

LIPID UNIVERSE

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**Blending of Edible Oils for
Nutraceutical Benefits**

**Fats & Oils in the
New Millenniums**

Krill OIL

Health Tips

Published by : Oil Technologists' Association of India (North Zone)





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Nutrition Information

(Approximate composition per 100 g when packed)

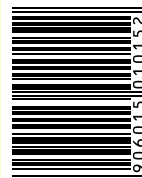
Energy	884 kcal
Protein	0 g
Carbohydrate	0 g
Fatty Acid Composition	Fat (100 g)
- Saturated fatty acids, (SFA)	15.5
- Mono-unsaturated fatty acids, (MUFA)	22.0 g
- Poly-unsaturated fatty acids, (PUFA)	58.1 g
Trans fat	<0.5 g
Omega 3	6-7.0 g
Cholesterol	Nil
Added Vitamin A	2500 I.U.*
Added Vitamin D	200 I.U.*
Vitamin E	2273 I.U.*

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Editor's desk



India imports about 60% of its domestic requirement of the edible oil. This is a huge quantity and one of the biggest forex consuming commodity. Self sufficiency in edible oil is a distant dream as challenges before the country are many. On one hand the productivity is low, HYV seeds are not in use, oil seed crop is mainly rain fed (only 25% is irrigated), pest control is inadequate, land holding are small and returns are not lucrative as compared to the other crops. On the other hand the demand is increasing @3-4% annually due to various reasons. The gap between demand and supply will increase in due course of time and this gap will be largely met by import. Though oil seed production is increasing @ 4% per annum but it is able to meet only less than half of the increasing demand.

There is an urgent need to make oil crop cultivation more lucrative as compared to the other crops. On agricultural front productivity (it is less than 50% of world average) and MSP is required to increase. On processing and technological front value addition of unutilized product should be encouraged. Deoiled cake which is exported as such can be used for production of protein isolate and other value added nutraceutical. DOC of mustard seed, rice bran and indigenous soyabean can provide good opportunity as they are non GMO also. The value addition through utilization of by product will improve the profit on the oil seed, thus will encourage more and more people to opt for the cultivation of the same.

Apart from this many unutilized and under-utilized oil seeds of industrial, medicinal and cosmetic value can further help in growth of oil sector in country. Palm oil cultivation and olive cultivation are the areas where good result can be expected.

Now time has come to improve the availability of oil in India based on true market driven economic principles. The self reliance in field of oil will not only reduce dependence on the import, will save valuable forex as well and have positive effect on economy by reducing CAD.

Yours truly,

C. S. Joshi, Editor

Oil Technologists' Association of India (North Zone)

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Blending of edible oils for nutraceutical benefits

(R. P. SINGH, Professor, H.B.T.I., Kanpur)

Vegetable fats and oils are integral to diet and comprise of an important source of calorie density in human diet. Besides, the edible vegetable oils have nutritional value and health benefits due to the presence of essential fatty acids and many micronutrients. The unsaponifiable matter of vegetable oils includes micronutrients such as tocopherols, tocotrienols, β -carotene, oryzanol, squalene etc., which have been reported for health benefits. However, their use is often limited by the presence of components that produce undesirable effects, if consumed in excess. For example, palm oil is rich in micronutrients but at the same time contains higher amounts of saturated fatty acid that are considered harmful in excess. Other oils such as rice bran oil in its crude form (and also refined form) has less saturated fatty acids and more micronutrients but is not acceptable to population due to its flavour and texture in crude form. Blending provides a solution to such problems. It cannot only dilute the effect of undesirable constituents (ex: erucic acid in mustard oil) but can also bring the advantage of micronutrients present in the blended oil. Also, soybean oil (SBO) and sunflower oil (SFO) have a good nutritional profile, with poor oxidative stability and is, accordingly, prone to flavour deterioration because of their high proportion of unsaturated fatty acids. But some oils are known to be more resistance to oxidation because of their content of more potent natural antioxidant and lower unsaturation such as virgin olive oil, sesame oil etc. Thus blending enhances the shelf-life of the oil. Oils and fats has emerged as modifying the physico-chemical characteristics of vegetable oils and fats besides enhancement in oxidative stability. Also, blending is the most economical process for fat modification. It is known that blending of edible oils is a common industrial practice allows optimal utilization of the physicochemical characteristics of the individual oil. Thus blended oils make it possible to get an ideal mix with the best of each raw material, resulting in excellent colour, better oxidative stability, natural taste, neutral flavour and good nutritional values.

As per BIS specification (ISI 4309:1995), blended edible vegetable oil is an admixture of two edible vegetable oils, refined or raw, or both, in which the proportion of any of oil is not less than 20%.

Needs & objectives of blending of Edible Oils

- Improving fatty acid profile to maintain the ratio of saturated / monounsaturated / polyunsaturated fatty acids for optimum nutritional properties of oils and fats

- Improve the oxidative stability and provide edible oils of improved shelf life
- To maintain the ratio of essential fatty acids (omega-3/omega-6) and assuring the presence of Natural antioxidants.
- To reduce the content of polyunsaturated fatty acids without increasing the content of trans fat
- To change a product so as to meet a specification and to make a 'new product with better quality.

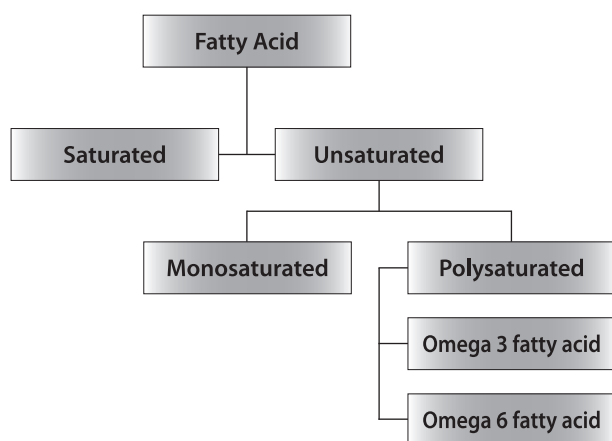
Desirable Saturated, Unsaturated & Monosaturated Fatty Acid Ratio (SMP ratio) & OMEGA-3/OMEGA-6 ratio in diet

The American Heart Association now recommends use of oils having an equal proportion of saturated, mono-unsaturated and polyunsaturated fats. The World Health Organization (WHO) recommends polyunsaturated fatty acid (PUFA)/saturated fatty acids (SFA) ratio of 0.8 to 1.0 and linoleic acid (Omega6) alpha linolenic acid (Omega3) ratio of 5-10 in the diet. The most recent recommendations according to the National Research Council, Washington DC are 10% saturates, 12 to 13% for monounsaturates, not more than 7 to 8% for poly-unsaturates. Japan's Ministry of Health & Welfare suggests fatty acid ratio of saturated / monounsaturated / poly -unsaturated as 1:1.5:1 and a 4:1 ratio of omega 6 to omega 3 fatty acids. A further noteworthy point in this recommendation is that the intake of polyunsaturated fat should be accompanied by vitamin E, vitamin C or carotene consumption to help prevent lipid peroxidation.

Blending of oils to enhance nutritional value of Edible Oils

In order to derive maximum benefits from oil, it is beneficial to consume blended oil in order to maintain a balance between the three fatty acids. Today a number of blended oils are available in the market. No single oil provides all the recommendation of healthy oil so a combination of oil (blended oil) is chosen to take advantage of the health benefits offered by each oil.

Naturally occurring edible oils are not wholesome in terms of balanced fatty acid composition and in minor constituents, which have independent health benefits. Efforts have been put towards developing combinations of vegetable oils to provide fatty acid composition in the ratio of approximately 1:1:1 and 1:1.5:1 for saturated: monounsaturated: polyunsaturated fatty acids for meeting



the needs of health conscious individuals. Combinations have been chosen to provide desired levels minor constituents to act as nutraceuticals. Various oils containing essential fatty acids of ω -6 and ω -3 series have been chosen as base oils and blended in appropriate ratios with oils like rice bran oil, red palm oil and sesame oil to provide nutraceuticals like oryzanol, β -carotene, tocotrienols, sesamin & sesamol.

