdalin. When wild bitter Almond are crushed, chewed, or processed, the Amygdalin turns into the poisonous liquid commonly known as Cyanide. The almonds that grow on most wild Almond trees contain varying amounts of Amygdalin, thus, if ingested, these bitter Almonds can have lethal consequences; however, Bitter Almond Oil, which is considered to be an essential oil, does retain medicinal properties and benefits, making it safe for external application.

Sweet Almond: The Sweet variety of Almond Oil is derived from only the sweet, edible Almonds of the botanical known as Prunus amygdalus var. dulcis, which grows white flowers. The oil that is obtained from this variety is considered to be a carrier oil and is most commonly used in skin and hair care to enhance the appearance, health, and texture of both.

Almond is really a drupe, not a nut. Almond originates in the Middle East, India subcontinent and North Africa. Presently, the largest producer of almonds is the United States of America, most of which comes from the state of California. Spain too is identified for its high-quality almonds.

Almond oil is reputed for its nutritional value. It is very high in Vitamin E. 100 grams of Almond oil provide about 200 % the daily necessity (RDI) of Vitamin E. Rest all vitamins and minerals are in negligible amounts, except for little amounts of Vitamin K. What we are actually interested in is the fat composition of Almond oil and the health benefits thereof.

Almond oil contains the below macro composition within fats in 100 grams oil.
Saturated Fats – 6.2 grams
Monounsaturated fats – 69.9 grams
Polyunsaturated fats – 17.4 grams

Nut oil		Almond
Oil amount (g.100 g^{-1})		25.1–60.7
Fatty acid composition (% area)	Myristic acid - 14:0	0–0.07
	Palmitic acid - 16:0	4.7–15.8
	Palmitoleic acid - 16:1	0.1–2.5
	Stearic acid - 18:0	0.3–2.5
	Oleic acid - 18:1	50.4–81.2
	Linoleic acid - 18:2	6.21–37.1
	Linolenic acid - 18:3	0–11.1
	Arachidic acid - 20:0	0.04–0.2
Total sterols mg·kg^{-1}		2178–2777
	Campesterol	2.5
	Stigmasterol	2.5
	β-Sitosterol	55.9–95.1
	Δ5-Avenasterol	8.5–28.2
Squalene mg·kg^{-1}		95.0
Total tocopherol mg·kg^{-1}		451.0
Tocopherol and tocotrienol composition (% of total content)	*α*-Tocopherol	97.3
	γ-Tocopherol	2.8

Production od Almond oil :

Almond oil can be taken from both the bitter almond and the sweet almond varieties. The oil is obtained generally through a cold-pressing process; however, sweet almonds can be pressed warmly. First, the almonds clean of impurities & loosed from their shells. The pre-cleaned seed is then lightly warmed to the press temperature and subsequently fed into a screw press. The resulting products, almond oil & almond press cakes, then undergo immediate further processing. The press cakes are crushed and cooled before being sent for more processing or into storage. The oil is normally turned into pure oil, after undergoing several stages of puri cation (rough filtration, fine filtration, and safety filtration). Alternatively, after being pressed, the oil is left standing for some days, which allows the mucilaginous components to settle and then, with the aid of filter presses, be removed. After being cold-pressed, the oil can be used to refined or untreated. Essential almond oil, however, is only taken from bitter almonds, which is also why it is named bitter almond oil.

Oil from crushed almond seeds was extracted with the help of supercritical CO2 at 350 bars & 40°C.

Almond oil extraction using supercritical uids (CO2) & pressing (both hydraulic & screw press) provides a product that is fit for human consumption with the pleasant sensorial characteristics that belong the primary product (the almond), consequently, no refining is needed, making the product a virgin oil.

Characteristic of Almond Oil :

Good quality almond oil is clear, slightly yellowish, runny & nearly odorless. It can, however, provide a mildly nutty, faint vanilla note. The flavor is reminiscent of almonds and is mild & oily. The oil usually has a mildly nutty, slightly sweet aroma. The solidification point lies in the range of -10°C to -20°C. Almond oil is comprised of 78% oleic acid, up to around 17% linoleic acid, and up to 5% palmitic acid. Besides containing a little amount of Myristic acid, almond oil also contains potassium, phosphorus, magnesium, sulphur, iron, sodium, glutamine, sterols & also vitamins A, B and E. The advantage of this oil is that it features a high content of water- soluble vitamins & secondary plant substances, as well as a small percentage of saturated fatty acids. Beyond this, it is frequently also well-tolerated by persons having nut allergy.

The oil should be stored in a cool and in a dark location in order to avoid turning rancid. Under such conditions, its shelf life can last around twelve months.

Therapeutic Properties of sweet almond oil:

Anti-Inflammatory – It reduces Inflammation topically & also when ingested.

Antioxidant – Almond oil possesses a mild antioxidant ability.

Immune Booster – Topical as well as the internal function of sweet almond oil boosts immunity and provide robust protection from various diseases.

Anti-hepatotoxic – Almond oil is recognized to aid the liver in eliminating toxins. Similar to castor oil.

Emollient – The excellent moisturization property. It is used to remove excess dry skin.

