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NEWS LETTER

OIL TECHNOLOGISTS' ASSOCIATION OF INDIA WESTERN ZONE

And now Sewage sludge is processed for biodiesel. And what more the dreaded E. coli is engineered to produce Bio-diesel without cells being fractured. Research throws up wonders !

Inside This Issue

This news letter is for free circulation only to the members of OTAI-WZ

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OIL TECHNOLOGISTS' ASSOCIATION OF INDIA WESTERN ZONE

From the Editors's Desk

Every event calls for deep thinking. Thoughts will slowly crystallise into various activities. But the creative thought is like the string in a Pearl Necklace, delicate and sustaining. The events planned and executed by OTAI-WZ is meticulous. Backed up by experience and led by seasoned and dedicated group, the events have been unique and path breaking. We have the sad background of CWG. What a fall, my countrymen, said Anthony of Ceaser. Media pursued it viciously and relentlessly. But the Media did not lend its shoulder to help and retrieve. Vicious criticism dismembers a society. Thus, one can understand and appreciate the events organised by OTAI bringing facets of a diamond to sparkle. The next event is on the anvil. This time in a vivacious city like Mumbai. All of us can play a positive role.

Trade & Commerce

INTERESTING!

Strange relationship between cotton fiber and cottonseed oil

Dr. R.C. Jain

Chariman & Managing Director (Tirupathi Yarns Ltd., Immediate Past Chairman NITRA, New Delhi)

It is to bring to notice of all concerned particularly Govt. of India to do following things immediately so that Cotton prices and consequently yarn prices can be contained at desired level:

1. Seed cotton consists 33 % fiber and approximately 67% cotton seed.

2. Out of cotton seed about 12 % oil is extracted and cotton seed animal meal(Khal) is obtained about 84 % with 6 to 7 % oil content.

3. For the last two years Govt. of India has withdrawn import duty on edible oil and duty free Palm oil @ Rs. 25/- per Kg. is being imported. Palm oil import has been increased to more than four times.

4. While cost of all edible items like wheat, rice, pulses and sugar have increased, prices of all edible oils have come down due to import pressure.

5. Import of duty free edible oil has caused irrepa rable loss to edible oil industry in India particularly in Haryana, Punjab, Maharashtra, Andhra Pradesh, Gujarat and Rajasthan. Domestic factories have mostly closed and have suffered losses due to price disparity.

6. Cotton Ginning factories are not able to sell cotton seeds. There is just no demand now. Prices of all cotton seeds have come down during last three months by more than 20 %. Even at reduced rates there is no demand of cotton seed oil and oil cake. This loss in realizing sale proceeds of ginning factories by product cotton seed is being pushed on to costing of cotton bales. For instance seed cotton (kapas) price continues to be same as these were three months back. But for this additional burden due to fall in prices of cotton seed oil and cotton seed oil cake is the real source of the cotton price tragedy. This is hardly being reviewed properly by those in Cotton Ginning, Cotton Trading and Garment & Textile Industries.

7. Cotton fiber is being indirectly burdened by the high prices to keep edible oil prices low. Therefore if cotton seed and cotton seed oil cakes are allowed to be exported with 5 % DEPB benefit as sesame seeds, it would take care of glut of cotton seeds and cotton seed oil cake in India . This would improve prices realization of the cotton seeds sold by ginning factories. Consequently cotton prices can come down by Rs. 4000/- per Candy.

8. If cotton prices are to be reduced further, Govt. should impose import duty 20 % on edible oil imports. This would mean import duty of Rs. 5/ - per kg, which would be neutralized by stronger rupee itself. This will not therefore impact on retail price of edible oil. But it would certainly further allow cotton price reduction by Rs. 2000/- per candy additionally. It may also help oil seed crushing industry to improve its capacity utilization.

9. This strange relationship between cotton fiber and cotton seed oil product is never being analyzed fully. It needs now to be taken into account immediately by Govt. of India to save Textile and Garment Industry in India.

10. Govt. should now put an immediate ban on cotton exports as cotton ending stocks has depleted below danger level. Cotton imports will be very costly. Cotton exports contract registration and cotton exports shipments have overshot desired levels and yet no official action has been initiated as yet. It needs to be initiated immediately.

11. Any attempt to restrict, or ban, or introduce contract registration for cotton yarn exports will be counter productive and will spoil India's lead position in the yarn world market.

(Courtesy : AICOSCA Newsletter, May 2010)

HAILING MONSOON !

Monsoon boosts sowing of oilseeds cotton

Good monsoon rain in Maharashtra, the Saurashtra Kutch belt of Gujarat, and much of Andhra has helped boost sowing of oilseeds and during the current kharif season, even as plantings are yet to fully pick-up in other crops.

Farmers have so far sown 43.68 lakh hectares (lh) under cotton this time, as against a coverage of only 29.17 Ih during this period last year. Much of this additional acreage has come in Maharashtra (13.89 Ih against 2.88 Ih last year), AP (6.35 Ih versus 3.47 Ih) and Gujarat (7.08 Ih versus 6.18 Ih).

In Punjab, too, a good round of pre-monsoon showers in mid-June has helped raise cotton planting from 5.36 Ih to 5.59 Ih, while it is lagging behind in relatively parched Haryana (4.44 Ih versus 5.07 Ih). Significantly, of the total 43.68 Ih sown under cotton till now, Bt hybrids/varieties have accounted for 39.76 Ih.

Oil seeds

A similar story holds for oilseeds such as groundnut and soyabean, where acreages are substantially up this time. In groundnut, there was no sowing in Gujarat at this point last year, whereas this season it has already touched 8.1 Ih. AP, too, has registered an increase from 1.13 Ih to 2.91 Ih. In the case of soyabean, Maharashtra farmers have so far sown 8.53 Ih (against last year's corresponding 0.54 Ih), while in the main growing State of Madhya Pradesh, only 2.13 Ih has been covered.

In most other crops, particularly coarse cereals, sowing has been held up by the slow progress of the south-west monsoon, which is still to cover half of the country. Last year, farmers generally went for large-scale early planting, buoyed by optimistic official monsoon forecasts. But with these forecasts going horribly wrong, they ended up burning their fingers. In many cases, the already planted crop withered away or had to be re-sown at a cost.

This time, reports from the ground suggest a more guarded approach on the part of farmers who are seemingly prepared to wait till the rains come.

The revival of monsoon activity is also crucial for the sugarcane crop, which has already been planted in Uttar Pradesh (during March-May). In Maharashtra, the bulk of the crop to be crushed in the new season beginning October was already planted between April last year and February this year. On the whole, cane area is up nearly six Ih this time. (The Hindu Business Line, 3rd July, 2010).

(Courtesy : AICOSCA Newsletter, June, 2010)

STRANGE ARGUMENT !

Bt. Cottonseed price limit detrimental to research says NSAI

Perturbed by state governments in Gujarat, Andhra Pradesh and Maharashtra imposing restrictions on the pricing of Bt cotton seeds, the seed industry on Friday said it may hamper investment in research and development and eventually result in seed shortage.

"Price restriction would hamper future advancements in germplasm and technologies resulting in non-availability of good quality seeds to the farmers in the future," Paresh Verma, member of National Seed Association of India (NSAI) said.

Gujarat, Maharashtra and Andhra Pradesh through state specific act put restriction on seed pricing for Bt cotton seeds, while other key cotton growing states such as Punjab, Haryana and Rajasthan do not have act to put restriction of seed pricing.

The Andhra Pradesh government had fixed the price of Bollgard-I, a variety cotton seed at Rs 650 for a 450 gm packet while the Bollgard-II have been priced at Rs 750. "Given the inflationary pressure, the prices should be revised by at least 30- 35%," Verma said. NSAI has asked the agriculture ministry to ensure that seed prices are not arbitrarily fixed.

According to NSAI, the requirement of Bt cotton seeds may go up by 7% to 3.2 crore packets of 450 gm each in the ensuing kharif season, as area under the crop is likely to rise because of better price realisation this season. More than 80% of area under cotton cultivation use Bt cotton seeds.

According to the Cotton Corporation of India, acreage under cotton cultivation in the country, the second largest producer in the world, is likely to go up by 5-8% this year to around 11 million hectare from 10.17 million hectare in 2009. (The Financial Express 22nd May, 2010

(Courtesy : AICOSCA Newsletter, May 2010)

THREE CHEERS

Three cheers monsoon for normal

The Indian Meteorological Department's prediction of a normal monsoon is comforting for the farming community, agriculture sector and the government, after a year of drought that adversely affected output. A good monsoon would definitely put agriculture on a sound footing. June rainfall decides area under cultivation for major crops such as rice, tur, urd, groundnut and vegetables.

Equally important is the distribution of rainfall between June and September. A well-distributed rainfall would substantially increase agricultural production, while skewed distribution may affect production.

A well-distributed and normal rainfall would help in bring down food inflation, which is not showing any signs of abating. First, the prices of vegetables would calm down by July. As monsoon progresses, prices of other commodities would also fall. Another advantage of a normal monsoon would be to recharge the groundwater, which is over-exploited during the previous drought year.

The government must take advantage of the normal rainfall to plan for higher production of kharif pulses. The prices of pulses have sky rocketed and are slowly coming down. In view of the increasing demand for pulses due to rising incomes, and their limited availability in the global market, all efforts need to be made for increasing supply through area expansion and productivity increase. The government should also popularise seeds of high-yielding varieties of pulses in different regions.

The second area to focus is rainfed agriculture. Watershed programme is one of the flagship programmes for rainfed areas. The activities under watershed programme should be finalised and acted upon before the start of the monsoon. Activities under NREGA need to focus more towards watershed programme in the rainfed areas. It would help in harvesting and conserving rainwater.

We must also be ready for low to high deviation in the projected monsoon. Past experience shows monsoon projections are not very reliable. It is because the rainfall is determined by a number of factors and some are not well captured at this stage in the prediction models.

Therefore, the government needs to develop a different strategy to face any eventuality. The strategy should be for production of essential food commodities. These should be related to crop plans, availability of seeds and other inputs, and improved management practices in case of any deviation of monsoon from the normal. (The Economic Times 24th April, 2010).

(Courtesy : AICOSCA Newsletter, April, 2010)

THE GREAT FALL

Oilmeal exports tumble to 5-year low

Oilmeal exports dropped to a five-year low during 2009-10 fiscal with shipments of soyameal declining by almost half compared with 2008-09.

According to the Solvent Extractors Association of India, oilmeal exports totalled 32.24 lakh tonnes (lt) during 2009-10 compared

with 54.21 lt during the same period a year ago. In terms of value, they declined 38 per cent to Rs 5,176.05 crore against Rs 8,340.90 crore.

The association said the exports were the lowest in five years due to lower crushing and disparity in the last few months. It blamed excessive speculation in the futures market, depreciation of the dollar and the withdrawal of exports sops for soyabean meal.

In March, oilmeal exports slipped to a seven-month low of 2.24 lt with soyameal also following a similar trend.

Soyameal exports during 2009-10 dropped to 21.14 lt against 41.77 lt, while that of rapemeal slid to 7.52 lt from 8.4 lt.

Castormeal exports witnessed a rise to 2.40 lt from 2.03 lt but realisation dropped to Rs 88.13 from Rs 103.50 crore. Realisation from rice bran extraction increased to Rs 81.54 crore from Rs 65 crore, though shipments (all to Vietnam) slipped to 1.10 lt from 1.44 lt.

Country-wise, exports to Vietnam slipped to 8.57 lt from 15.10 lt, while to South Korea it was down to 4.77 lt from 8.08 lt as also to Japan (4.74 lt vs 8.06 lt).(The Hindu Business Line, 6th April, 2010).