Criteria of healthiest cooking oil & requirement of blending in Edible Oil

About 60 years ago, scientists first noticed a connection between heart disease and the type of oils consumed. Atherosclerosis is a condition mostly of middle age persons when deposits contain cholesterol on the wall of blood vessels. Because of the resultant narrowing, less blood reaches the heart with danger of stroke. Less of these deposits were noticed when oils like safflower, sunflower, which are rich in polyunsaturated fatty acids (PUFA) were used and the existing deposits cleared as well. This led to widespread use of polyunsaturated fats such as sunflower oil, safflower oil etc.

In the course of time, further scientific research showed that excessive use of polyunsaturated fats are, in fact, injurious to health as these reduce bad fat as well as good cholesterol (HDL), which may lead to negative cholesterol balance and increase triglyceride level in the blood. It was also emphasised by the scientific community that these polyunsaturated fats might lead to oxygen from the blood and get oxidized, thereby producing free radicals which have the risk of developing cancer.

Soon it was recommended that monounsaturated fats (MUFA) are good for health. The importance of saturated fats was also realized. According to recommendations of the World Health Organization (WHO) and American Heart Association, considered from nutritional point of view, dietary fat should meet the following requirements :

1. Of the total calorie requirement of a human being, energy from fat intake should not be less than 15% and not more than 30%

2. SFA, MUFA & PUFA should be present approximately in equal proportion (below 33%, above 33% and around 33%) respectively.
3. Ratio of PUFA :SFA should be 0.8-1.0 while ratio of linoleic (omega 6) to linolenic acid (omega 3) should be 5-10.
4. According to recommendation of Japan's Ministry of Health & Welfare intake of polyunsaturated fat should be accompanied by micronutrients like vitamin E, vitamin C, carotene etc. to help prevent lipid oxidation.

A perusal of the recommendations shows that there are basically three parameters to judge any oil as the healthy cooking oil, namely, SFA: MUFA: PUFA, ratio of linoleic to linolenic acid and presence of natural antioxidants.

A perusal of the fatty acid composition of vegetable oil shows that no single vegetable oil has the optimal proportion of these components". However, by judicious use of a variety of currently available vegetable oils, the composition of intake of fat can be optimized. This is one of the considerations for allowing manufacture & marketing of blended vegetable oils. An exercise has been made to work out the optimal proportion of fats and oils for balanced intake of fat.

In the upper and middle income groups, health education needs to be given to inform the public that over consumption of oils is harmful. Total amount of fat should not exceed 30% of overall energy consumption per day.

Quality criteria for blended oil is based on its fatty acid composition, SFA (saturated fatty acid) must be as low as possible, MUFA (monounsaturated fatty acid) and PUFA (poly unsaturated fatty acid) must have values in the recommended range and oil should contain Omega-3 fatty acid. The unsaturated fatty acids in the vegetable oils are in the isomers but during hydrogenation of vegetable oil it forms TFA. Food industry prefers hydrogenated fat because of long shelf life and stability during deep frying usages. Trans fatty acid has a profound effect on the fetus development & studies indicate that TFA transference from mother to fetus correspond to maternal intake. PUFA is required for the maturation of the child. TFA inhibits PUFA biosynthesis and decreases formation of long chain PUFA, which are essential for the development of nervous system.

Linoleic / Linolenic ratio for better nutrition

Blended oils (weight ratio)	18:2	18:3	18:2/18:3	18:1+20:1	SFA	22:1
Rice bran+Soybean (1:1)	45	5	9	33	17	-
Rice bran+Mustard (1:1)	25	5	5	33	12	25
Sunflower+Mustard (1:1)	35	5	7	24	11	25
Sunflower+Soybean (1:1)	55	5	11	20	20	-
Soybean+Mustard (1:1)	35	10	3.5	20	10	25

Characteristics of blended oil

- High proportion of mono-unsaturated fatty acids and polyunsaturated fatty acids.
- It has high content of Linoleic acid and low contents of Linolenic acid .
- It has longer shelf life.
- It provides good nutrition to our body.
- Helps in treating coronary heart diseases.
- Efficiently lowers the cholesterol level in our body, thereby reducing ill effects

Effect of blending on oxidation stability

- Blending with oils like sesame oil, rice bran etc. which contain natural antioxidants like oryzanol, sesamol, sesamine, sesamoline etc. increases the oxidative stability of the oils.

Advantage of blending over hydrogenation

Blending the PUFA rich oils with MUFA and SAFA rich oils in desired amounts leads to the formulation of oil blends which have optimum PUFA concentration without the formation of trans fatty acids as in case of hydrogenation

Types of blends

- A blend consisting of 18% soybean oil, 57% hydrogenated soybean oil, 21% interesterified soybean oil and 4% hydrogenated palm oil resulted in a product having 33°C slip point which could be used for making margarine with pleasing texture and ready spread.
- Tub margarine can be prepared by blending 80% of an interesterified fat phase (made by randomization of 20% sunflower, 40% hydrogenated soybean, 25% palm kernel fat and 15% palm fat) with 20% safflower oil.
- Margarine fat can be prepared by blending and randomization of 30% palm stearin, 30% palm oil and 40% palm kernel oil. This randomized product is blended with vegetable oil containing high level of PUFA in proportion of 1:1.
- The blends of interesterified palmolein with selective hydrogenated liquid oils like hydrogenated cottonseed, soybean, palm oil and rice bran oil play high satisfactorily blends which offer excellent shortenings including vanaspati.
- Blending different proportions (10, 20 and 40% v/v) of olive oil with SBO or SFO provides improvement in antioxidative potency of these edible oils.
- Blending sunflower and soybean oils with roasted sesame seed oil (20 and 40%) showed nutritional merits with improved stability for domestic cooking and heating purpose.

- A comparable protective effect of natural antioxidants to that of blending of rice bran and soybean oil was observed in a 50:50 blend, by remarkably increasing the induction period.

Application

- Cocoa butter substitutes with satisfactory thermal properties can be produced from the blends of suitable palm oils and sal oils (stearin).
- In area of confectionary fats and chocolates. In good quality chocolates, the fat phase is invariably the cocoa butter. Its unique chemical composition and physical properties make it suited in chocolates to impart eating qualities.
- Cooking oil containing saturated fats elevate LDL cholesterol level, which has an adverse effect on heating and hence by blending of essential fatty acids, a better and safe oil can be produced.
- A balance is made between MUFA and PUFA through blending so that the use of trans-fats in hydrogenated oils and of saturated fats can be minimized.
- Certain additives blended with oils result in improving the shelf life, frying characteristics and also nutritional characteristics.

Conclusion

Thus, it is concluded that individual oils may not give all the good qualities needed in an edible oil. From nutritional point of view, the blended oils are the best in which good properties of one oil could be utilised in the other oil so that we get balanced fatty acid composition with better nutritional quality. For example rice bran oil is rich in oryzanols, vitamin E and $\omega 6$ and if it is blended with another oil having $\omega 3$ fatty acid in right proportion. The resultant oil will be nutritionally rich with better antioxidant properties and $\omega 3/\omega 6$ ratio. Similarly other blends could be prepared which will be good from health point of view.

Trade News

Structured oil – Latest trends

The Solazyme and AkzoNobel (the largest global paints and Coatings Company and a leader in specialty chemicals) announced an agreement targeting the development of advanced tailored triglyceride oils and commercial sales for near-term product supply. The agreement focuses on supply for the chemical giant's Surface Chemistry and Decorative Paints businesses.

Solazyme has developed a new technology for production of structured oils. The new technology will ensure desired change in the positioning and performance of triglyceride oils. In past the company has developed technology to manipulate the chain length and saturation of fatty acid in triglyceride molecule. The new technology is based on reengineering essentially the same basic algae fermentation process.

Commercial supply of multi-thousand ton quantities of highly sustainable algal oil is expected to originate from the Solazyme Bunge Renewable Oils Joint Venture oil manufacturing plant in Brazil. Sales of product are anticipated to commence in 2014. The structured triglycerides will find extensive use in food and industrial application.

In the field of food and nutrition the structured product will have ability to eliminate the trans fats in food application without compromising on the taste and texture. The advantages of animal origin fats in foods will be possible without presence of harmful cholesterol. The properties of texture and structure delivered by hydrogenated fats will be obtained by structured TG.

In the field of Industrial and personnel care structured TG will help in product formulation with sharp melting point. As in case of chocolate and similar products this quality is required at desired temperature in mouth. STG will also insure that in consumer items creamy texture with consistent and long lasting effect. The arrival of structured TG in market will help in development of new food and industrial products.