Laxative – Promotes defecation & relieves constipation. This laxative action is mild as compared to stronger laxatives similar to castor oil.

Analgesic – Almond oil is a soft pain reliever

Muscle Relaxation – Massage with almond oil soothes stressed & sore muscles.

Cicatrizant – It helps wounds heal faster.

Anti-dandruf – It dissolves, leaving dandruf from the scalp.

Uses of Sweet Almond Oil:

The uses of Sweet Almond Oil are abundant, ranging from medicinal to cosmetic. Its many forms include oils, gels, lotions, creams, soaps, shampoos, and candle making.

Used topically, Sweet Almond Oil can be warmed to body temperature for increased absorption before being applied directly to skin. Though its mild nutty scent is

pleasant, a few drops of an essential oil of personal preference can be blended in to customize its aroma.

To effectively lighten dark circles under the eyes, a few drops of warmed Almond Oil applied under the eyes will gradually brighten them while reducing puffiness. Applied all over the face, Almond Oil promotes the regeneration of new skin cells, thereby making skin appear to be rejuvenated and slowing the appearance of aging. To exfoliate rough skin, Sweet Almond Oil can be mixed with fine sugar to create a natural scrub that can be used on the face or the body to gently but deeply cleanse pores and prevent future acne breakouts. Simply mix the two ingredients together, apply it in a gentle, circular motion to the skin to remove dirt and dead skin cells, then rinse it off with water.

In massage, Sweet Almond Carrier Oil boosts circulation, strengthens bones, and soothes aching muscles. Hypoallergenic and mild, it is safe to use on baby skin as well as other types of sensitive skin; however, applying it directly to the skin may lead to the oil leaving an unwanted residue, hence it is commonly diluted with natural creams, lotions, or other carrier oils. Sweet Almond Oil builds and repairs skin's collagen layer, which keeps skin looking firm yet soft, contributing to the appearance of youthfulness. Applying Almond Oil topically in skin care or in a massage can prevent skin from losing moisture and can relax tight, tired muscles. For a massage with optimal results, first heat the Sweet Almond Carrier Oil until it is almost too hot to touch and apply the hot oil to the affected areas. Cover the area with a hot, damp towel for half an hour to draw out toxins.

Used in hair, Sweet Almond Carrier Oil is known to enhance cognitive functions and to improve memory. To strengthen and repair damaged or brittle hair with the moisture and nutrients from Sweet Almond Carrier Oil, apply the oil to damp hair immediately after washing it with a mild natural shampoo and towel drying it. Rub the oil between the palms, then apply it to the scalp and hair, ensuring that each strand is evenly coated. Allow the hair to air dry, and the result will be manageable hair that retains shine and is free from knots.

Used medicinally, Sweet Almond Oil is recommended for reducing bodily pain, relieving stress, and for boosting cerebral functions when applied to the head such as on the temples, forehead, or scalp. It addresses skin conditions related to circulation, such as varicose veins and spider veins. To soothe rashes, chafing, and inflammation caused by friction, dip a few fingers into a small amount of Sweet Almond Carrier Oil and apply it directly to the affected areas, leaving it on until it is completely absorbed by the skin.

Laugh Out Loud

When Mr. Leno of the Tonight Show went J-walking and asked pedestrians some science questions, he discovered some amazing new facts about the universe / life,

Jay Leno: "How does blood circulate in the human body?"
A high school cheerleader: "I not exactly sure. Does it go down the right leg and up the left?"
Jay Leno: "Can you name the three kinds of blood vessels?"
Afreshman at UCLA: "Yes. Arteries, veins and caterpillars."

Jay Leno: "Why does dew appear on plants in the morning when the Sun comes up?" A waitress: "Is it because the Sun makes them perspire?"
Jay Leno: "Why does the Moon orbit the Earth?" An auto mechanic: "To get to the other side?"
Jay Leno: What are magnets?" A taxi driver: "Are they the things crawling over a week-old dead cat?"
Jay Leno: Which is more useful, the Sun or the Moon?" A thirteen-year old: [Pause] "I think it's the Moon because the moon shines at night when you want the light, whereas the Sun shines during the day when you don't need it.

* * * * * * *

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."

* * * * * * *

A biologist, an engineer, and a mathematician were observing an empty building. They noted two people entering the building and sometime later observed three coming out.
The biologist remarked, “Oh, they must have reproduced.”
The engineer said, “Our initial count must have been incorrect.”
The mathematician stated, “Now if one more person goes into the building, it will be completely empty.”

* * * * * * *

A man, complaining of headaches, entered a hospital for diagnostic tests. A doctor examined the results for a brain scan and told the patient, "I have bad news and good news for you. The bad news is that you have a serious brain disease and will die without treatment. The good news is that this hospital has developed a new procedure for brain transplants and due to a car accident this morning two 'fresh' brains are available: one is from a taxi driver and the other is from a scientist. The brain of the taxi driver costs $225,000, while that of the scientist is only $29.95." Puzzled, the patient asked, "Why is the scientist's brain was so much cheaper?" The doctor replied, "It's used."