(Courtesy : AICOSCA Newsletter, April, 2010)

GOOD IDEA

AP not to hike price of Bt Cottonseed

In a move that will impact Monsanto, the Andhra Pradesh Government has decided not to increase the price of the Bt cottonseeds in the State. But it asked seed manufacturers to increase remuneration for seed growers, keeping in mind the spiralling cost of production.

"We are going to issue an order, mandating the seed manufacturers to sell Btl seed (for a packet of 450 gm) at Rs 650, Bt ii at Rs 750 and non-Bt seed at Rs 500," Mr N. Raghuveera Reddy, State Minister for Agriculture, told Business Line after signing a file relating to the seed price.

There has been a lot of speculation in the State for the last few weeks whether the Government will increase the cottonseed price or not. Monsanto has moved the Andhra Pradesh High Court, seeking to restrain the State Government from reducing the trait value.

"The farmers in the State have suffered in both kharif and rabi seasons. They are not in a position to bear any extra burden. So, we have decided not to hike the cottonseed price," he said.

The decision might hurt Monsanto as it means lower trait value. (The Hindu Business Line, 25th April 2010).

(Courtesy : AICOSCA Newsletter, April, 2010)

BIODIESEL ECONOMICS

Industry moots Rs. 36/ litre for Jatropha biodiesel

A price of Rs. 36 a litre for biodiesel from jatropha has been suggested by the industry to ensure sustainable growth of the domestic biodiesel sector.

This price would be lower than the current diesel retail price as biodiesel enjoys a tax exemption. The basis of the biodiesel price is a CII study on “Realistic cost of biodiesel in India”. “The present procurement price of Rs. 26.50 a litre, approved by the Government through the Biodiesel Purchase Policy for blending by the oil marketing companies (OMCs), is not suitable for the growth of the industry and other stakeholders. The price needs to be reviewed and corrected realistically to sustain investments required,” says the study.

No tax components

Asked if this proposed price would result in biodiesel from jatropha becoming costlier than the current retail price of regular diesel (which sells at Rs. 37.99 - 39.88 a litre), Mr. Pramod Chaudhari, Chairman CII National Committee on Biofuels, said. " It is not correct to compare the two prices, as there is no tax component on the biodiesel price. Besides, the regular diesel is retailed at an administered price".

The OMCs sell regular diesel at a Government controlled price to protect the consumer from the volatility in the international crude price.

The only additonal cost that the OMCs can levy on this Rs.36 a litre price is the marketing margin, blending costs and transportation charges to the depot, if any, he explained.

Policy Framework

The study was undertaken with guidance from the ministry of New and Renewable Energy and supported by both th eTariff Commission and the Petroleum Planning and Analysis Cell, he said.

"A core committee has worked out the cost of biodiesel from jatropha and linked it with international diesel price with the best available methodology," he added.

Considering the volatility of the crude oil price and the fluctuations in the international diesel price, the Government may create a policy framework - of incentives, grants and distribution medchanism - to make Rs. 36 a litre price of biodisel self sustainable, the study states.

Sustainable initiative

To make biodiesel blending a sustainable initiative with conservative long-term price of international diesel at $80 a barrel, the proposition of selling diesel at a price of Rs. 36 a litre would require a financial support of Rs. 605 crore from the Government (considering the current diesel consumption of 51.7 million tonnes annually and the biodiesel blending a the rate of two percent) the study says.

The study also reveals that the international diesel price at $95 a barrel will make the biodiesel blending programme a self-sustainable initiative.

It also recommends an average procurement price of jatropha seeda t Rs. 6000 a tonne to ensure no migration of food land for duel crop.

(Courtesy : SAARC Oils & Fats Today, May 2010)

Oilseeds in India

'Current Status, Production Constraints and Future Outlook

Rakesh Chopra, Executive Director &
K. R. Chopra, Managing Director,
Biostadt MHseeds Ltd

India is one of the major players in the global oilseeds economy and fifth largest oilseeds producing country. Oilseed crops form the second largest agricultural commodity after cereals, occupying nearly 14% of gross cropped area, accounting for 3% of gross national product and 10% of the value of all agricultural products. India has the largest area under groundnut, rapeseed/ mustard, sesame, saff lower and castor in the world. However, productivity of the oilseeds in India is just 50-60% of the world average.

OILSEEDS are cultivated on about 27 million hectares. India has been able to raise its annual oilseed production from 10.8 million tonnes in 1986 to 28.8 million tonnes in 2007-2008. The Production in 2006-07 was 24.3 million tonnes. The productivity has risen from 570 to 1086 kg/ha. Thanks to the improving economic scenario of the country, per capita consumption has risen from 2.5 kgs in the early 50's to 12 kgs in recent years; hence the oilseeds demand in 2020 AD is projected at 60 million tonnes. Currently India is importing 40% of its oil needs spending nearly Rs. 12000 crores per year (Table.1). The Imports may increase sharply in the near future when the supply-demand gap will further increase, unless measures arc taken to increase production through genetic improvement of cultivars and developing production technology' suited to specific growing conditions of each ecological region.

Currently India accounts for:

- 7.4% of world oilseed output;
- 6.1 % of world oilmeal production:
- 3.9% of world oilmeal export;
- 5.8% of world vegetable oil production;
- 11.2% of world vegetable oil import; and
- 9.3% of world edible oil consumption;

Source: - Oil World, 2007

Current Status

The diverse agro-ecological conditions in the country are favorable for growing all nine annual oil seeds, which include seven edible oilseeds viz., groundnut, rapeseed/mustard, soya bean, sunflower, sesame, safflower and linseed. A wide rage of other minor oilseeds of horticultural and forest origin, including coconut and oilpalm are also grown in the country. Oil is also obtained from rice bran and cotton seed which are major sources ol non-traditional edible oils; Oilseed crops in India are mostly cultivated under rainfed conditions by small and marginal farmers who are usually resource poor and cannot invest on cash inputs.

More than 80 per cent of the total oilseed acreage and production in the country is accounted for by the states of Madhya Pradesh, Rajasthan, Maharastra, Gujarat, Andhra Pradesh and Karnataka. The three states Madhya Pradesh, Rajasthan and Maharashtra together account for 54.5 per cent of the oilseed area and 60.5 per cent of the total oilseed production (Table 2).

Among the seven oilseed crops cultivated in India, soyabean contributes 31.1 per cent, rapeseed/ mustard contributes 28.6 per cent and groundnut 27.3% (Table 1). Actual production of total oilseeds during the IX plan period (1997-2002) was 106.02 million tonnes against a targeted production of 135.5 million tonnes, The production of oilseeds

Table 1: Domestic production, import and availability of edible oils in India

Year	Domestic Oil seeds*	Production ('000 t) Edible oil	Import Edible Oil	Per capita net availability* (consumption) (kg/person/year)
1978-79	10100	2799	821	4.8
1987-88	12650	3464	1944	7.1
1997-98	21320	5041	1266	7.2
2007-08	28830	6922	4902	12.0

**Nino oilseeds viz., raposood/mustard, groundnut, sesamum, safflowor, niger, soybean, sunflower, linseed and castor*
**Edible oil and vanaspati*

was about 87% of the targeted production for the tenth plan.

In spite of the fact that over 75% of the area under oilseeds is rainfed, subject to vagaries of monsoon, there has been continuous improvement in oil seeds production in past few decades. During the period 1950 to 2008 country has witnessed 5.5 times increase in oilseeds production through increase in area under cultivation and increase in productivity per hectare. Maximum increase in production has come from Gujarat, Rajasthan, Madhya Pradesh, Maharashtra, Haryana and West Bengal. The country as a whole witnessed 109% increase in production in last two decades due to 38% increase in area and 53% improvement in productivity. Among the annual oilseeds, bulk of the increase in last two decades is contributed mainly by soyabean, rapeseed/mustard and sunflower, while production and productivity growth in other oilseeds like groundnut, sesame, safflower, linseed and niger are very low.

India has been importing on an average 46.8 lakh tonnes of edible oil to meet its requirement during the last six oil years at a cost of Rs.12000 crores annually. Population pressure coupled will better standards of living, low oilseed production due to aberrant weather for several years and liberalization of import-export policy are the causes behind such an import scenario. There is a need to balance the government policies between availability of edible oils to the consumers in reasonable quantities, at affordable prices on one hand and promoting domestic production without resorting to uncontrolled imports to safeguard the interest of the farmer grower employment, industry and human health on the other hand.

Production Constraints

The annual edible oilseed crops are diverse in their agro-climatic requirement and crop management practices. The production constraints facing each of the crops are also' diverse in nature. Common production constraints which are applicable to all the annual oilseed crops are:

1) Lack of availability of superior seed material of improved varieties at the correct time;
2) Lack or varieties suited to mixed or intercropping;
3) Cultivation of these crops mostly on marginal and sub-marginal lands of poor fertility.
4) Predominantly rainfed cultivation;
5) Low or non adoption of packages of improved production technology;
6) Susceptibility of most oilseed varieties to post and diseases;
7) Non-adoption of pest and disease management practices;
8) Number of biotic and abiotic stresses;
9) Lack of price support policies and high input costs;
10) Poor linkages between research and extension loading to lacunae in technology transfer;
11) Limited involvement of private R&D;
12) Lack of micro-financing facilities;
13) Poor linkages between different stakeholders; and
14) Less efficient oil extraction technology.

Table 2: State Wise area and production of oilseed in India (2006-07)

State (%)	Area (m.ha)	Production (m.t)
Madhya Pradesh	6.09	5.81
Rajasthan	4.51	5.17
Maharashtra	3.86	3.72
Gujarat	2.83	2.57
Andhra Pradesh	2.24	1.36
Karnataka	2.35	1.13
Tamil Nadu	0.59	1.08
Uttar Pradosh	1.23	1.03
Others	2.81	2.42
All India	26.5 1	24.29

The profitability of oilseeds has to come either through increasing production or through reducing the cost of cultivation. The key for profitable oilseed production lies in use of high quality, genetically pure seed of improved varieties and hybrids, which can tolerate various stress conditions associated with rainfed farming and efficient crop management with emphasis on low cost inputs. Currently domestic oilseed production is not profitable as the oilseed prices are low in international market and liberalized policy on importing edible oils under OGL hence, imported oil is cheaper in the market. This challenge can be met by increasing profitable, globally competitive and sustainable oilseeds production system.

Following low cost production technologies which can improve productivity even under rainfed farming should he adopted by the farmer's. The objective is optimum realization of genetic potential of the variety used.

1. Adoption of improved cultivar recommended for season, location and duration.
2. Use of its quality seed with high genetic purity, germination and vigour.
3. Adopt rocommendod seed rate and mode of planting.
4. Selection of efficient cropping system. Intercropping system optimizes production and utilizes resources more efficiently especially, under rainfed conditions.
5. Manage soil moisture efficiently, give and protective irrigation at critical crop growth stages.
6. Apply recommended fertilizer dose, and
7. Follow integrated pest and disease management practices.

Future Outlook

The oilseed production needs a substantial boost to meet the rising edible oil demand in the country. Taking cognizance of production constraints and strategies to increase productivity can serve as a guideline for future research. Development and use of superior value added cultivars (varieties and hybrids wherever identified) suited to area specific growing conditions coupled with area specific production technology and management will help improve productivity. Development of new crop production and protection techniques which are eco-friendly and incorporate the constraints imposed by the natural resource availability of the region are need of the hour.