New phase of development of Rice Bran in China :

China's annual rice output is about 185 million tons or approximately one third of global rice production. From this rice about 15 million tons of raw rice bran is produced annually as a by-product of rice milling. At present, about 10% of raw rice bran production goes to production of rice bran oil for human food applications. The remaining rice bran is used as animal feed.

Recently RiceBran Technologies (global leader in the production and marketing of value added products derived from rice bran) and Wilmar International Limited (Asia's leading agribusiness group) has entered into a series of agreements to develop rice bran and its derivatives in China for human food ingredient and animal nutrition applications. The venture will seek to develop the human food and animal nutrient market in the country. Wilmar will use Rice Bran's proprietary intellectual property to stabilise and process ricebran, and use its recent research and development on the extraction and concentration of protein from the milling by product. RiceBran Technologies' stabilization and protein extraction processes will support greater conversion of rice bran into high quality animal nutrition, human food, functional food and nutraceutical applications.

As part of the agreements, Wilmar will purchase two proprietary rice bran stabilization extruders, designed and manufactured by RiceBran Technologies for use in the People's Republic of China. Payments by Wilmar for licensing rights and extrusion equipment will be used by RiceBran Technologies to repay obligations related to rice bran protein extraction development costs and for general operating purposes. In addition, Ricebran Technologies will have co-investment rights to purchase up to 45% equity interest of any entity established in China by Wilmar to commercialize the licensed intellectual property and know-how.

Neptune Krill Oil facility to reopen

Neptune Technologies & Bioresources Inc. has begun reconstruction of its plant in Sherbrooke, Que., site. The plant was shut after a fatal explosion that demolished the whole plant in last November.

Neptune is a biotechnology company that primarily develops and commercializes marine-derived omega-3 polyunsaturated fatty acids. It has a patented process of extracting oils from Antarctic krill, which is sold as a dietary supplement capsule, in the U.S., Europe and Asia.

The Montreal-area diet supplement maker says the plant will have the capacity to produce more than 150,000 kilograms of Neptune krill oil per year. Neptune is also overhauling an adjacent expansion facility that was being built at the time of the explosion. The company says it expects construction to be complete by this fiscal year, which ends in February 2014.

Last week, the company released its full-year results. Neptune's losses surged to \$12.8 million last year despite a 35 per cent increase in revenues to \$25.2 million.

Deoleo and Hojiblanca join hands to Form New Global Olive Oil Giant

Recently Deoleo (global leader in sales of bottled olive oil) and Hojiblanca (the biggest producer of extra virgin olive oil) have joined hands and the merger has got approval from Spain's competition watchdog National Competition Commission (CNC). CNC cleared the merger on assurance from both the companies that they will not share certain market sensitive information which may have anti competition impact.

The Hojiblanca Cooperative Group is the umbrella for 95 cooperatives. The group comprises of 55,000, olive oil farmers, which have more than 325,000ha of cultivation and nearly 100 mills, with a turnover of €544 million in 2012. On the other hand Deoleo group, is the world's leading bottler of olive oil, with 22 percent of the global market, and nearly €1 billion in turnover. Deoleo, which already controls three of the world's top four olive oil labels — Bertolli, Carapelli and Carbonell, will thus be allowed to also acquire the "Hojiblanca extra virgin olive oil" brand.

The CNC apprehension that the deal will affect Deoleo's downstream competitors, such as those who are currently supplied by Hojiblanca in its capacity as a source of bulk olive oil, as well as upstream ones, such as companies other than Hojiblanca that have until now been suppliers for Deoleo.

To ensure that Hojiblanca's presence on the Deoleo board does not compromise the competition, CNC has taken four commitments from Deoleo, and these are given hereunder.

The first is designed to avoid any de-facto limit on Hojiblanca's competition in the branded (as opposed to store brand) olive oil market. It requires the removal of a clause in the agreement between the companies that would have seen Hojiblanca lose its right to two seats on Deoleo's board if, after a three-year agreement not to compete, it held more than a 2 percent share of this market in Spain.

The second requires that Hojiblanca's two representatives on Deoleo's board of directors have no access to commercially sensitive information on Deoleo's sales of packaged olive oil to third parties, or on Deoleo's purchase of bulk olive oil, and abstain from votes relating to such matters. Similarly, no-one from Deoleo's board can solicit commercially sensitive information from Hojiblanca on its bulk sales to other parties.

The third commitment provides that after three years have passed, the CNC will assess whether there has been any relevant change in the structure or regulation of the markets that justifies continuing or adapting the conditions for two more years.

The fourth relates to monitoring compliance with the commitments and includes the signing of a confidentiality agreement by the secretary to Deoleo's board and submission of certain information to the CNC.

Oil seed to boost economy of Northern Uganda

The war ravaged northern Uganda is reviving its economy by promoting oil seed production among the farmers. The crops of soyabean, groundnut, sesame and sunflower are emerging as major cash crop in the region.

Government is also trying its best to boost this sub-sector. Vegetable oilseed sub-sector was earmarked in 2004 as one of seven strategic areas in the Poverty Eradication Action Plan. The 2006 Seed Act, called for increased production of oilseeds in order to make them more available and affordable for smallholder farmers operating mostly in rural communities. This led to the formation of Ossup (the national Oilseed Sub-sector Platform), in 2007, with a primary focus of tackling the deficiencies in national seed multiplication programme. The plan was to increase capacity among seed houses, to produce sufficient seed planting materials and change the trends from over reliance on expensive imported seed varieties, to production of locally modified seeds.

The platform, with funding from the Dutch development organisation SNV, and the International Fund for Agricultural Development, formed regional hubs including Lira, Gulu, West Nile and Mbale with Makerere university as the research centre.

Ossup collaborated with private companies such as Mukwano group and Mt Meru, who would multiply the seed varieties from Makerere and supply them to farmers, at reasonable prices.

"They also offer favourable prices. Soybeans used to go for Shs 450 but they now give us Shs 1,200," added Okello, who said their group currently has a 24 tone soybean stock".

On the other hand, Peter Ajungo, the Lira district production and marketing officer, said that it had not only improved people's livelihoods on the farm but also the value chain. "The Lira region used to have two oil mills but today there are over 30 mills that provide market for small scale farmers and cheap oil to the communities," he said.

On a national scale, it is estimated that oilseeds account for over 60 per cent of the country's vegetable oil production, and directly affect the livelihoods of over 12 million Ugandans. Today, there are over 200,000 farmers whose lives have been impacted through this platform.

Ambitious growth in Palm oil refining in Indonesia

As per Indonesian Palm oil producer Association, there is plan to invest at least US \$ 2.7 billion on new palm oil processing facilities, in the year 2014. The new facilities will boost Indonesia's processing capacity to 39.46 million tons a year in 2014, which will comprise 30.9 million tons for refining, and fractionation capacity, 4.22 million tons for oleo chemical production capacity and 4.34 million tons for biodiesel manufacturing capacity of 4.34 million tons.

"The investments will be channeled by 20 local and foreign processors, 12 of which will pour more than Rp 1 trillion (\$101.4 million) into the palm oil downstream industry," Indonesian Vegetable Oil Refiners Association (GIMNI) executive director Sahat Sinaga said in Dumai, Riau, recently. The companies, including Sinar Mas Group, Musim Mas Group and Permata Hijau Group, are all developing oleochemical and oleo food plants.

In the first quarter of this year, investors have spent around \$1.02 billion on new processing facilities. The new investments are expected to increase the country's total processing capacity to 30.9 million tons a year by year 2013 end, a 19.31 percent increase from the past year. The total processing capacities aimed for this year will consist of 25.1 million tons a year for refining and fractionation, up 24.88 percent from last year, about 2.2 million a year for oleochemical production and about 3.6 million tons a year for biodiesel manufacturing.

Local industry players have said that the inflow of such sizeable investments was attributed to the government's decision to change the export tax structure in late 2011, which effectively makes investments in the downstream industry more attractive.

The new tax structure generates a margin of export tax on crude palm oil and downstream products, such as RBD palm Olein of between 5.5 percent and 9.5 percent, making Indonesian products more competitive than those produced by Malaysian producers. Under the new tax regime, the export tax on processed palm oil products declines from 25 percent to 10 percent.

At the same time, a progressive tax is also charged on crude palm oil (CPO) with levies starting at 22.5 percent whenever the commodity's prices shore up beyond \$750 per ton. For every \$50 price rise from the ceiling, exporters must pay an export tax of 1.5 percent.