* * * * * * *

An eighth-grade science teacher spent a class explaining the difficulties of doing experiments. She discussed such things as background noise, equipment malfunction, conceptual mistakes and so on. At the end of the hour, she summarized the situation rather pessimistically as "Badness comes in waves." The students were then asked to go home, research the topic further and write an essay entitled, "The Difficult Nature of Doing Scientific Experiments." One student wrote a rather good report but ended it with the sentence: "Baldness comes in waves."

* * * * * * *

Q Why it is so easy tostay awake until 6 am but so hard to wake up at 6am ?
A. Things in motion tend to stay in motion while things at rest need more Force to get into motion

Member's PAGE

INDIRECT COMMERCIAL USES OF OILS AND FATS

M. C. Pandey
Ex - Vice - President, JVL Agro Foods, Alwar (Raj.)

The significance of any food product to our diet depends on its total consumption. The Oil and Fat in our diet requires not only for eating pleasure but mainly for its nutritional advantage of its highly Caloric Energy. As one gram of Oil /Fat provide 9kcal Energy.

Edible Oil and Fats for human consumption are used widely in two forms :

1 Liquid Oils prepared from Vegetable Oils that are Refined , Bleached , Deodorised, Winterised and Interesterfied.

2 Plastic Fats, such as Butter, Salad Dressing, confectioner's coating, Shortening and Margarines etc. In this category a wide variety of Oils and Fats having commercial uses .

A) BISCUITS AND PASTRY :
The Major component of these products are Flour, Fat and Sugar in various proportions. The eating properties , texture of Biscuits Pastries mare varied over a wide range.

B) PUFF PASTRIES :
The property of Fat in Puff pastry is very important as Fat does not mix into dough during process. It must be very resistance to work softening , a high degree of Plasticity is required. Palm Oil , Palm stearin are suitable for pastry margarine.

C) CAKES :
shortening is used in cake manufacturing preferably for two important functions. Firstly they enable Air to be incorporated in the butter and secondly they contribute to the tender 'shore' eating quqlity of baked cake.

D) IMITATION CREAM :
There are made by homogenizing an emulsion of vegetable Fats in skimmed milk with added sugar. By selection of selected fat ,this cream has greater stability then Real Cream.

E) ICE CREAM :
It is made from an emulsion of Fat with milk portion and added sugar. The fat may be butter fat or vegetable oil. The rigid structure of Ice cream is formed on freezing and partly linking of fat globules.

F) FILLER FAT SHORTENING :
The manufacture of sandwiches and wafers requires a filler mixtures between the cookies and wafers. The mixtures is composed of 1/3 shortening and 2/3 finally ground sugar with suitable flavours added.

G) SNACK SPRAY FATS :
This is very popular type of fat used by the snack industry for spraying on snacks crackers to improving eating quality and glossy surface appearance. The oil must possess two important qualities, Good oxidative stability and low melting point to avoid a very waxy /greasy feel and dull surface appearance.

H) COATING FATS :
These are hard butter, an substitute for cocoa butter, and imitation dairy products. These are made from combination of Soyabean Oil and small quantity of Cotton Seed Oil with special hydrogenation techniques.

I) FLUID SHORTENING :

These covers for frying and baking and are fat removed from the traditional plastic or semisolid products . These consist of hydrogenated Soybean Oil which is added with hard emulsifiers. This fluid shortening has distinct advantage of being pourable at room temperature and can be used for frying or for bread baking.

J) BUTTERS :

All butters/ Margarines are water in oil emulsion, margarines and spread contain added emulsifiers, such as Lecithin, Mono Diglycerides to aid in emulsion preparation. Butter in contrast contains milk fat, lecithin and natural Emulsifier.

K) BREADS AND ROLLS :

The primary function of Fat or Oil is lubrication. In the expansion of dough and improves dough handling during sheeting, are needed for proper slicing.

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CONCLUSION :

Hence Oil and Fat , now a days are widely utilized for other than deep frying for different types of Spreads , Margarines, Shortenings, Butters, as per consumer choices for bread and snacks.

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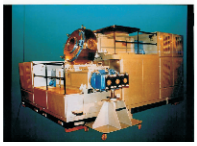

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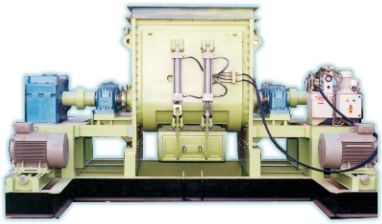

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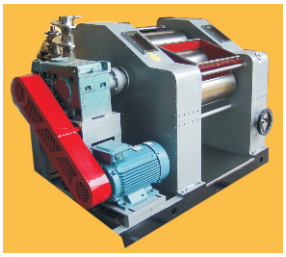

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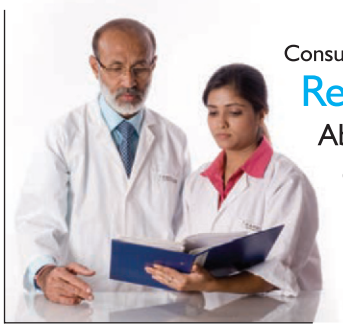

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