The productivity enhancement possible in oilseed crops is probably highest among any group of crops due to plethora of factors. The existing low level of productivity also offers immense potential for achievements in crop improvement through application of conventional research, genetic engineering, marker assisted selection (MAS) technology and other novel approaches. Conscious and strategic integration of MAS with traditional breeding of oilseed crops can provide means to improve their productivity. It is possible to achieve self sufficiency in oilseed production if we fully exploit genetic potential of improved cultivars and adopt area specific pro-

Table 3: Production of annual edible oilseeds in India
(Average of 2001-03 to 2006-07)

Annual edible oilseeds	Production (m. tonnes)	Contribution (%)
Soya bean	7.3	31.1
Rapeseed/ Mustard	6.7	28.6
Groundnut	6.4	27.4
Sunflower	1.1	4.7
Sesame	0.6	2.6
Niger	0.1	0.4
Safflower	0.2	0.9
Other oilseeds	1.0	4.3
Total oilseeds	**23.4**	**100**

duction technology in our annual edible oilseed crops.

Transgenic technology has the potential to drastically influence the availability of vegetable oils for edible and non-edible uses. This technology can also improve fatty acid profile. Better fatty acid composition could improve availability of good quality oil and protein for human consumption specially in oil from cotton seed and oil palm.

Increase in area under high yielding hybrid seeds in oilseed crops like sunflower, castor, safflower and more recently rapeseed/ mustard will improve productivity and also encourage more proactive private sector investment in research. Government should consider reasonable incentives to attract this sector's participation.

Efficiency in oilseeds and oil processing industry benefit all stake holders, farmer's, processors and consumers Research and development strategies for improving the efficiency of oilseed processing industry are very important to enhance the productivity and quality of the oil.

Thus India's oilseed sector has the potential to increase its efficiency in several directions like efficient crops development and processing with the use of efficient and innovative technologies as well as, bettor trade promotion. Further liberalization of the sector with proactive measure by the Government in partnership with all stakeholders can enhance its efficiency and lead to higher contribution in India's economic development.

(Courtesy : SAARC Oils & Fats Today, May 2010)

SAYS ME !

Various Uses of Sesame oil

SESAME oil (also known as gingelly oil or til oil) is an edible vegetable oil derived from sesame seeds. Besides being used as a cooking oil in South India, it is often used as a flavor enhancer in Chinese, Korean, and to a lesser extent Southeast Asian cuisine.

History

Sesame seeds were one of the first crops processed for oil as well as one of the earliest condiments. In fact, the word 'ennai' that means oil in Tamil language has its roots in the Tamil words 'eL' and 'nei', which mean sesame and fat.

Also the Hindi word 'tel' means oil is also derived from sesame (from Sanskrit Taila', which means obtained from Tila-Sesame).

Prior to 600 BC, the Assyrians used sesame oil as a food, salve, and medication, primarily by the rich, as the difficulty of obtaining it made it expensive. Hindus used it in votive lamps and considered the oil sacred.

Manufacturing process

The extraction of sesame oil from the sesame seed is not a completely automated

Oil, sesame, salad or cooking Nutritional value per 100 g (3.5 oz)	
Energy	3,699 kJ (884 kcal)
Carbohydrates	0.00 g
Fat	100.00 g
saturated	14.200 g
monounsaturated	39.700 g
polyunsaturated	41.700 g
Protein	O.OOg
Vitamin C	0.0 mg (0%)
Vitamin E	1 .40 mg (9%)
Vitamin K	13.6 ig (13%)
Calcium	0 mg (0%)
Iron	0.00 mg (0%)
Magnesium	0 mg (0%)
Phosphorus	0 mg (0%)
Potassium	0 mg (0%)
Sodium	0 mg (0%)

Source: USDA Nutrient database

Sesame oil is composed of the following fatty acids

Fatty acid	Nomenclature	Minimum	Maximum
Palmitic	C16:0	7.0 %	12.0%
Palmitoleic	C16:1	Trace	0.5 %
Stearic	C18:0	3.5 %	6.0 %
Oleic	C18:1	35.0 %	50.0 %
Linoleic	C18:2	35.0 %	50.0 %
Linolenic	C18:3	Trace	1.0%
Eicosenoic	C20:1	Trace	1.0 %

process. In the fairy tale "Ali Baba and the Forty Thieves", the sesame fruit serves as a symbol for wealth. When the fruit capsule opens, it releases a real treasure - the sesame seeds. However, a great deal of manual work is necessary before this point is reached. That is why sesame is hardly over cultivated in Western industrialised agricultural areas.

The sesame seeds are protected by a capsule, which does not burst open until the seeds are completely ripe. The ripening time tends to vary. For this reason, the farmers cut plants by hand and place them together in upright position to carry on ripening for a few days. The seeds are only shaken out onto a cloth after all the capsules have opened.

The discovery of an indehiscont mutant by Langham in 1943 began the work towards development of a high yielding, shatter-resistant variety. Although researchers have made significant progress in sesamo breeding, harvest losses due to shattering continue to limit domestic US production.

Sesame seed market

As of 2007, sesame is being imported into the US at a price of US$0.43/lb. This relatively high price reflects a worldwide shortage. Though the market for sesame seed is strong, domestic US production awaits the development of high-yielding nonshattering varieties. It is advisable to establish a market before planting.

Varieties

There are many variations in the colour of sesame oil: cold-pressed sesame oil is pale yellow, while Indian sesame oil (gingolly or til oil) is golden, and Chinese and Korean sesame oils are commonly a dark brown colour. This dark colour and flavour are derived from roasted/toasted sesame seeds. Cold pressed sesame oil has a different flavour than the toasted oil, since it is produced directly from raw, rather than toasted seeds.

Sesame oil is traded in any of the forms described above: Cold-pressed sesame oil is available in Western health shops. Unroasted (but not necessarily cold pressed) sesame oil is commonly used for cooking in the Middle East and can often be found in halal markets. In East Asian countries, different kinds of hot-pressed sesame oil are preferred.

Uses

Cooking

Despite sesame oil's high proportion (41%) of polyunsaturated (Omcga-6 fatty acids), it is least prone, among cooking oils with high smoke points, to turn rancid when kept in the open. This is due to the natural antioxidants present in the oil.

Light sesame oil has a high smoke point, and is suitable for deep-frying, while heavy (dark) sesame oil (from roasted sesame seeds) has a slightly lower smoke point is unsuitable for deep-frying, instead it can be used for stir-frying of meats or vegetables; making of omelette. Most in Asia used Roasted Sesame Oil for seasoning, particularly in East Asian cuisine.

The Chinese use sesame oil for preparation of meals for women during postpartum confinement.

Sesame oil is most popular in Asia, especially in the South Indian states of Karnataka, Coastal Andhra Pradosh and Tamil Nadu, where its widespread use is similar to that of olive oil in the Mediterranean.

Body massage

Sesame oil is reputed to penetrate the skin easily, and is used in India for oil massage. In Maharashtra, Sesame oil is specially used for massaging the foot.

Hair treatment

Applying sesame oil to the hair is said to result in darker hair. It may be used for hair and scalp massage. It is believed to reduce the heat of the body and thus helps in preventing hair loss.

Food manufacture

Sesame oil is used in the manufacture of pickles. Refined sesame oil is used to make margarine in Western countries.

Drug manufacture

Sesame oil is used in the manufacture of Ayurvedic drugs.

Worship

Sesame oil is used in brass or silver lamps kept in front of gods and goddess of Hindus. Sesame oil is used for performing puja in Hindu temples.

Industrial uses

In industry, sesame oil may be used as:

- a solvent in injected drugs or intravenous drip solutions,

No more than 10 per cent of a person's total caloric intake should be derived from polyunsaturated fats such as those found insesame oil, according to the American Heart Association

- a cosmetics carrier oil,
- coating stored grains to prevent weevil attacks. The oil also has synergy with some insecticides.

Low grade oil is used locally in soaps, paints, lubricants and illuminants.

Alternative medicine

Vitamins and minerals

Sesame oil is a source of vitamin E. Vitamin E is an anti-oxidant and has been correlated with lowering cholesterol levels. As with most plant based condiments, sesame oil contains magnesium, copper, calcium, iron, zinc and vitamin B6. Copper provides relief for rheumatoid arthritis. Magnesium supports vascular and respiratory health. Calcium helps prevent colon cancer, osteoporosis, migraine and PMS. Zinc promotes bone health.

Besides being rich in Vitamin E. there is insufficient research on the medicinal properties of sesame oil. However, the following claims have been made.

Blood pressure

Sesame oil has a high percentage of polyunsaturated fatty acids (omega-6 fatty acids) - but it is unique in that it keeps at room temperature. This is because it contains two naturally-occurring preservatives, sesamol and sesamm. (Normally, only oils predominately composed of the omega-9 monounsaturated oil, like olive oil, keep at room temperature.)

It has boon suggested that duo to the presence of high levels of Polyunsaturated fatty acids in sesame oil, it may help to control blood pressure. It could bo used in cooking in place of other edible oils and to help reduce high blood pressure and lower the amount of medication needed to control hypertension.

The effect of the oil on blood pressure may be due to polyunsaturated fatty acids (PUFA) and the compound sesamin - a lignan present in sesame oil. There is evidence suggesting that both compounds reduce blood pressure in hypertensive rats. Sesame lignans also inhibit the synthesis and absorption of cholesterol in these rats.

Oil pulling

Sesame oil is one of the few oils recommended for use in oil pulling (sunflower oil is the other oil recommended).

Stress and tension

Various constituents present in the sesame oil have anti-oxidant and anti-depressant properties. Therefore proponents encourage its use to help fight senile changes and bring about a sense of well-being.

Adherents for its therapeutic use reports claims of feeling better than when not using it.

General claims

While not approved by the U.S. Food and Drug Administration, sesame oil is reputed to have a number of therapeutic uses.

As with cure-all claims of other folk and therapeutic medicines, it is suggested that regular topical application and/or consumption of sesame oil should mitigate effects of anxiety, nerve and bone disorders, poor circulation, lowered immunity and bowel problems. It is suggested such use would also relievo lethargy, fatigue and insomnia, while promoting strength and vitality, enhancing blood circulation. There are claims that its use has relaxing properties which eases pain and muscle spasm, such as sciatica, dysmenorrhoea, colic, backache and joint pain. Sesame oil when used in infant massage, it is claimed, helps to calm babies and lull them to sleep and improves growth of the brain and the nervous system. These are claims similar to other therapeutic medicines, that it's having antioxidants explains beliefs that it slows the aging process and promotes longevity.

It is suggested that sesame oil, when consumed and/or topically applied, should relieve dryness both externally and internally. Sesame oil is sometimes recommended to alleviate the dryness associated with menopause. It is believed that its use "restores moisture to the skin, keeping it soft, flexible and young looking". It is suggested that it relieves "dryness of joints" and bowels, and eases symptoms of dryness such as irritating coughs, cracking joints and hard stools. Since "dryness of joints" is not a medically classifiable condition, it would be difficult to medically comprehend or verify these claims of panacea.

Other uses include as a laxative, as a remedy for toothaches and gum disease and in the treatment of blurred vision, dizziness, and headaches.

It is suggested that sesame oil could tie used in the treatment of dry nose, reduction of cholesterol levels (due to presence o! Lignans which are phytoestrogens), antibacterial effects, and even slowing down certain types of cancer (due to the anti-oxidant properties of the Lignans).

Adverse effects

Sesame oilo is not known to be harmful when taken in recommended dosages, though the long-term effects of taking sesame derived remedies (in any amount) have not been investigated. Due to lack of sufficient medical study, sesame oil should be used with caution in children, women who are pregnant or breast-feeding, and people with liver or kidney disease.

Because of its laxative effects, sesame oil should not be used by people who have diarrhea.

No more than 10% of a person's total caloric intake should be derived from polyunsaturated fats such as those found in sesame oil, according to the American Heart Association.