This measure supports the Industry Ministry's aim to see palm oil exports comprise 60 percent processed products and 40 percent crude palm oil by 2015.

Prior to the introduction of the tax rule, CPO made up 60 percent of overall exports, while processed palm oil represented the other 40 percent. However, a marked change took place last year that saw processed oil account for 61 percent of total exports, while CPO represented 39 percent. Sahat said that the domestic downstream industry aimed to push up processed palm oil output for exports to 21.7 million tons this year, up 4.63 percent from last year. This figure would account for 62.6 percent of Indonesia's palm oil exports throughout 2013.

Introduced in late 2011, the tax holiday facility offers five-to-10 year tax breaks in five industrial sectors — base metal, oil refining and petrochemicals, renewable energy and telecommunication equipment — with an investment of at least Rp 1 trillion. In the palm oil downstream industry, the facility has been given to Unilever Oleochemical Indonesia, a local unit of consumer goods giant Unilever Indonesia, which has spent \$133 million to build an oleochemical refinery in Sei Mangke, North Sumatra.

Some possible Areas of Study in the field of Fats & Oils in the New Millenniums

(Compiled by Dr M. K. Kundu, M.Tech. D. Sc, FABI (USA), Member, FSSAI (SP);
Member, Working Group on Harmonisation of Food Standards, FSSAI & Formerly Edible Oils Commissioner, GOI.

1. Genetically Modified Food Crops including oilseeds :

There is widening gap between demand and supply of food crops which include cereals, fruits, vegetables, oilseeds etc. A major reason for the growth in production not being able to keep pace with the demand is the comparatively low productivity. There is need for technological breakthrough if we have to augment productivity and achieve self-reliance. But no technological breakthrough through conventional approach is yet in sight. Recent development in biotechnology particularly regarding genetically modified crops, say genetically modified oilseeds (GMO) seem to provide exciting possibilities of enabling quantum jump in productivity of oilseeds and hence of edible oils within a specified time frame.

Genetically modified or genetically engineered crops are those foods or crops which contain a foreign gene. Genetic engineers can cut out a gene from anywhere and put it into any crop. Transgenic plants being made both in food and cash crop are corn, soyabean, mustard, potato and vegetables. USA is the main producer of transgenic GM crops followed by Canada, Australia and Argentina and, to a smaller extent, Japan. The GM Technology provides tremendous opportunity to revolutionise medicine, animal husbandry and agriculture. An optimistic view is that GM crops and food stuffs will make a major contribution to reducing mass hunger. Yet there are lots of apprehension associated with GM foods relating to safety aspects, both for environment and human health.

The present level of concern, to some extent, appears to stem from a lack of information about the genetic modifications and the possible consequences. In order to be able to take advantage of the opportunities that this new technology offers, Govt and industry have to work together with a positive approach and lay down, at the earliest possible, realistic and reasonable guidelines, in addition to spreading knowledge and understanding about the process of genetic modifications, what it can and can not achieve, what risks there are and how they are being guarded against, so that we are able to take advantage of these exciting developments in biotechnology.

2. Clean and Sustainable Palm oil :

Palm oil industry is a source of considerable social benefits as it provides employment in rural areas and contributes to economic development in producer countries, but as

demand for palm oil increases, substantial tracts of tropical forests are often cleared to make room for large plantation.

In the major palm oil producing regions of Indonesia and Malaysia, almost 1/3 rd of the forest loss in the last 10 years was due to expansion of oil palm. 15% of all human induced greenhouse emission is reported to be caused by deforestation, forest degradation and peat land emission.

To ensure regular supply of clean or sustainable palm oil that does not involve sacrificing tropical forests or contribute to global warming, all companies that produce, trade or use palm oil need to move towards sustainable palm oil, which will ensure that primary forests or any land that is important for wild life and communities are not cleared, considering the huge quantity (about 7 million ton) of palm oil imported into India. The participation of Indian companies can fast-track India's efforts to reduce ecological foot prints in the rest of the world.

3. Organic food :

Organic foods are foods that are produced using methods that do not involve synthetic inputs such as synthetic pesticides, chemical fertilisers nor involve irradiation, industrial solvents or chemical food additives. General public perception is that organic foods are better health-wise. Affluent, health-conscious people are generally using more and more of organic foods. As a consequence, the growth in organic food industry is reported to be around 30% in the last six years.

Scientific evidence so far available seems to be thin that organic foods are really nutritionally superior. There is obviously need for detailed study both nationally and at international level in this regard.

4. Development of salt-tolerant oilseed crops:

One particular area where there is tremendous possibility of R& D work is regarding development of "halophytes" plant or salt-tolerant oilseed crops. It is understood that university of Arizona had developed a commercial variety of oilseed halophyte *salicornia* which grows in saline and degraded land (waste land) unsuitable for cultivation of any other crops. Water requirement can be met directly by untreated sea water or ground brackish water. Yield is quite high, 20MT per hac biomass, in terms of seed 2MT per hac. Oil content of the seed is around 30%. The oil and meal quality is reported to be excellent. The oil compares favourably with safflower oil and the meal with soymeal.

Large areas of Gujarat and Rajasthan are wasteland suitable for such type of crops. It will not compete with conventional agriculture for land and water. Sea water agriculture reverses the flow of nutrients from land to the sea. That has taken place for thousands of years.

5. Planning Commission's Demand Projection:

Demand for edible oil has far exceeded the rate projected by the Planning commission. There is need to undertake a fresh study. Demand for food in general is projected to grow, spurred by increase in population, higher income and liberal import policy. There has been change in dietary preferences of the population over the years. For example, the change in dietary preferences of the population for meals cooked with oils has created a great demand for edible oil. The level of consumption is correlated with income level. Average per capital consumption of edible oils is around 12 kg with urban average higher by about 3 kg. With increase in income and population, India's edible oil consumption is bound to rise. India produces around 8 million ton of edible oil annually. Nearly all of domestically produced oilseeds are crushed, Yet supply is not enough to meet the demand. A significant development in India's edible oil market is the increasing price sensitiveness of consumers for imported edible oils.

There is need for a realistic assessment of the country's demand for and supply of foods like edible oils so as to facilitate a responsible estimate of the demand-supply gap and formulation of a plan in the proper perspective.

6. Detoxification of Oilseeds/Oilcakes/Deoiled Meals (Extractions):

With increase in production of oilseeds, the production and availability of oil cakes /deoiled meal (Extractions) are expected to go up and correspondingly large quantities should be available for export, even after meeting domestic demands. Often there has been rejections by the importing countries, of the extra tractions of the groundnut cotton seed, mustered, rice bran etc. because of the presence of toxic material beyond specified limit, which make them unfit for production of animal feed or which fetch much lower price. The problem would be compounded, once the availability of extractions increases, if steps are not taken to improve the quality of extractions so as to be able to meet the export requirements.

Detoxification of Extractions is thus a priority area. Technologies are reported to have been developed for detoxifications of oil cakes and extractions. If so these technologies need to be tried and perfected so as to make them commercially viable. Alternatively adoption and absorption of commercially proven technologies from abroad need to be considered.

Important Figures : Oil Seed Production – An overview

Production of Oilseeds in (Lakh Tonnes)							
	2000-01	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Groundnut	64.1	91.82	71.68	54.29	82.65	69.33	87.14
Sesamum	5.2	7.57	6.4	5.88	8.93	8.21	7.58
Nigerseed	1.1	1.1	1.17	1	1.08	1	0.87
Rapeseed Mustard	41.9	58.34	72.01	66.08	81.79	67.76	81.93
Linseed	2	1.63	1.69	1.54	1.47	1.41	2.76
Safflower	2	2.25	1.89	1.79	1.5	1.21	2.79
Sunflower	6.5	14.63	11.58	8.51	6.51	4.99	11.61
Soyabean	52.8	109.68	99.05	99.65	127.36	122.82	126.19
total	175.6	287.02	265.47	238.74	311.29	276.73	320.87

(Source: Directorate of Economic & Statistics)

Import of Oil Seeds (Qty in MT)			
S.No.	Commodity	2010-2011	2011-2012
1	SOYA BEANS W/N BROKEN	5	121
2	SHELLED GROUNDNUTS WHETHER OR NOT BROKEN	1737	692
3	LINSEED WHETHER OR NOT BROKEN	411	64
4	OTHER RAPE/COLZA SEEDS W/N BROKEN	100	
5	SUNFLOWER SEEDS WHETHER OR NOT BROKEN	3	3
7	SEASAMUM SEEDS W/N BROKEN	8728	609
8	MUSTARD SEEDS W/N BROKEN	151	78
9	OTHR OIL SEEDS & OLEGNUS FRUITS W/N BROKN	42929	40599
	Total	54063	42166

(Source: Directorate of Economic & Statistics)

Export of Oil Seeds (Qty in MT)			
S.No.	Commodity	2010-2011	2011-2012
1	SOYA BEANS W/N BROKEN	15384	37945
2	GROUND-NUTS IN SHELL,NOT ROASTED/COOKED	10518	11654
3	SHELLED GROUNDNUTS WHETHER OR NOT BROKEN	423235	820963
4	COPRA	18433	17619
5	LINSEED WHETHER OR NOT BROKEN	969	1332
6	LOW ERVUCACID RAPE OR COLZA SEEDS	100	1363
7	OTHER RAPE/COLZA SEEDS W/N BROKEN	3	42
8	SUNFLOWER SEEDS WHETHER OR NOT BROKEN	4208	5183
9	SEASAMUM SEEDS W/N BROKEN	398441	389154
10	MUSTARD SEEDS W/N BROKEN	14253	35960
11	OTHR OIL SEEDS & OLEGNUS FRUITS W/N BROKN	25735	41405
	Total	911279	1362620

(Source: Directorate of Economic & Statistics)

Area, Production and Yield of Groundnut						
State	2011-12			2010-11		
	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg / Hectare)	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg / Hectare)
Gujarat	1.65	2.64	1603	1.81	3.37	1862
Tamil Nadu	0.45	1.07	2382	0.39	0.9	2308
Andhra Pradesh	1.31	0.85	650	1.62	1.46	901
Rajasthan	0.41	0.8	1930	0.35	0.68	1943
Karnataka	0.7	0.5	705	0.85	0.74	871
Maharashtra	0.29	0.36	1247	0.36	0.46	1278
Madhya Pradesh	0.21	0.34	1618	0.2	0.3	1500
Uttar Pradesh	0.09	0.09	1000	0.09	0.08	889
Odisha	0.07	0.07	1147	0.07	0.09	1286
Others	0.13	0.2	@	0.12	0.18	@
All India	5.31	6.93	1305	5.86	8.26	1411

(Source: Directorate of Economic & Statistics)

@ Since area/production is low in individual states, yield rate is not worked out

Area, Production and Yield of Soyabean						
State	2011-12			2010-11		
	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg / Hectare)	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg / Hectare)
Madhya Pradesh	5.67	6.28	1108	5.56	6.67	1200
Maharashtra	3.07	4.03	1312	2.73	4.32	1582
Rajasthan	0.9	1.39	1544	0.77	1.12	1455
Andhra Pradesh	0.13	0.21	1618	0.13	0.22	1692
Karnataka	0.2	0.18	900	0.17	0.15	882
Others	0.21	0.2	@	0.24	0.26	@
All India	10.18	12.28	1207	9.6	12.74	1327

(Source: Directorate of Economic & Statistics)

@ Since area/production is low in individual states, yield rate is not worked out

Area, Production and Yield of Rapeseed & Mustard						
State	2011-12			2010-11		
	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg/Hectare)	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg/ Hectare)
Rajasthan	2.5	2.97	1187	3.68	4.37	1188
Madhya Pradesh	0.79	0.87	1108	0.75	0.86	1147
Haryana	0.54	0.86	1609	0.5	0.94	1880
West Bengal	0.42	0.44	1049	0.41	0.42	1024
Uttar Pradesh	0.64	0.72	1125	0.6	0.72	1200
Gujarat	0.21	0.33	1577	0.22	0.35	1591
Assam	0.24	0.13	558	0.24	0.14	583
Bihar	0.09	0.1	1151	0.09	0.09	1000
Punjab	0.03	0.04	1333	0.03	0.04	1333
Others	0.47	0.31	@	0.38	0.25	@
All India	5.92	6.78	1145	6.9		

(Source: Directorate of Economic & Statistics)

@ Since area/production is low in individual states, yield rate is not worked out

Area, Production and Yield of Sunflower						
State	2011-12			2010-11		
	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg/Hectare)	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg/ Hectare)
Karnataka	0.38	0.19	503	0.41	0.25	610
Andhra Pradesh	0.16	0.12	785	0.23	0.16	696
Maharashtra	0.09	0.05	586	0.21	0.13	619
Tamil Nadu	0.02	0.03	1742	0.01	0.01	1000
Haryana	0.01	0.02	1800	0.01	0.02	2000
Uttar Pradesh	0.01	0.02	2143	0	0.01	2500
Bihar	0.01	0.01	1429	0.02	0.02	1000
Others	0.05	0.06	@	0.04	0.05	@
All India	0.72	0.5	692	0.93	0.65	701

(Source: Directorate of Economic & Statistics)

@ Since area/production is low in individual states, yield rate is not worked out

All-India Area, Production and Yield of Nine Oilseeds Along with coverage under Irrigation

Year	Area (Million Hectares)	Production (Million Tonnes)	Yield (Kg./Hectare)	Area Under Irrigation(%)
1	2	3	4	5
2000-01	22.77	18.44	810	23.0
2001-02	22.64	20.66	913	24.3
2002-03	21.49	14.84	691	22.7
2003-04	23.66	25.19	1064	24.5
2004-05	27.52	24.35	885	26.6
2005-06	27.86	27.98	1004	28.0
2006-07	26.51	24.29	916	28.3
2007-08	26.69	29.76	1115	27.1
2008-09	27.56	27.72	1006	27.1
2009-10	25.96	24.88	959	NA
2010-11*	26.82	31.10	1159	NA

Source: Department of Agriculture and Cooperation

India : Total oil seeds PSD			
Oil Seeds ('000 metric tons)	MY 2011/12	MY 2012/13	MY 2013/14
	Revised	Estimate	Forecast
Beginning Stocks	1905	1365	1165
Production	35377	34792	37010
MY Imports	20	20	20
Total Supply	37302	36177	38195
MY Exports	813	623	672
Crush	28684	28129	29770
Food Use Dom. Cons.	1580	1610	1745
Feed waste Dom. Cons.	4860	4650	4945
Total Dom. Cons.	35124	34389	36465
Ending Stocks	1365	1165	1058
Total Distribution	37302	36177	38195

Source : Directorate of Economics & Statistics

India : Open Market Prices vis-a-vis Minimum Support Price				
Commodity	Minimum Support Price (Rs./100 kg)			Market Price in 2012/13
	2012-13	2011-12	2010-11	
Soybean	2200 (black)	1650 (black)	1400 (black)	2200-3900
	2240 (yellow)	1690 (yellow)	1440 (yellow)	
Rapeseed/mustard	3000	2500	1850	2700-3700
Peanuts (in shell)	3700	2700	2300	3600-4800
Sunflower seed	3700	2800	2350	2700-3400

*Market price (Rs./quintal) across major centers during 2012/13

Source : Directorate of Agriculture Marketing, GOI

India : Total oil meals PSD

Oil Meals ('000 metric tons)	MY 2011/12	MY 2012/13	MY 2013/14
	Revised	Estimate	Forecast
Crush	28684	28129	29770
Beginning Stocks	689	632	602
Production	16937	16788	17791
MY Imports	110	110	110
Total Supply	17736	17470	18503
MY Exports	5466	5360	5610
Industrial Dom. Cons.	0	0	0
Food Use Dom. Cons.	325	330	353
Feed waste Dom. Cons.	11313	11178	11858
Total Dom. Cons.	11638	11508	12211
Ending Stocks	632	602	682
Total Distribution	17736	17470	18503

(Source: Directorate of Agriculture Marketing, GOI)

India : Oilmeal export in thousand metric tons

	Soybean meal	Rapeseed meal	Peanutg meal	Sunflower meal	Total
October, 2012	49840	39058	0	0	88898
November, 2012	517103	66966	0	0	584069
December, 2012	494456	26590	0	0	521046
January, 2013	619793	69990	0	0	689783
February, 2013	581606	45656	0	0	627262
Oct'12 - Feb'13	2262798	248260	0	0	2511058
Oct'11 - Feb'12	2475893	364518	0	0	2840411
Percentage Change	-9	-32			-12