Oil massage should be avoided immediately after administering enemas, emetics or purgatives, during the first stages of fever or if suffering from indigestion.

People who are allergic to peanuts are likely to be more susceptible to sesame allergy. Allergy to peanuts is one of the most common allergies, and can lead to anaphylactic shock which can be fatal. Persons allergic to sesame seeds should be cautious about using sesame oil.

(Courtesy : SAARC Oils & Fats Today, May 2010)

SUSTAIN

Jean Wills Hinton

Sustainability

But what does sustianability means to a 100-year-old scientilic society such as AOCS?

One hundred years ago, the individuals who established this Society set out to meet an immediate need, which was to develop methods and to share research results. This early network of analysts created an opportunity to collaborate on research and established a journal lo share information. As a result, more people joined the Society, and the fields of research expanded owing to the interaction. New products and improvements to health and vitality resulted. And then more facets of research, related to the original focus on cottonseed oil and soaps emerged because of the work and collaboration, and friendships grew, and businesses grew, and the collaboration became more and more international, and meetings resulted, and books were published, etc.

And here we are, 100 years later, wondering what is next, as we continue to draw our disparate global membership into a tightly knit group of colleagues whose efforts continue to result in the improvement of health, wellness. cleaning, personal care, nutrition, energy alternatives, and food. products (to name a few).

So, as far as the meaning of sustainability in the context of AOCS goes, it means the con*tinual growth of the bodies of knowledge that exist within the professions of the members we serve - and the application of that knowledge to improve the human land in some cases, animal) condition - an important pursuit by any estimation.*

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[Courtesy : inform March 2010, Vol.21 (3)]

BEWARE OF MEDIA !

Dealing with the media

MOST journalists and documentarians are dedicated to providing fair and comprehensive accounts of events and issues. Case in point: Stephen Schneider. a climatologist at Stanford University who studies climate change, told Nature (461:848. 2009) that only twice out of the roughly 3,500 interviews he has given has he been "set up" by unethical journalists.

Twice is two times too many, however. The best way to avoid being used is to spot hidden agendas before you say "yes" to a interview. After all. interviews—once given—cannot easily be withdrawn. Trying to withdraw them can actually draw more media attention to a partisan project and your part in it. So do your home work, by using these tips, before agreeing to be interviewed.

BEFORE AGREEING TO THE INTERVIEW

1. Do not take cold calls. Understand the journalist's topic and slant first and call back before deadline. You may well not be the right expert for the interview.
2. Ask about starting assumptions and the proposed audience.
3. Research the previous work of the journalist and any companies behind the project. Look for a partisan or sensational tone. If you sense a lack of balance, do not accept the interview.
4. Ask if you can receive questions in advance. Many journalists prefer not to send questions in advance, choosing instead to have a more spontaneous interview. But there is no harm asking.

PREPARING FOR THE INTERVIEW

1. Prepare three to five talking points.
2. Practice being brief (think "sound bites")
3. Practice transitional bridges such a s "what is important here is." or "the real issue is." or "that is a good question, but what is really important is ... ."

DURING THE INTERVIEW

1. Do not say anything you do not want to have repeated. There is no such thing as "off the record."
2. Be concise and say "I don't know" if you don't know.
3. Do not speculate.
4. Stick to the topic.
5. If you are being quoted in a print piece, ask to have the quotes read back to you. (Do not ask to see the story before it goes to print.)
6. Double-check the journalist's understanding of the science during the interview.

AFTER THE INTERVIEW

1. Send written materials, if applicable, after the interview.
2. If your meaning was not conveyed accurately, let the reporter know (in a helpful, nondefensive way).
3. If the misstatement is serious, call or write a letter to the editor.
4. Keep a record of all your interviews. List the journalist's name, affiliation, phone number and/or email address, and story idea, along with your talking points. Rate your performance and try to do better next time.

RECORD SPEAKS !

USDA: Record 2009 crops

Last year's US soybean and corn crops set new records, according to the Crop Production 2009 Summary issued by the US Department of Agriculture's (USDA) National Agricultural Statistics Service.

Soybean production broke records for planted and harvested area as well as for yield and production. US farmers produced 3.36 billion bushels (about 91.6 MMT). higher by 13% than 2008 levels and 5<7r more than the previous record set in 2006.

The average yield per acre was 44 bushels, up 0.9 bushels from the previous record set in 2005. Fanners nationwide planted a total of 77.5 million soybean acres (approximately 31.4 million hectares) and harvested 76.4 million acres in 2009. both up 2% from the previous record set in 2008.

Corn production reached 13.2 billion bushels. \c/ (above the 2007 record of 13 billion bushels, and 9% higher than 2008. Corn yields were the highest ever in 2009 at 165.2 bushels/acre, overtaking the previous record of 160.3 bushels/acre (104.1 kg/ha) set in 2004. Planted area, at 86.5 million acres, is the second highest since 1949, behind 2007's 93.5 million acres.

Cotton production was down 3% from 2008, at 12.4 million 480-pound (lb) bales. Yield was estimated at 774 lb/acre for 2009. down 39 lb from 2008. Harvested area, at 7.69 million acres, was up 1°/c from 2008. The complete report is available at. http://tinyurl.com/y9u4h8c.

[Courtesy : inform March 2010,
Vol. 21 (3)]

NEW AVENUE

Single stage Extraction & Miscella refining of cottonseed oil new avenue in scientific processing cottonseed oil : New avenue in scientific processing cottonseed oil

by **ASHISHMANTRI**
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JALNA (MAHARASHTRA)

I. Introduction

INDIA is the third largest cottonseed producing country, next only to China and the US. Traditional method of cottonseed processing is adversely affecting the export of by-products and losses of extra oil. There is approximately an estimated loss of over Rs.5380 crores annually due to adoption of traditional processing of cottonseed.

What is Traditional Processing of cottonseed and its disadvantages?

Cottonseed can be processed either in a scientific manner by way of delinting/decortication etc. or simply by traditional crude method of crushing seed without delinting in undecorticated form. More than 95 percent of the cottonseed processed in the country is by this traditional (crude) method (i.e. expeller base oil mill). The oil cake obtained by the traditional method contains about 7 percent oil which is virtually not required by the cattle. Further, the protein content, considered as vital nutrient for raising the milk yield/maintaining healthy growth of the cattle is considerably low i.e. about 20 to 22 percent in undecorticated cottonseed oil cake. Besides the loss of oil and protein, the linlers (fuzzy portion of cottonseed) are also lost.

It is a myth that oil content in the cottonseed cake raises milk yield or fat percentage in the milk. Oil is generally required for generation of energy. The ruminant have a specialized digestive system with compound four compartment stomach. The energy is generated while cattle carry on rumination of the fibrous portion of the feed. Therefore, the oil content in oil cake is virtually not of much use to the cattle.

What is Scientific processing of cottonseed?:

Scientific processing of cottonseed broadly involves removal of linters, decortications, separation of hull, expelling, solvent extraction and refining of oil. Such processing ensures securing almost the entire cottonseed oil (about 16.5 of the total oil content of about 18) from the cottonseed, The cottonseed de-oiled cake / meal / extractions obtained by this method contains protein as high as about 40 to 42 as compared to about 20 to 22 in traditionally processed cottonseed oil cake. The protein content in the cattle feed is best utilized by the cattle if-it by-passes its rumen (first part of the stomach) and is digested in the subsequent parts of the stomach. Such phenomena is known as "bypass protein". It has been established that the protein content in cottonseed extractions is of "bypass protein" type. Decorticated cottonseed extraction is recognized all over the world as better cattle feed. In fact, undelinted undecorticated cotton-seed oil cake is virtually an unknown product in the developed countries. Cottonseed extraction has also two other uses viz. fish feed and poultry feed. Based on the experience abroad, there is good scope for export of cottonseed extraction as poultry feed.

COTTONSEED AVAILABILITY IN INDIA

(State wise):(Lakhs Metric Tonnes)

Sr. no.	Particulars	2008-09 Qty	2009-10 Qty	% of each state (2009-10)
1	Gujarat	29.97	32.63	33.60
2	Maharashtra	20.65	20.3	20.90
3	Andhra Pradesh	17.65	16.65	17.10
4	Punjab	5.83	5.08	5.20
5	Haryana	4.66	4.91	5.00
6	Karnataka	3	3.16	3.20
7	TamilNadu	1.67	1.67	1.70
8	All other states:	13.14	12.84	13.20
	TOTAL	96.57	97.24	
	Less:- Seed retained for cultivation/Direct consumption	4.99	4.00	
	Seed available for processing	91.58	93.24	

(Data from AICOSA)

(Courtesy : AICOSA Newsletter,

BE UPDATED

Facts about some common fats

VANASPATI

Vanaspati is the Indian name for a hydrogenated vegetable fat product which is used as a substitute for ghee (a butter fat) in cooking. In some countries, it is also called Vegetable ghee'. It is an important food item in India and Pakistan, and is also popular in West Asia as well as in some eastern Mediterranean countries. It is also known by several other names: in Yugoslavia & Greece (*voutyros*), and in Turkey, Algeria & Morocco (*smin*). The absence of moisture makes it more resistant to microbiological deterioration.

Since vanaspati is produced as a substitute for ghee which exhibits slow crystallization resulting in a granular texture; this appearance is usually looked upon as a sign of purity and quality. Palm oil, which tends to crystallize in a smooth microcrystalline form highly suitable for margarines and shortenings, is less suitable for grainy vanaspati.

In order to increase the granularity and the inclusion level of palm products (up to 80%), palm oil or preferably palm olein, can be selectively hydrogenated to increase the trans content of the blend and the ratio of asymmetrical to symmetrical glycerides. However, with the preference for trans-free products, interesterification of palm oil products with palm kernel oil can also achieve the same desirable attribute as this process also increases asymmetry.

In almost every country where vanaspati is made, the melting point and composition are legislated by law. For example, in India and Pakistan, the product still has to bo hydrogonatod (not interesterified) to a slip melting point o(maximum 41 °C and 39°C, respectively. After hydrogenation and refining, the finished oil is cooled to a slightly cloudy condition and packed in cans. The cans are stacked and allowed to cool slowly to develop the granular texture in a cold room in a process called tempering.

In recent years, innovative companies have been promoting smoother products which can bo produced in a simpler and more cost-effective manner, but of course, taste the same.

MPOB has carried out a detailed study of Indian and Pakistani vanaspati products and Table 1 shows some of the characteristics.

Vanaspati Formulations
(slip melting point approximately 40°C)

Palm stearin	20%
Palm oil	80%

Table 1: Chemical Characteristics of Ghee and Vanaspati

	Ghee		Vanaspati		
	Cow typical	Buffalo typical	Pakistan mean (n=3)	India mean (n=3)	SD
SMP (°C)	34.4	29.9	38.1	35.6	1.8
IV	34.9	28.4	63.5	76.5	4.3
SFC (%)					
10°	53.4	51.9	63.6	75.1	7.6
20°	22.6	23.1	40.3	52.6	7.5
30°	7.9	10.3	18.2	20.7	5.8
35°	3.2	4.0	9.1	6.8	4.0
40°	0	0	4.3	1.3	1.7
FAC (as % methyl esters)					
16:0 (palmitic)	27.2	33.7	30.1	14.8	
Saturated	68.0	71.7	37.7	23.8	
Unsaturated	32.0	28.3	62.2	76.2	
Trans	0.9	1.7	27.0	53.7	

Source : Kheri MSA (1982)

Table 2: Solid Fat Content (SFC) Profiles and Slip Melting Points (SMP) of Vanaspati Formulations with at least 30% Palm Oil

Formulation	SMP (°C)	SFC(%) 10°C	20"C	30°C	35UC	40°C
Hydrogenated palm oil (42°C)/ hydrogenated soyabean oil (32°C) 50%/50%	37.0	85	67	31	15	-
Hydrogenated palm olein (43°C)/palm oil 30% 170%	37.0	66	45	19	12	-
Hydrogenated palm oil (41 °C)/ hydrogenated soya bean oil (36°C) 50%/50%	36.0	78	53	20	10	1
Palm oil/hydrogenated soyabean oil (30°C) 30%170%	34.8	72	46	14	5	-

Table 3: Solid Fat Content (SFC) Profile and Slip Melting Point (SMP) of Interesterified Vanaspati Formulation

Formulation	SMP (°C)	SFC(%) 10°C	20°C	30°C	35°C	40°C
Interesterifiod blend (70% palm stearin/30% rapeseed oil)	38	44	25	11	8	3

The above formula will give a rather smoothbut inexpensive product with no trans fatty acids. For increased granularity, replace part of the palm oil with hydrogenated soyabean oil, for example:

Palm stearin (48° C)	20%
Palm oil	40%
Hydrogenated soyabean oil (32°C)	40%

The following blends, arranged in order of de-creasing slip melting point contain at least 30% palm oil which have given good results, are shown in Table 2.