(Source: Directorate of Agriculture Marketing, GOI)

India : Total oil PSD

Oil ('000 metric tons)	MY 2011/12	MY 2012/13	MY 2013/14
	Revised	Estimate	Forecast
Crush	28684	28129	29770
Beginning Stocks	1602	1577	1460
Production	7217	7195	7629
MY Imports	9085	10115	10915
Total Supply	17904	18887	20004
MY Exports	5	17	10
Industrial Dom. Cons.	625	690	770
Food Use Dom. Cons.	15697	16720	17600
Feed waste Dom. Cons.	0	0	0
Total Dom. Cons.	16322	17410	18630
Ending Stocks	1577	1460	1354
Total Distribution	17904	18887	20004

(Source: Directorate of Agriculture Marketing, GOI)

International Prices

International Price of Oil seeds in US\$/Ton					
		Groundnut	Sunflower	Rapeseed	Soyabean
January	2011	1,580.00	716	693	582
February	2011	1,580.00	714	669	575
March	2011	1,646.00	684	663	553
April	2011	1,770.00	684	701	556
May	2011	1,894.00	693	670	556
June	2011	1,923.00	663	670	558
July	2011	2,068.00	615	658	559
August	2011	2,275.00	594	639	558
September	2011	2,360.00	555	628	543
October	2011	2,400.00	524	607	503
November	2011	2,738.00	545	596	486
December	2011	2,800.00	545	578	474
January	2012	2,800.00	540	594	498
February	2012	2,800.00	577	618	512
March	2012	2,800.00	589	628	543
April	2012	2,800.00	620	657	575
May	2012	2,800.00	603	619	573
June	2012	2,250.00	575	600	567
July	2012	2,175.00	629	620	662
August	2012	1,850.00	660	626	684
September	2012	1,550.00	704	650	670
October	2012	1,488.00	677	623	617
November	2012	1,418.00	652	618	589

Source : FAO

World Production of Major Oilseeds (in million MT)						
Year	2008/09	2009/10	2010/11	2011/12	Jan 2012/13	Feb 2012/13
Production						
United States	89.20	98.90	100.38	92.35	92.71	92.71
Brazil	60.31	71.42	79.03	70.20	85.22	86.22
Argentina	35.51	57.94	54.22	44.75	58.82	57.82
China	58.12	57.84	58.10	59.07	56.58	57.28
India	33.40	32.37	34.95	35.67	35.38	35.38
Other	120.17	125.66	129.04	139.36	137.10	137.47
Total	396.70	444.13	455.72	441.39	465.80	466.87

Source : USDA

World Import of Major Oilseeds (in million MT)						
Year	2008/09	2009/10	2010/11	2011/12	Jan 2012/13	Feb 2012/13
China	44.14	52.54	53.66	62.29	65.16	65.31
EU-27	18.03	15.9	16.31	16.75	15.52	15.72
Mexico	4.72	5.2	5.36	5.21	5.09	5.09
Japan	5.74	5.91	5.47	5.35	4.99	5.01
Taiwan	2.22	2.47	2.46	2.29	2.31	2.41
Indonesia	1.63	1.9	2.19	2.22	2.31	2.31
Thailand	1.56	1.73	2.2	1.98	2.02	2.02
Turkey	1.75	2.59	2.34	2.03	1.96	2.01
Egypt	1.6	1.68	1.71	1.87	1.77	1.77
Korea South	1.3	1.35	1.4	1.32	1.33	1.34
Other	11.26	10.45	11.08	10.27	9.75	9.7
Total	93.95	101.72	104.17	111.57	112.19	112.67

Source : USDA

World Export of Major Oilseeds (in million MT)						
Year	2008/09	2009/10	2010/11	2011/12	Jan 2012/13	Feb 2012/13
Brazil	30.14	28.65	30.07	36.46	38.49	38.49
United States	35.69	41.69	41.83	37.69	37.55	37.72
Argentina	6.31	13.82	10.03	8.17	11.88	11.78
Canada	10	9.47	10.2	11.66	10.84	10.84
Paraguay	2.33	4.69	5.19	3.25	5.14	5.14
Ukraine	3.68	2.41	2.85	2.83	3.25	3.3
Australia	1.21	1.37	2.2	3.31	2.66	2.66
Other	4.91	5.29	5.43	6.21	5.45	5.74
Total	94.27	107.38	107.78	109.57	115.26	115.67

Source : USDA

Health Tips

Almonds are helpful in losing Weight?

A study supported by the US Department of Agriculture and published in the summer of 2012, discovered a 32% discrepancy between the Atwater and an empirical measurement of the energy in almonds.

The study designated a test group and a control group, both with a normal diet of mixed foods. The diet included french toast and eggs, meats, cheese, salads and pretty “normal” snacks like chips and brownies. The test group ate all the same foods but some were required to add 42g and others 84g of whole raw almonds each day.

Comparing the feces and urine of both groups, researchers found that those who ate almonds excreted more calories than the control group. This means that eating almonds altered absorption of macronutrients and energy from the diet as a whole. The undigested, excreted dietary fat leapt from 1.7g/day in the control group to 10.8g/day in the group with the most almond consumption. People who incorporated 42g of almonds digested 5% less fat from their overall diet; and those who ate 84g per day, nearly 10% less fat. Unabsorbed calories in the control group averaged at 132.2kcal/day; but the group eating 42g of almonds daily averaged calorie excretion of 217.7kcal/day; and the group consuming 84g/day excreted 282.3kcal/day.

This means that the actual calorie value of almonds is much lower than the Atwater predicted value, making the data found on food labels flawed, especially for nuts. Based on this study, the available energy content in one small 28g serving of whole almonds is 129kcal. Compare that to the Atwater estimation of 168-170kcal for the same amount. That’s a 32% stretch, without even considering that more fat from other foods was also excreted simply because of almonds included in the diet.

All of this research is showing that there are more factors involved in calculating the energy availability of nuts, as compared to other foods, than we have taken into account. As a result, these potent health-promoting foods have been overshadowed by the misconception that they promote obesity. Newer studies are revealing that this might be far from the truth. Health ‘nuts’ and professionals are realizing that almonds and other nuts may actually assist the body in shedding excess fat, but now we want to know, for maximum results, does it matter if we eat them sliced, diced, in oils or butters? According to more than a handful of studies, the answer is yes. In 1980, researchers assigned consumption of whole peanuts, peanut butter and peanut oil to test subjects. Those consuming the whole peanuts showed the least absorption of fat and calories of all three.

More recently, a research team studied 63 adults in the USA and Brazil. The study concluded that eating whole peanuts resulted in significantly greater fecal fat and less absorption of calories than consuming peanut butter, oil or flour. Culture differences did not affect the results.

In case you really want to target calorie and macronutrient non-absorption, more studies have shown that chewing a little more means absorbing a little more; chewing the nuts less, means absorbing less of their energy. This isn’t surprising, but now it’s scientifically confirmed. One study even reports, “With a weight reduction diet, this deficit [of nutrient absorption caused by almonds] could result in more than a pound of weight loss per month. Nuts and peanuts, being relatively energy dense and high-fat foods, may be expected to contribute to weight gain. However, both epidemiologic studies and intervention studies have suggested otherwise.” No one in test groups actually gained any weight by adding nuts to their diet, and many observed weight loss when almonds replaced simple carbohydrate heavy foods.

Cooking Oils for lowering BP and cholesterol

The oil used to cook your food can influence your blood pressure and heart health. Research in India, demonstrates that two oils may improve your cholesterol and ease your hypertension.

The scientists found that people cooking with sesame and rice bran oils experienced significant drops in blood pressure and had better cholesterol. The effect was nearly as strong as commonly prescribed blood pressure pharmaceuticals but without the side effects.

“Rice bran oil, like sesame oil, is low in saturated fat and appears to improve a patient’s cholesterol profile,” says researcher Devarajan Sankar, M.D, Ph.D., a research scientist in the department of cardiovascular disease at Fukuoka University Chikushi Hospital in Chikushino, Japan. “Additionally, it may reduce heart disease risk in other ways, including being a substitute for less healthy oils and fats in the diet.”

The 60-day study in New Delhi, India, focused on 300 people who had mild to moderately high blood pressure. Systolic blood pressure dropped an average of 14 points for those using a blend of the two oils. Diastolic blood pressure (the bottom number in a blood pressure reading) also dropped significantly: 11 points for those using the oils. As for cholesterol, those using the oils saw a 26 percent drop in their LDL (“bad” cholesterol) and a 9.5 percent increase in the HDL (“good” cholesterol).

Timing and nutritional value of Fruits and Vegetables

Fruits and vegetables in grocery stores are still alive and know what time of day it is, researchers report.

The findings suggest that the way produce is stored and eaten could have an impact on its nutritional value and health benefits, according to the study, which was published in the journal *Current Biology*.

"Vegetables and fruits, even after harvest, can respond to light signals and consequently change their biology in ways that may affect health value and insect resistance," study author Janet Braam, of Rice University. "Perhaps we should be storing our vegetables and fruits under light-dark cycles and timing when to cook and eat them to enhance their health value." By remaining alive after being harvested, vegetables and fruits can alter levels of chemicals that protect them from being eaten by insects and other creatures, the researchers found. Some of these chemicals also have anti-cancer effects.

Braam and her colleagues made the initial discovery in cabbage and then found similar responses in lettuce, carrots, spinach, sweet potatoes, zucchini and blueberries. By eating vegetables and fruits at certain times of day, you may gain the most benefit from them. But that may prove challenging, so the researchers suggested another approach to get the most out of your produce. "It may be of interest to harvest crops and freeze or otherwise preserve them at specific times of day, when nutrients and valuable phytochemicals are at their peak," Braam said.

Vegetable Fat May Help Prostate Cancer Patients Live Longer

According to new research, for men with prostate cancer, consuming vegetable fats, like those found in olive oils, nuts and avocados, instead of animal fats or carbohydrates may bring a longer life. In the study, prostate cancer patients who substituted 10 percent of their daily calories from carbohydrates with vegetable fat were 29 percent less likely to die from prostate cancer over an eight-year period. They were also 26 percent less likely to die of other causes. An extra serving (1 ounce) of nuts per day was linked with an 11 percent lower risk of death from any cause, the researchers said.

The study is one of the first to examine the effect of fat consumption on prostate cancer survival in men already diagnosed with the disease. "Our findings support counseling men with prostate cancer to follow a heart-healthy diet, in which carbohydrate calories are replaced with unsaturated oils and nuts," the researchers write in the journal *JAMA Internal Medicine*.

However, the study only found an association and cannot prove a cause-and-effect link between vegetable fat consumption and survival. While the researchers took into account many factors that could influence patients' risk of

death, such as medical treatments, body mass index, smoking and exercise habits. There may be other factors that explain the link, including the timing of cancer treatments and the way the animal fat was cooked. Future studies should explore the benefit of vegetable fat consumption for men with prostate cancer, the researchers said.

The study looked at 4,577 men diagnosed between 1986 and 2010 with prostate cancer that had not spread to other parts of the body. Participants answered questions about their diet every 4 years, and were followed for an average of 8.4 years. During the study, a total of 1,064 men died. Thirty-one percent died from cardiovascular disease, 21 percent from prostate cancer and about 21 percent from other cancers.

In an editorial accompanying the study, Dr. Stephen Freedland, of the Duke University Medical Center in Durham, N.C., writes that obesity is the only controllable factor known to be reliably linked with death from prostate cancer. "Thus, avoiding obesity is essential," Freedland said. The new study suggests substituting healthy fats for unhealthy foods may be one way to do this, he said.

However, further research is needed to determine whether the link is due to lower consumption of "bad" foods or increased consumption of "good" foods, Freedland said.

DNA Mapping may be key to Abundant and Tasty Chocolate

A map of a particularly delicious variety of cacao plant's DNA could lead to more abundant, high-quality chocolate. While this news sounds scrumptious to chocolate lovers, the Cacao Genome Database noted it could be an even sweeter treat to the ears of the world's 6.5 million cacao farmers in South America, Africa and Asia.

In 2010, geneticists deciphered a preliminary version of the molecular code of a variety of cacao plant (*Theobroma cacao*), known as *Matina*. Farmers around the world commonly plant *Matina*, or similar varieties, because of its excellent flavor. Now, scientists working for candy-maker Mars Incorporated, the U.S. Department of Agriculture, IBM and several universities have finished the entire sequence. A group of those geneticists identified a particular set of genes in *Matina* that code for its greenish pod color, which relates to the quality of the beans-to-be, and published their results in *Genome Biology*.

The genetic marker for quality cacao could speed up efforts to breed better chocolate beans. For example, in Ecuador, farmers plant a very high yielding red-podded variety of cacao. However, this variety isn't as tasty as *Matina*. Efforts to cross-breed the Ecuadorian variety with *Matina* have been slow, expensive and labor intensive, yet met with little success. With the identification of the genetic marker for *Matina*'s scrumptious seed pods, plant breeders can now screen seedlings DNA for the desired trait. Before this development, breeders needed years to grow a plant to maturity before they knew if they had hit a pod payoff.

Krill oil

Krill oil is oil from a tiny, shrimp-like animal. Krill are shrimp-like crustaceans that are approximately 1 to 6 centimetres long. They live in the ocean, where they feed mainly on phytoplankton. This usually refers to the species of krill called "Euphausia superb". In Norwegian, the word "krill" means "whale food. Baleen whales, mantas, and whale sharks eat primarily krill. They're near the bottom of the food chain and are eaten by whales, seals, penguins, squid and fish. A blue whale eats up to 8,000 pounds of krill each day during feeding season.

Krill is consumed widely in Japan, Korea, Taiwan and Former Soviet Union. Asians also enjoy dried krill. The only edible part and real delicacy is the intact shell-free tail meat – which, is also the most difficult to obtain, is– known for its rich omega-3 fatty acids.

Important Facts :

Now we get all the omega-3s need by eating fish. Unfortunately, studies show that eating fish can potentially expose you to a high degree of contamination with industrial pollutants and toxins like mercury, PCBs, heavy metals and radioactive poisons. On the other hand Krill Oil is packed with omega -3- fatty acid, antioxidants, including the vitamins A and E, plus astaxanthin and canthaxanthin. Astaxanthin is a carotenoid-type of antioxidant that is even more powerful than beta-carotene, alpha-tocopherol, lycopene and lutein.

Krill oil, the oil that's found naturally in krill, recently become popular as a unique nutritional supplement because it contains Omega -3- fatty acid, an antioxidant called Astaxanthin and Phospholipid-derived fatty acids (PLFA), mainly phosphatidylcholine (alternatively referred to as marine lecithin). Unlike many other antioxidants, astaxanthin crosses the blood-brain barrier, where it could theoretically protect the eye, brain and central nervous system from free radical damage. Unlike fish oils, pure krill oil carries omega-3s in the form of phospholipids – liposomes or little packages that deliver the fatty acids directly to your body's cells. It makes the omega-3 fats in, Krill Oil significantly more bioavailable than those in fish oil by allowing EPA and DHA to directly enter your cells.

The most predominant phospholipid in pure krill oil is phosphatidyl choline, which is partially composed of choline. Numerous studies have demonstrated the importance of choline in brain development, learning and memory. In fact, choline is particularly important for fetal and infant brain development in pregnant and nursing women. Choline is the precursor for the vital neurotransmitter acetylcholine (which sends nerve signals to the brain) and for trimethylglycine, a recognized liver protector.

MUCH Better Absorption than Fish Oil - This means you can take 1/5 the dose – two small capsules rather than 10 large ones. The phospholipid binding increases the bioavailability of the omega-3s, improves the omega-3 to omega-6 ratio and supports healthy cell membrane functioning.

Superb Antioxidant Protection - Unique antioxidants – including astaxanthin and a novel marine flavonoid – may protect you from damaging free radicals.

Pollution-Free - Krill are at the bottom of the food chain and collected far from pollution in the pristine seas surrounding Antarctica. So there is no worry about unsafe accumulations of mercury, PCBs, heavy metals or other toxins that low-quality fish oil products may contain.

Ongoing Supply - Krill are a highly renewable source. They are the largest biomass in the ocean and there is simply no risk of causing them to perish from over-harvesting. There is no danger of over-harvesting as Antarctic krill form one of the largest biomasses on the planet. If all the krill available are weigh, they would be more than twice the weight of the entire human population. Krill represent a renewable, sustainable and environmentally positive nutrition source

Stability - Krill Oil is more stable and more resistant to rancidity than conventional fish oils. This means it will last longer. It will last for TWO years at room temperature.