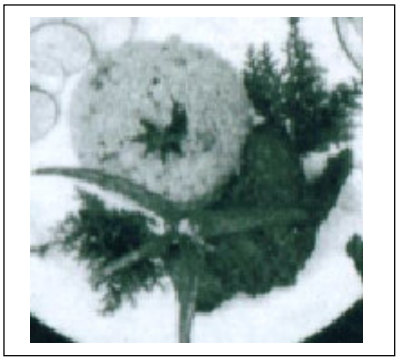
The following trans-free blend produced by intereste-rification, had a more gentle solid fat content profile but, nevertheless still gave a good grainy texture (Table 3).

Trans-free Vanaspati

Palm oil has desirable physical characteristics for vanaspati and does not require hydrogenation. The blending of palm oil products and liquid vegetable oils to the requirements of consistency and melting point of vanaspati is quite feasible. The blended and/or interesterified palm stearin with soyabean, rapeseed and sunflower oil are also suitable for trans-free vanaspati.

Direct blending of 60% palm stearin and 40% liquid vegetable oil produces the most acceptable vanaspati. The product appears homogenous, has soft consistency with no oil separation. In the case of interesterified vanaspati, a higher amount of palm stearin of up to 80% can be incorporated.

Traditional chicken rice cooked with vanaspati (in bowl)



BAKERY FATS

It is said that bread was first baked in Europe some 6000 years ago, and from there it spread to all parts of the world.

The largest markets for the bakery industry are now the United Kingdom, Germany, France, Italy and the USA. In these countries, annual per capita consumption of bread is about 40 kg and it accounts for about 70% of all morning goods sales.

Bread Fats

Although bread can be made by the traditional long fermentation process without fat, addition of fat ensures a better texture and longer shelf-life. The amount of fat used depends on the recipe and custom, e.g. American breads normally contains more fat than those in Britain. One of the best fats for bread is shortening made from 100% RED palm oil. It is bland compared to lard and similar fats, and has the advantages of being competitively priced and of vegetable origin, and is cholesterol-free. Table 4 below shows a typical formula of white bread used by a bakery in Britain.

Table 4: Typical White Bread Formula (United Kingdom, industrial)

Ingredient	Weight (kg)
Wheat flour (strong)	100
Water	60-65
Yeast	3
Yeast food	0.4
Salt	2
Sugar	4
Mould inhibitor	0.125
Non-fat dry milk solids	3
Fat (palm oil)	2
Emulsifier	0.25

FATS

Bread Made by Non-fermentation Process (mechanical dough development)

In major western countries, industrially produced bread is made by semi-or fully-continuous processes as Chorleywood (UK), Do-Maker (USA) and AmFlow (USA). The flour-gluten dough is developed by intensive stirring and mixing for a few minutes after adding a small amount of yeast rather than by bulk fermentation.

Here, fat at about 1% of the flour weight is essential to the recipe and the British Bakery Industrial Research Association has shown that the critical factor is the solid fat phase at the temperature of the final proof (ca. 37°C). This should be at least 0.022% of the flour weight with as high a palmitic content as desirable.

Palm stearin is a highly competitive fat for this purpose, possessing a high solid fat content profile, high palmitic acid content (over 50%), and cholesterol-free.

Other Yeast Raised Products

The only difference between various yeast raised bakery products is their richness as reflected by the relative amount of sugar, fat, milk and egg used. A comparison of some general formulations is shown in Table 5 (American products).

Bread Improvers

Freshly milled flour does not make as good a bread as old mature flour which has undergone some oxidation.

Most bread flour in the market can. therefore, be improved by adding 'bread improvers', which contain mild oxidizing agents, emulsifiers, etc., to the bread fat. A suitable formula is:

Palm oil (or palm-based shortening)	48.0%
Glycerol monostearate	12.5%
Sugar	29.3%
Dextrose	10.0%
Ascorbic acid	0.2%
Flavouring	as needed
Total	100.00

BISCUIT FATS

In industrialized countries, biscuit manufacturers are one ofthe largestusers of shortening. In the production of biscuits, oils and fats are used for three major purposes:

- biscuit dough
- biscuit cream, and
- spraying oil after baking

For each of these uses, the requirements from the oil/fat are very different, but palm oil is eminently suitable as a major component for all of them.

Table 5: Typical Formulae of Bakery Products (in parts)

Ingredient	Crackers wheat bread	Whole bread	White (dinner & hamburger rolls, etc.)	White rolls products (sweet rolls & coffee cakes, etc.)	Sweet
Flour	100	100	100	100	100
Water	56	66	62	64	60
Yeast	1.5	2	2	3	4
Salt	1.75	2.25	2.25	2.25	2
Sugar	1	4	6	8	14
Milk (dry skim)	-	-	4	6	6
Shortening	5	5	4	8	12
Eggs (whole)	-	-	-	-	10
Dough conditioner	0.2	0.3	0.3	0.3	0.2

Biscuit Dough Fats

Biscuit dough varies greatly in its make-up, consistency and use of machinery for its processing, and no single fat or blend can be considered ideal. But for all biscuits, the following two requirements are absolutely essential:

- no tendency for fat bloom, and
- long shelf-life

Fat bloom in biscuit is not a very well understood phenomenon and one can only be guided by experience. A series of trials in MPOB on shortcake biscuits showed that natural lard gave no bloom, hydrogenated lard with melting point of 38°C gave slight bloom, and hydrogenated lard with melting point 44°C gave severe bloom.

in general, it is a common practice to use blends of two or more oils to have a greater range of fatty acid molecular weights, and the complexity of the triglycerides and this approach is followed in industrial biscuit dough fats. Palm oil has found very successful applications in this field since its high palmitic acid content is a convenient means of interrupting the sequence of C18 chains found in seed oils. Hydrogenated fish oil is also good in this respect, but it is not vegetable and contains trans-fatty acids. In the European Union, palm oil is now the largest single component of biscuit dough fats, just as palm kernel oil is of biscuit cream fats.

Examples of formulations i. Palm kernel oil or 10% coconut oil

i	Palm oil	57%
	Hydrogenated fish oil [or hydrogenated soyabean oil (40/42°C)]	33%

FATS

ii.	Palm oil	67%
	Hydrogenated fish oil [or hydrogenated soyabean oil (40/42°C)]	33%

Biscuit Cream Fats

Biscuit cream fats are used in the manufacture of cream for sandwich-type biscuits. A biscuit cream is essentially a blend of fat, sugar, milk solids and flavourings/colour. The fat required should have a steep solid fat content profile so that it is firm at room temperature and melts cleanly and completely in the mouth. If cost is of no concern, then cocoa butter would be the ideal fat, but because of its high price, cocoa butter is not normally used except in luxury markets. At times, oils of somewhat greater plasticity or higher melting point, may be preferred for climatic or price reasons.

In western countries, most top quality biscuit cream is made with lauric CBS such as palm

kernel stearin, while for the mass market, the simplest confectionery fats, hydrogenated palm kernel oil and hydrogenated coconut oil are used.

Hydrogenated palm kernel oil is particularly popular as it can be made into a wider range of melting points than coconut oil and is also usually more competitively priced. The world production trend is certainly in its favour.

In cases where even cheaper fats are needed, or in warm countries where higher melting points are required, hydrogenated palm olein is the most suitable. It is also particularly suitable for high quality Bourbon-type biscuit cream, which is based on the cocoa mass, where lauric fats are unsuitable due to formation of eutectics.

Suitable Formulations

Some highly successful formulations from the United Kingdom industry are given below:

i.	Hydrogenated palm kernel stearin (32°C or 38°C)	100%
ii.	Hydrogenated palm kernel oil (32°C, 35°C or 38°C) (Melting point according to season, climate and preference)	100%
iii.	Hydrogenated palm kernel oil (38°C)	50%
	Palm kernel oil	50%
iv.	Hydrogenated palm kernel oil (35°C)	80%
	Hydrogenated palm kernel oil (42°C)	20%
v	Hydrogenated palm olein (30°C or 42°C)	100%

Biscuit Spraying Oils

Certain types of savoury biscuits are made from a lean cream cracker recipe and then have oil sprayed on after baking to give them a richer taste and an attractive glossy appearance.

The major requirements for the fat are low solid fat content at 25°C-30°C and very high oxidative stability since the fat is sprayed hot and fully exposed to air on the gluten strands and starch particles of the biscuit shell. However, the fat should have an appreciable solid fat content at 20°C to ensure dry handling.

Lauric fats, such as those from palm kernel oil, have the required properties. However, blends of palm kernel oil with palm oil products, which are even more economical to use, are perfectly suitable and widely used.

Examples of fat formulation

i.	Palm kernel oil	100% - best western practice.
ii.	Palm oil	50%
	Palm kernel oil	50% - good western practice.
iii.	Palm olein	100% - for lower cost.
iv.	Hydrogenated palm olein (33/35° C)	100% - for hot climate.

Blend No.2 above takes advantage of the strong eutectic effect of palm oil with laurics.

PEANUT BUTTER

Peanut butter is a very popular food in the USA and its consumption has now spread widely in Europe and other countries. It is eaten mainly as a spread on bread or toast with fruit jelly or jam, and also in savoury sandwiches of all types - in place of butter or margarine. It is a very wholesome product containing only two-thirds of the fat in butter, is less saturated than margarines, and contains more protein than prime steak.

Standards of Identity

In the USA. the PDA introduced a standard of identity (or peanut butter in 1968, defining it as a food prepared by grinding shelled roasted peanuts with the optional addition of not more than 10% other ingredients. Its total oil content must not exceed 55%. The optional ingredients must perform useful functions and normally include salt, natural sweeteners, emulsifiers such as lecithin, and stabilizers such as fully hydrogenated vegetable oils, and a suitable monoglycerides. Any addition of vitamins A,

B, C, D or artificial colour, flavour and preservatives are not permitted.

Stabilizers

These are fat-based products which are added to peanut butter to prevent oil separation and settling of the solids into a solid mass at the bottom of the container. The crystal form of the stabilizer is important and it should be in the p-prime phase. The p-crystallizing fats tend to transform gradually into larger, coarser crystals giving a dull surface to the butter and oil separation.

Suitable fats are straight hard palm stearin added with mono-and diglycerides, from fully hydrogenated vegetable oils. Palm oil products have the advantage that they are not required to be declared as chemicals on the product label and palm stearin is gaining popularity since it is fully natural, and usually the most competitively priced.

Only a minimum amount of stabilizers should be used. An excessive amount will produce a drier product with poorer taste and flavour release. However, too little stabilizer will lead to a quick oil separation and early onset of rancidity.

Formulations

With the increasing health consciousness of the EU consumers, the use of palm oil products as stabilizers in peanut butter has become virtually a standard practice. The inclusion of palm oil can be confirmed on the label. Typical peanut butter formulae are as follows:

1.	Top quality	
	Roasted peanuts	96%
	Palm stearin (hard type)	2%
	Salt	2%
2.	A slightly cheaper version	
	Roasted peanuts	90%
	Sugar	7%
	Palm stearin (hard type)	2%
	Salt	1%
3.	A slightly less sweet product	
	Roasted peanuts	90%
	Corn syrup solids	6.5%
	Palm stearin or hydrogenated palm oil (IV 5-1 0)	2%
	Salt	1 . 5 %

Note on Nut Quality

Any variety of peanut can be used provided that they are aflatoxin-free, US-Grade 1 or equivalent. Virginias have too low oil and require blending with other varieties, or addition of peanut oil.

The US Standard of Identity allows the skin to be left on the nuts, but this will introduce a slightly bitter note which may not be acceptable to, some consumers.

In all recipes, the final total oil content should be adjusted to 55% maximum by additional or removal of the oil used.

(Courtesy : SAARC OILS & FATS TODAY, June 2010).

WHAT IS COOKING?

Various uses of Sunflower oil

SUNFLOWER oil is the non-volatile koil expressed from sunflower "(Helianthus annuus) seeds. Sunflower oil is commonly used in food as a frying oil, and in cosmetic formulations as an emollient.

Composition

Sunflower oil contains predominantly linoleic acid in triglyceride form. The British Pharmacopoeia lists the following profile:

- Palmitic acid : 4 - 9%
- Stearic acid : 1 - 7%
- Oleic acid : 14 - 40%
- Linoleic acid : 48 - 74%

There are several types of sunflower oils produced, such as high linoleic, high oleic and mid oleic. High linoleic sunflower oil generally has at least 69% linoleic acid. High oleic sunflower oil has at least 82% oleic acid. Variation in unsaturated fatty acids profile is strongly influenced by both genetics and climate. In the last decade high stearic sunflower lines have been developed in Spain to avoid the use of hydrogenated vegetable oils in food industry.

Sunflower oil also contains lecithin, tocopherols, carotenoids and waxes. This oil's properties are typical of a vegetable triglyceride oil. Sunflower oil

is produced from oil type sunflower seeds. Sunflower oil is light in taste and appearance and has a high Vitamin E content. It is a combination of mono-unsaturated and polyunsaturated fats with low saturated fat levels.

Physical properties

Sunflower oil is liquid at room temperature. The refined oil is clear and slightly amber-colored with a slightly fatty odor.

Smoke point (refined)	232°C	450°F
Smoke point (unrefined)	227°C	440°F
Density	(25°C)	917 kg/m3
Refractive index (25°C)	= 1.473	

Uses

As a frying oil, sunflower oil behaves as a typical vegetable triglyceride. In cosmetics, it has smoothing properties and is considered non comedogenic. Only the high-oleic variety possesses shelf life sufficient for commercial cosmetic formulation. Sunflower oil's INCI name is Helianthus Annuus (sunflower) Seed Oil.

Health benefits

There is a variety of health benefits associated with the consumption of sunflower oil.

Sunflower oil (high oleic (70% and over)) Nutritional value per 100 g (3.5 oz)

Energy	**3,699 kJ (884 kcal)**
Carbohydrates	0 g
Fat	100 g
saturated	9.748 g
monounsaturated	83.594 g
polyunsaturated	3.798 g
Protein	0 g
Vitamin E	41.08 mg (274%)
Vitamin K	5.4 (lg (5%)

Diet and cardiovascular benefits

Sunflower oil is high in the essential vitamin E and low in saturated fat. The two most common types of sunflower oil are linoleic and high oleic. Linoleic sunflower oil is a common cooking oil that has high levels of the essential fatty acids called polyunsaturated fat. It is also known for having a clean taste and low levels of trans fat. High oleic sunflower oils are classified as having monounsaturated levels of 80% and above. Newer versions of sunflower oil have been developed as a hybrid containing linoleic acid. They have monounsaturated levels lower than other oleic sunflower oils. The hybrid oil also has lower saturated fat levels than linoleic sunflower oil. Sunflower oil of any kind has been shown to have cardiovascular benefits as^ well. Diets combined with a low fat content and high levels of oleic acid have been suggested to lower cholesterol which, in turn, results in a smaller risk of heart disease. Sunflower oils fit this criterion. Studies of adults suggested that a balanced diet in which small quantities of saturated fats are replaced with sunflower oil has detectable cholesterol-reducing benefits. Research suggests that lower cholesterol levels can be caused by balances of polyunsaturated and monounsaturated fatty acids. Sunflower oil may help with this balance.

Restaurant and food industry uses

Restaurants and food manufacturers are becoming aware of the health benefits of sunflower oil. The oil can be used in conditions with extremely high cooking temperatures. It may also help food stay fresher and healthier for longer periods of time [5]. Food manufacturers are starting to use sunflower oil in an effort to lower the levels of trans fat in mass produced foods. A number of common snack foods currently contain sunflower oil, including New York Fries French fries, Majans BHUJA Mix healthy snacks, the Sri Lankan style Bombay Mix - Rani Mix, Kettle Chips, Sun Chips, Sunflower Chips, Ruffles, Walkers and Lay's potato chips; the recipe of the latter was modified in late 2006 in order to include the oil.

For skin protection

Sunflower oil, like other oils, can retain moisture in the skin. It may also provide a protective barrier that resists infection in pre-term infants. Studies using sunflower oil have been conducted involving low birth weight pre-term infants that are often susceptible to infection due to their under-

developed skin. The study determined that infants receiving a daily skin treatment of sunflower oil were 41% less likely to develop infections in hospital.

Negative health effects

A high consumption of omega-6 polyunsaturated fatty acids, which are found in most types of vegetable oil including sunflower oil, may increase the likelihood that postmenopausal women may develop breast cancer. Similar effect was observed on prostate cancer. Other analysis suggested an inverse association between total polyunsaturated fatty acids and breast cancer risk.

(Courtesy : SAARC OILS & FATS TODAY, June 2010).

WATCHOUT

Oil that makes your life healthier

IT is believed that the biggest threats to health in developed countries are chronic illnesses such as cardiovascular disease, diabetes, obesity and cancer. The main cause is the faulty nutrition, with a high intake of mostly saturated fatty acids, isomers of unsaturated fatty acids.

Our daily diet lacks of poly-unsaturated omega 3 fatty acids that take part in lowering triglycerides and high blood pressure, also prevent blood from clotting and increase HDL cholesterol (the good cholesterol).

Omega 3 fatty acids are found in fish, especially fatty ones such as mackerel, salmon, sardinesor herring. They are also in bread, yogurt, soybean, tofu, walnuts, flax and pumpkin seeds.

Also cooking oils, namely flax seed, canola and soybean contain these important acids.

The list of edible oils, which can be incorporated into our diet, is very long. These include oil: canola, olive, soybean, linseed, mustard, corn, sunflower, safflower, poppy, grape seed, pumpkin seed, sesame, peanut, palm oil. There is a belief that olive oil is the healthiest and canola oil is not good for our body. However, these oils help reduce the risk of cardiovascular disease. This opinion has been stated and confirmed by U.S. Food and Drug Administration.

According to professor Krzysztof Krygier, rapeseed is often treated as a raw material of second kind because of poor oil quality. In fact, it is believed that canola oil is less "healthy" than others. Professor Krygier opposes this opinion claiming that today's rapeseed oil is completely different than some years ago. It has been deprived of two components: erucic acid and sulfur compounds. Erucic acid was considered health damaging and the sulfur compounds caused unpleasant taste and smell of the oil.

(Courtesy : SAARC OILS & FATS TODAY, June 2010).

VENTURE

GM plans biodiesel - based vehicles

BIODIESEL, developed by an Indian research organisation, has received patent in the US and the success of a project on jetropha in Gujarat could make General Motors India introduce biodiesel-capable products as parts of its global efforts to synergise business with alternative sources of green energy.

The global gieant recently joined a tripartite agreement with the US Department of Energy (DOE) and the Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar, in a $ 950,000 project in Gujarat for five years.

CSMCRI on Monday unveiled a GM Tavera, run on B-100 jatropha biodiesel, produced through an internationally patented process. “No modifications of any kind has been made on the vehicle”, it said.

David Tulauskas, DIrector, Public Policy, GM Internatrional Operations told Business Line here that the project cost is part of a GM-DOE partnership worth $1.4 million to work on alternative fuel projects - including jatropha, CNG and LPG - in southern California), Mexico, South America, South-East Asia and India.

In India, GM independently runs a biodiesel project at Talegaon, near Pune, and another in Bhavnagar district in association with CSMCRI, CSMCRI had so far latter has run some 50,000 kms as test drives on six vehicles using this fuel. laboratory optimised stains of jatropha would be produced through selective and marker-assisted bredding in the designated farms.

Karl Slym, President and Managing Director of GM India, said the tie-up reiterates the company's commitment to green technology and alternative fuel solutions to reduce dependence on fossils fuels. "If jatropha proves commercially viable, GM India will be ready to respond by introducing biodiesel-capable products."

The CSMCRI Director, Dr. Pushpito K. Ghosh, said CSMCRI has a plan at Bhavnagar producing 500 litres of biodiesel a per day and another for the Defence Ministry, manufacturing one tonne of biodiesel daily. Under the new partnership project, two new farms will be established on a 33-hectare plot in Bhavnagar and a 20-hectare plot in Kalol.

It will also oversee the existing GM-CSMCRI 30 hectare farm in Bhavnagar. under the five year partnership formalised between CSMRI, GM and US DOE, jatropha would be developed as a sustainable energy crop. It aims at demonstrating that jatropha, aplant traditionally seen as a weed, can produce significant quantities of oil for commercial scale conversion to biodiesel. jatropha is a dought-resistant, non-edible plant that can be grown commercially with minimal care on marginal land. Unlike corn and sugar cane, which are grownelsewhere for biofuels, jatropha is inedible. As a result, its cultivation for biofuel does not negatively impact the food chain.

(Courtesy : SAARC OILS & FATS TODAY, May, 2010).

E.coli HELPS

BIODIESEL

Engineered E. coli can make biodiesel

USING the tools of synthetic biology, a collaborative team of researchers at the US Department of Energy's Joint BioEnergy Institute (JBEI). the University of California at Berkeley, and LS9 (South San Francisco, California) has developed a microbe that can produce biodiesel directly from cellulosic biomass in a one-step process. This discovery enables the production of advanced hydrocarbon fuels and chemicals in a single fermentation process that does not require additional transformations. The results appeared in a paper entitled "Micro-bial Production of Fatty Acid-Derived Fuels and Chemicals from Plant Biomass" in *Nature 463*:559-562 (2010).

The three collaborating entities worked with Eschcrichia coli. a bacterium whose natural ability to synthesi/.e fatty acids and notable amenability to genetic manipulation make it an ideal target for biofuels research. Eric Steen. one of the co-authors associated with JBEI, said, "Biosynthesis of microbial fatty acids produces fatty acids bound to a carrier protein, the accumulation of which inhibits the making of additional fatty acids. Normally, *E. coli* doesn't waste energy making excess fat, but by cleaving fatty acids from their carrier proteins, we're able to unlock the natural regulation and make an abundance of fatty acids that can be converted into a number of valuable products." for example, fatty acid esters. Steen added, "Further, we engineered our E. coli to no longer eat fatty acids or use them for energy."