No Fishy Aftertaste, Reflux Or Other Side Effects - Although fish oil consumption commonly leads to side effects of fishy aftertaste, reflux or belching of fish flavors, this has not occurred with Krill Oil. No adverse effects have been noted even at high dosages.

The Krill oil consumption promotes :

A healthy heart; Support for concentration, memory and learning; Blood sugar health; Healthy joints, with an increase in joint comfort; Fighting signs of aging; Healthy brain & nervous system function and development; Protection for cell membranes; Cholesterol and other blood lipid health; Healthy liver function; Bolstering your immune system; Healthy mood support; Optimal skin health.

The appropriate dose of krill oil depends on several factors such as the user's age, health, and several other conditions. At this time there is not enough scientific information to determine an appropriate range of doses for krill oil. It is to keep in mind that natural products are not always necessarily safe and dosages can be important. Be sure to follow relevant directions on product labels and consult your pharmacist or physician or other healthcare professional before using.

Laugh Out Loud



- **Iron man** - What a Fe male.
What did the confused Magnesium Oxide say? - OMg
- **Every Olympic event should include one average person competing, - for reference.**
- **Biology is the only science in which multiplication is the same thing as division.**
- **A biologist and a physicist got married but soon had to divorce** - There was just no chemistry.
- **A light year** - Just like a regular year, but with fewer calories
- **Scientists have isolated an entirely new chemical compound that emits a high-pitched giggling sound**
They think it probably contains an element of fun.

- **Q: What is the simplest way to observe the optical Doppler Effect?**

A: Go out at and look at cars. The lights of the ones approaching you are white, while the lights of the ones moving away from you are red.

- According to Einstein's Theory of Relatives, the probability of in-laws visiting you is directly proportional to how much you feel like being left alone.
- A student comes into his lab class right at the end of the hour. Fearing he'll get an "F", he asks a fellow student what she's been doing. "We've been observing water under the microscope. We're supposed to write up what we see." The page of her notebook is filled with little figures resembling circles and ellipses with hair on them. The panic-stricken student hears the bell go off, opens his notebook and writes, "During this laboratory, I examined water under the microscope and I saw twice as many H's as O's."
- A small piece of sodium that lived in a test tube fell in love with a Bunsen burner. "Oh Bunsen, my flame," the sodium pined. "I melt whenever I see you," The Bunsen burner replied, "It's just a phase you're going through."
- Heisenberg is out for a drive when he's stopped by a traffic cop. The cop says: "Do you know how fast you were going?" Heisenberg replies: "No, but I know where I am".
- A rabbit is sitting in the forest on a tree stump punching at the keys of a laptop. A fox walks past, stops and asks:
"What are you writing?"
"A scientific study of how rabbits eat foxes," says the rabbit.
"Whaaat?" says the fox. "You're crazy."

"Come with me," says the rabbit. "I'll show you something."

An hour later, the rabbit is sitting on the tree stump with his laptop again. A wolf walks past, stops and asks: "What are you writing?"

"A scientific study of how rabbits eat wolves," says the rabbit.

"Whaaat?" says the wolf. "You're a nutcase."

"Come with me," says the rabbit. "I'll show you something."

An hour later, the rabbit is back on his stump with his laptop. A bear walks past, stops and asks:

"What are you writing?"

"A scientific study of how rabbits eat bears," says the rabbit.

"Whaaat?" says the bear. "You're off your head."

"Come with me," says the rabbit. "I'll show you something."

A mound of wolf and fox bones is piled up outside a cave. Beside it, a lion is gnawing at the bloodied leg of a bear.

The moral of the story?

The accuracy of your scientific study is irrelevant if you're mates with the project manager.

- A Princeton plasma physicist is at the beach when he discovers an ancient looking oil lantern sticking out of the sand. He rubs the sand off with a towel and a genie pops out. The genie offers to grant him one wish. The physicist retrieves a map of the world from his car and circles the Middle East and tells the genie, 'I wish you to bring peace in this region'.

After 10 long minutes of deliberation, the genie replies, 'Gee, there are lots of problems there with Lebanon, Iraq, Israel, and all those other places. This is awfully embarrassing. I've never had to do this before, but I'm just going to have to ask you for another wish. This one is just too much for me'.

Taken aback, the physicist thinks a bit and asks, 'I wish that the Princeton tokamak would achieve scientific fusion energy break-even.'

After another deliberation the genie asks, 'Could I see that map again?'

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Mango Seed Oil has a treasure-house of nutritional benefits including antioxidants, fatty acids and other health-supporting components. It is an excellent choice for skin care preparations aiding in hydration, elasticity and sun-protective qualities. Mangos have long been coined as the "Food of the Gods." It is no wonder the heart of this fruit has so many heavenly, healing properties.

Fatty acids in Mango Seed oil : Fatty acids are needed for the body's health and play a key role in skin care. They act as elemental building blocks in the lipid layers of the skin, thus retaining the skin's moisture. Essential fatty acids is a term given to fatty acids that are not produced within the body, which are necessary for cellular health. Linoleic acid, for example, is classified as an essential fatty acid and contributes to healthy hair, skin and wound healing. A deficiency of linoleic acid or other fatty acids can lead to dry skin and a compromised skin barrier function. Conversely, linoleic acid supports sunburns and even mild cases of acne vulgaris by accelerating the regeneration of the skin barrier. Through integrated skin conversions, linoleic acid is responsible for tissue hormones that contribute to immune response, allergic reaction counteracts, anti-inflammatory action and wound healing support.

Benefits of Mango seed :

Dandruff : Mango seed can help you to get rid of dandruff. Take mango seed butter and apply it on your hair for luster and strength. You can also mix it with mustard oil and leave it out in the sun for few days. Application of this mixture can control alopecia, hair loss, early greying and dandruff.

Healthy smile : Tooth powder can be prepared from mango seed. Pour a small amount on the palm of your hand, moisten your toothbrush, dip in and brush your teeth. This powder will help to keep your teeth healthy.

Diarrhoea : Take powdered mango seed thrice a day to cure diarrhea or dysentery. Dry the mango seeds in shade and powder them. Consume this in doses of 1-2 grams with honey.

Obesity : Mango seed extract can help obese people to lose their excess weight, lower cholesterol levels and improve blood circulation.

Cholesterol : This seed boosts blood circulation and thus reduces bad cholesterol levels. This indirectly helps to lower blood sugar and C-reactive protein levels.

Cardiovascular disease : Moderate consumption of mango seed is useful for minimizing the risk of cardiovascular diseases and hypertension. Our nervous system is interconnected by the heart and blood vessels. A low amount of mango seeds in our daily diet can keep at bay heart problems and high blood pressure.

Healthy hair : Mango seed oil is a good source of essential fatty acids, minerals and vitamins. You can even extract the oil by yourself at home.

To remove the outer coat of the mango seed mix it with coconut, olive, til (sesame) or mustard oil, pour this in a glass jar and place the mixture in sunlight for a week. Use this mixture regularly to avoid hair fall or grey hair. This will also make your hair black, long and thick.

Skin health : Mango seed oil is an excellent moisturizer. The butter obtained from mango seed is used in many lotions as well to nourish and moisture your skin. This mango butter is non-oily and non-greasy when applied on the face.

Moisturizer : Mango seed butter is a real boon for dry skin. It's the best lotion for dry skin, especially for the delicate areas like eyes, cheeks, etc. It contains a very gentle ingredient and acts as a barrier to prevent skin drying.

Dry lips : You can use mango seed butter as a 100% natural lip balm to hydrate and soften dry lips. Apply it on dehydrated lips as a balm before going to sleep. This will rejuvenate skin cells, moisturize and help you get rid of any dead skin cells. This also helps in quick healing.

Diabetes : Mango seed gives amazing results in lowering blood sugar levels. They alter enzymes of the intestine and liver to reduce absorption of glucose. It also reduces body fat, weight and the waist's circumference.

Acne : You can prepare an acne-fighting scrub with mango seed. Grind mango seeds and mix with tomatoes. Apply this evenly on your face. This scrub is useful to exfoliate the skin, cure blackheads, breakouts, acne and blemishes, unclog pores and reduce redness. This scrub is gentle enough for daily use.

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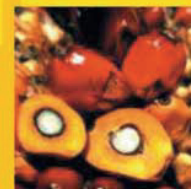
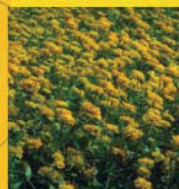
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