The engineered *E. coli* secretes the biodiesel into the surrounding medium, meaning that cells do not need to be fractured to get the diesel out, thus saving on processing costs. And because biodiesel is insoluble in water, it floats to the top, where it can be collected, also saving on processing costs.

Jay Keasling. chief executive officer for JBEI and one of two corresponding authors for the article, commented. "Given that the costs of recovering biodiesel are nowhere near the costs required to distill ethanol,. .. our results can significantly contribute to the ultimate goal of producing scalable and cost-effective advanced biofuels and renewable chemicals."

After diverting fatty acid metabolism toward the production of fuels and other chemicals fromglucose, the researchers engineered their

new strain of *E. coli* to produce hemicellulases - enzymes that can ferment hemicelluloses, the complex sugars that are a major constituent of cellulosic biomass and a prime repository for the energy contained within plant cells walls. In all. the authors reported more than a dozen genetic modifications.

Steen added, "Engineering *E. coli* to produce hemicellulases enables the microbes to produce fuels directly from the biomass of plants that are not used as food for humans or feed for animals...[B]iochemical processing of cellulosic biomass requires costly enzymes for sugar liberation. By giving the E. coli the capacity to ferment both cellulose and hemicellulose without the addition of expensive enzymes, we can improve the economics of cellulosic biofuels."

The next steps in this research program will involve maximizing the efficiency and the speed by which this engineered strain of AT. coli can directly convert biomass into bio-diesel, and maximizing the total amount of biodiesel that can be produced from a single fermentation.

[Courtesy : inform March 2010, Vol. 21 (3)]

DOUBTING THOMAS

Doubts over jatropha in India

OIL extraction from jatropha seeds has been touted in India as an eco-friendly way to meet the country's growing energy needs. Promoters have said the plant grows on marginal and uncultivated land, where it does not compete with food crops, and that the plant grows without irrigation. The latter is especially attractive for drought-prone areas in the nation.

However. Sarachchandra Lele, a senior fellow with ATREE (Ashoka Trust for Research in Ecology and the Environment), which promotes sustainable development, said recently. "Some state governments are promoting its cultivation on regular agricultural land, where it will displace existing crops, including food crops." Furthermore, "We are basically subsidising the urban elite's petrol consumption at the cost of rural livelihoods and food production."

ATREE reports their research shows jatropha production yields of less than one metric ton (MT) per hectare, considerably less than the 2.5-4 MT per hectare, after six years, predicted in 2007 by the state-run National Oilseeds and Vegetable Oils Development Board (www.novodboard.com).

According to the AFP news agency (January 27). the Indian government hopes to have 11 million hectares planted to jatropha by 2011. Subhas Patnaik. chief operating officer of Mission Biotuels. which currently owns about 130.000 hectares for jatropha plantations in India, argues that poor initial results will he overcome. "The whole challenge is how to get better yields from this crop and once you're able to prove that to the farmer . . . then definitely it is going to he a miracle crop."

[Courtesy : inform March 2010, Vol. 21 (3)]

BRAIN DRAIN

α-Tocotrienol and brain protection

BLOCKING the function of an enzyme in the bruin with a-tocotrienol can prevent nerve cells from dying after a stroke, new research suggests.

In a study using mouse brain cells, scientists found that the (i-tocotrienol form of vitamin E stopped the enzyme from releasing the arachidonic acid (2():4n-o) that would eventually kill neurons.

"Our research suggests that the different forms of natural vitamin E have distinct functions. The relatively poorly studied tocolricnol form of natural vitamin E targets specific pathways to protect against neural cell death and rescues the brain after stroke injury." said Chandan Sen. professor and vice chair for research in The Ohio State University's Department of Surgery and senior author of the study.

"Here, we identify a novel target for tocotrienol that explains how neural cells are protected."

The research appeared online and is sched-

uled for later print publication in the *Journal of Neurochemistry* (doi:10.1111/j.1471-4159.2009.06550.x).

Vitamin E occurs naturally in eight different forms. The form of vitamin E in this study. «-tocotrienol or TCT. is not abundant in the American diet but is available as a nutritional supplement. It is a common component of a typical Southeast Asian diet, in large part because palm oil contains significant amounts.

Sen's lab discovered TCT's ability to protect the brain 10 years ago. But this current study offers the most specific details about how that protection works, said Sen, who is also a deputy director of Ohio State's Heart and Lung Research Institute.

"We have studied an enzyme that is present all the time, but one that is activated after a stroke in a way that causes neurode-generation. We found that it can be put in check by very low levels of tocotrienol." he said. "So what we have here is a naturally derived nutrient, rather than a drug, that provides this beneficial impact."

The research team had linked TCT's effects to various substances that are activated in the brain after a stroke before they concluded that the enzyme could serve as an important therapeutic target. The enzyme is known as cytosolic calcium-dependent phospholipase A2. or cPLA2.

Following the trauma of blocked blood flow associated with a stroke, an excessive amount of glutamate is released in the brain. Glulamate is a neurotransmitter that, in tiny amounts, has important roles in learning and memory. Too much of it triggers a sequence of reactions that leads to the death of brain cells, or neurons—the most damaging effects of a stroke.

Sen and colleagues used cells from the hippocampus region of developing mouse brains for the study. They introduced excess glutamate to the cells to mimic the brain's environment after a stroke.

With that extra glutamate present, the cPLA2 enzyme releases arachidonic acid (AA) into the brain. Under normal conditions. AA is housed within lipids that help maintain cell membrane stability. But when it is free-roaming. AA undergoes an en/ymatic chemical reaction that makes it toxic—the final step before brain cells are poisoned in this environment and start to die. Activation of the cPLA2 en/yme is required to release the damaging AA in response to insult caused by high levels of glutamate.

Sen and colleagues introduced the TCT to the cells that had already been exposed to excess glutamate. The presence of the vitamin decreased the release of AA by 60% when compared to cells exposed to glutamate alone

"Our research suggests that the different forms of natural vitamin E have distinct functions. The relatively poorly studied tcotrienol form of natural vitamin E targets specific pathways to protect against neural cell death and rescues the brain after stroke injury."

Brain cells exposed to excess glutamate followed by TCT fared much better, too. compared to those exposed only to the damaging levels of glutamate. Cells treated with TCT were almost four times more likely to survive than were cells exposed to glutamate alone.

Although cPLA2 exists naturally in the body, blocking excessive function of this enzyme is not harmful. Sen explained. Studies have already determined that mice genetically altered so they cannot activate the en/yme achieve their normal life expectancy and carry a lower risk for stroke. Sen also noted that the level of TCT needed to achieve these effects is quite small—just 250 nanomolar—a concentration about 10 times lower than the average amount of TCT circulating in humans who consume the vitamin regularly.

"So you don't have to gobble up a lot of the nutrient to see these effects." Sen noted.

The study was co-authored by Savita Khanna. Sashwati Roy. and Cameron Rink of the Depart-

ment of Surgery and Narasimham Parinandi and Sainath Kotha of the Department of Internal Medicine, all at Ohio State, and Douglas Bibus of the University of Minnesota. The National Institutes of Health supported the work.

For more information about toco-trienols. see *Tocotrienols: Vitamin E Beyond Tocoplterols*, published jointly by AOCS Press and CRC Press (http://tinyurl.com/Tocotrienols Book) and edited by Ronald Ross Watson and Victor R. Preddy. Sen and co-authors Savita Khanna and Sashwati Roy provided a chapter in the book entitled "Tocotrienols as Natural Neuroprotective, Vitamins."

[Courtesy : inform March 2010, Vol. 21 (3)]

THE TRUTH !

Biobased misconceptions

LOU Honary, director of University of Northern Iowa Ag-Based Industrial Lubricants Research Center, clears up the following three misconceptions about bio-lubricants.

1. Lubricants biodegrade in the machinery. Biodegradable doesn't mean the lubricants will biodegrade in the application. In order for anything to biodegrade. microorganisms that are capable of breaking the lubricant down need to be present. These microorganisms exist naturally in soil but not in machinery. Honary explains, "For example, we have oil from 12 years ago sitting in a pie pan. and it still has full liquidity with no sign of oxidation. We've monitored hydraulic oils in machines for thousands of hours and we've not seen any biodegradation."

2. If you mix plant- and mineral-based products, they'll coagulate and plug up the machinery. Research and real-world use shows that this is not the case. Even with hydraulic oil made of 50% plant-based and 50% mineral-based oils, there is no congealing.

3. Using genetically modified soybeans reduces the lubricant's biodegradability. Tests show that vegetable oils, regardless of their fatty acid content, biodegrade at about the same rate. All chemically and genetically modified oils tested at UNI-NABL have shown the same levels of biodegradability.

[Courtesy : inform March 2010, Vol. 21 (3)]

UPDATE ON CASTOR

Castor oil-based chemicals

Dhananjay D. Zope

CASTOR oil is obtained from seeds of Ricinus corn-munis I., a member of the Euphorbiaceae. India enjoys supremacy as far as production and export of castor oil is concerned and contributed 64% of the entire global production in 2005-2006 (Fig. 1). Production of castor oil originated in the tropical belt of India and Africa. On a commercial scale it is cultivated in 30 countries, but the major castor oil-growing regions are India, China, Brazil, Thailand, Ethiopia, Mexico, and the Philippines. Worldwide demand for castor oil from the industrial sector is estimated at about 220,000 metric tons per annum.

Although castor is a poisonous plant (both seeds/beans and leaves), it is an important nonedible oilseed crop. Castor oil is obtained by pressing the seeds, followed by solvent extraction of the pressed cake. Castor oil is somewhat unique because of its content of ricinoleic acid (12-hydroxy-r/.v-9-octadecenoic acid), a hydroxy fatty acid that constitutes about 90% of the total fatty acids of the oil. Castor oil is also distinguished from other vegetable oils by its high specific gravity, thickness, and hydroxyl value.

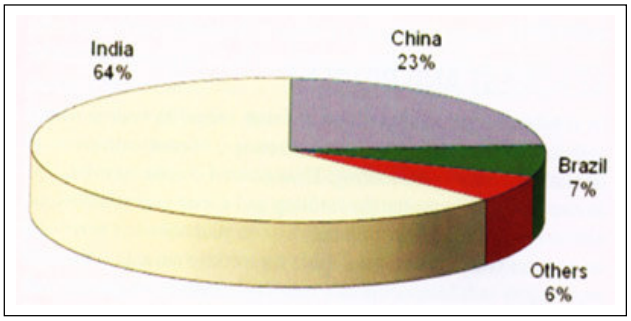
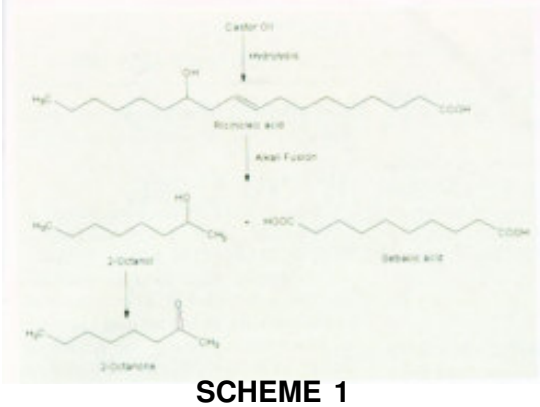


FIG. 1. World production of castor oil

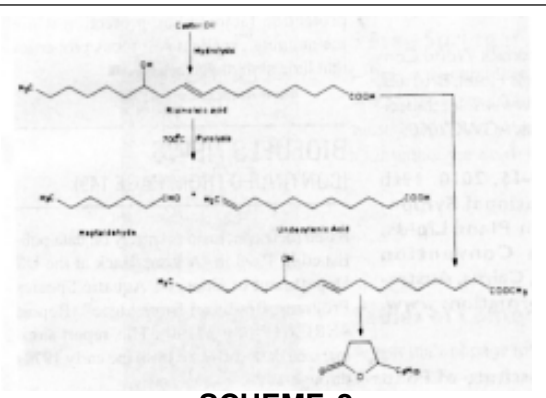
Ricinoleic acid, the active component of castor oil. is responsible for many of its desirable properties. This light-colored liquid is obtained by the hydrolysis of castor oil (Scheme 1). Ricinoleic acid is effective in preventing the growth of numerous viruses, bacteria, yeasts, and molds. It is successful as a topical treatment for ringworm, keratoses. skin inflammation, abrasions, fungal infections of finger- and toenails. acne, and chronic pruritus (itching).

Macrolactones and polyesters can be derived from ricinoleic acid. Poly(anhydrides) obtained from ricinoleic acid are hydrolyti-cally degradable polymers that are used as a vehicle for controlled delivery of drugs. These poly(anhydrides) are biodegradable and can be synthesi/.ed in the laboratory.

Ricinoleic acid has three functionalities and, via its ester, double bond and hydroxyl group, can be processed in many different ways (Schemes 1. 2) to give 2-octanol. sebacic acid, heptaldehyde. and undecylenic acid. These compounds may be used as they are or as raw materials to produce a number of perfumery and flavor chemicals.



SCHEME 1



SCHEME 2

OTHER USES OF CASTOR OIL

Castor oil finds applications in nylon, plasticizers. soaps, lubricants, rubber treatment, and also serves as a replacement for mineral oil. Other applications of castor oil and its derivatives are these:

- Foods: castor oil esters, viscosity-reducing agents, conjugated fatty acids, medium-chain triglycerides
- Cosmetics: castor oil, castor oil esters, castor wax, emulsifiers, undecylenic acid, deodorants, medium-chain triglycerides
- Pharmaceuticals: castor oil. glycerine, hydrogenated castor oil, undecylenic acid, zinc undecylenate. calcium undecylenate, enanthic (heptanoic acid) anhydride
- Textiles: surfactants, pigment wetting agents, auxiliaries
- Paper: defoamers. waxes, waterproofing agents
- Rubber and plastics: polyols. coupling agents, plasticizers, processing aids, nylon-11
- Electronics and telecommunications: castor oil. castor oil esters, polyurethane systems, polyamide resins, polyols, waxes for application to cables to prevent stickiness under high-heat conditions, capacitor fluids
- Paints, inks and adhesives: castor oil, glycerine, dehydrated castor oil (DCO), DCO fatty acids, polyols, alkyd resins, poly-amides, wetting and dispersing agents, water-thinnable resins
- Lubricants: castor oil esters, hydrogenated castor oil, ricino-leic acid, 12-hydroxystearic acid, methoxy-12-hydroxystear-ate, heptanoic acid, sebacic acid, polyol esters, hydroxyamide waxes, metallic salts
- Castor oil meal (castor oil cake) also can be used as manure vs. agriculture.

[Courtesy : inform March 2010, Vol. 21 (3)]

NOW FROM SLUDGE

Potential for biodieselfrom sewage sludge

ACCORDING to a review article by David M. Kargbo (US Environmental Protection Agency Region III. Philadelphia, Pennsylvania, USA) ap-

pearing in Energy & Fuels (24:2791-2794. 2010). existing technology can produce biodiesel fuel from municipal sewage sludge that is within a few cents a gallon of being competitive with conventional diesel refined from petroleum.

US wastewater treatment facilities produce 7 million dry metric tons of sewage sludge annually, and the amount is expected to increase in the future. Significant concentrations of lipids in sludge are derived from their direct adsorption onto the solid material, including triglycerides. diglycerides, monoglycerides, phospholipids, and free fatty acids. In addition, the cell membranes of microorganisms used in the treatment process are composed primarily of phospholipids.

According to the review, "up to 36.8 wic/r of the dry sludge is comprised of fatty acids and steroids. With the fatty acids from sludge predominantly in the range of CIO to C18, these are excellent for the production of biodiesel."

Major challenges include how best to collect the different lipid fractions and achieve maximal extraction, choice of solvents for the transesterification reaction, soap formation and product separation, bioreactor design, and the presence of pharmaceuticals in sewage sludge.

Kargo concludes, "Currently, the estimated cost of production of biodiesel from dry sludge is $3.11 per gallon of biodiesel compared to $3.00 per gallon for petro diesel (as of January 2010)".

[Courtesy : inform March 2010, Vol. 21 (3)]

INTERESTING

Newflaxseed review

A new review paper explores the role of flaxseed as an antioxidant that may protect against cancer and diabetes. The new research appears in Comprehensive Reviews in Food Science and Food Safetv (9:261- 269,2010).

"Flaxseed has been the focus of increased interest in the field of diet and disease research due to the potential health benefits associated with some of its biologically active components," according to researchers from the School of Food Science and Technology at Jiangnan University in China, who conducted the review. Their article evaluated current research on flax-seed, its role as a functional food, and any potential benefits it may have against diabetes and certain cancers.

Flax is rich in a-linolenic acid (ALA), an essential omega-3 fatty acid, and phy-tochemicals such as lignans. Lignans are found in many cereals and grains, with the highest amounts occurring in flaxseed. Researchers from Canada, England, and China found the following:

Flaxseed lignans might play a role in cancer prevention - specifically in breast, prostate, colon, and skin cancers;

Soluble fiber and other components of flaxsecd fractions could potentially affect insulin secretion and maintenance of steady blood sugar.

Lead author Alhassane Toure of the Institute Polytechnic in Guinea states that flaxseed contains natural antioxidants with potential health benefits but more studies need to be conducted to assess any overdose effects.

[Courtesy : inform March 2010, Vol. 21 (3)]

"GO NUTS"

Profitable plans for coconuts

BILL Lavers looks at new developments in the coconut community that are focusing on increasing productivity and adding value to coconut oil and other coconut products

The coconut palm is probably the most widely grown tropical crop in the world. According to a recent report citing Asian and Pacific Coconut Community (APCC) statistics, it is cultivated commercially in some 93 countries on a total land area of almost 13M ha. Many of the countries in which it is grown - the Pacific Islands, for example - are very small nation states, however, and the coco-

nut is first and foremost a basic food resource for local people, sustaining the daily livelihoods of many millions in rural populations. Commercial production of coconut oil is dominated by a small handful of countries Philippines, Indonesia and India and even here the majority of the coconut crop is used locally in a range of traditional products. In India, for example, it has been part of the Ayurvedic tradition for more than 2,500 years.

Coconut production

The Philippines is a world leader in coconut oil production and. since 2000. it has been producing 1.3-1.5M tonnes/year, followed by Indonesia with 750,000-950,000 tonnes, and India with around 400,000 tonnes. Secondary producers are Mexico (up to 120,000 tonnes), Malaysia and Sri Lanka (see figure 1. following page, far global coconut oil production).

Yields of coconut oil are seldom more than one tonne/ha, although theoretically they could be much more - in the range of 1.5-2.0 tonnes/ha. Assuming that the total cultivated area of 1.1M ha could achieve yields at these levels, world production of coconut oil could potentially be in the region of 15-20 M tonnes. In practice, it has never exceeded 4M tonnes and has been hovering around 2.5-3.5M tonnes for more than a decade, while production of palm kernel oil - its main competitor as a traded lauric oil - has grown progressively from less than 2M tonnes in the mid-1990s to almost 5M tonnes today, on the back of the sustained growth in palm oil.

COCONUT is one of the most widely grown tropical fruits in world with commercial production of its oil dominated by a small number of countries

In fact, despite continued attempts to improve productivity in the coconut sector among all the major producer countries, with many initiatives over the years, yields have continued to decline in most instances. Declining productivity, the high cost of production - both of copra and its derived products - in many Asia-Pacific nations, and the volatility of international prices have combined to present a continual challenge to the governments of these countries as they struggle to improve the livelihoods of their rural communities.

Achieving the hidden potential

The recent focus has not only been on rehabilitation and productivity improvements, however. There is also a growing awareness that product diversification and production to maximise added-value in coconut products is the key to greater prosperity for those who rely on coconuts for a living.

Harvested whole coconuts vary widely in composition, not only in the si/e of the nut. the thickness of the shell and the weight of fibre: but typically they may contain more than 5()°o water, up to 4()"o oil and 6% protein. The copra obtained by drying the meat from the nuts may typically contain 60-70% oil, and the high laurie content of this oil (up to 52"c>) is what sets it apart from the other traded vegetable oils, along with palm kernel oil. its main competitor in trade. High in saturates and low in polyunsatu-rates. coconut oil has high oxidative stability, and useful melting properties for food applications. Its low molecular chain length also makes it particularly useful for a variety of oleoehemieal applications.

But, while the lauric status usually commands a premium over the remaining longer molecular chain length oils in international trade, lauric oils are still commodities, subject to the price volatility of trade cycles beyond the industry's control.

Quality control is also a key issue in coconut

processing. In the past, large cargoes of copra shipped to Europe for crushing have been rejected because of contamination with afla-toxin. the myeotoxin associated with mould growth. In producer countries, maintaining the quality of the copra - which is produced at local level, often in small-scale village enterprises - is the key to adding value later.

Applying new technology at all levels of the production chain - for productivity, for better quality copra, for utilising and valorising waste and by-products, and above all for the opportunity to diversity into new value-added products catering for the health and wellness markets - is the key to moving away from commodity status for the coconut sector.

Coconut productivity initiatives

In the past few years, all major coconut-producing countries have been pursuing ne\v productivity initiatives, with varying degrees of success.

The Philippine Coconut Authority, for example, announced early in 2008 that it had successfully implemented the country's Na*tional* Coconut Productivity Programme in 2008, with the planting of an additional 52,500ha with almost 7.9M seedlings, as well as distributing salt (sodium chloride) fertiliser for some 65.000ha in the first phase of a nationwide salt fertilisation project. The second phase of this is said to be ongoing.

In Indonesia, coconut is the second largest *crop* after paddy rice. According to a recent study report, 70% of the country's total production of coconuts are consumed by households - for basic food and drink - and only 30% is utilised industrially, for production of coconut oil but also desiccated coconut, coconut milk and cream, coconut water, coconut sugar, and charcoal derived from coconut shell.

In North Sulawesi province (NSP), the country's third largest coconut producing province, there have been development initiatives under implementation since the late-1960s, with a focus on improving productivity that has had mixed success until quite recently. Kven in NSP. which is now seen as a model for modern coconut production and processing, more than 95% of estate holdings are operated by small farm enterprises, so that even large coconut processing industries depend on these units for their raw materials.

A 'coconut cluster' programme, organised around collective copra production and integrated processing, was introduced in 2000 and has made "tremendous progress not only in basic productivity but also in the "accessibility to value addition", says the report.

The combination of good manufacturing practice ((IMP) and integrated processing for added value is seen as the best way to achieve the diversification of products, and utilisation of waste and by-products, that are essential to profitability.

At the same time, the economic importance of cultivars - in terms of the size of nuts, kernel content, shell and water - has not been overlooked. In NSP, the average yield of copra is 1.123 tonnes/ha/year, while some tall tree varieties planted in the province give a copra yield of 2.5-3.5 tonnes/ha. But poor management and inadequate pest control has meant that, despite all efforts so far. the overall trend in yield with these tall varieties is still downwards, with 1.9 tonnes copni/ha cited as the average. So there is still much room for improvement, especially among the smallholdings sector.

In Malaysia, which along with Mexico and Sri Lanka is a much smaller producer on the world scale than Indonesia and the Philippines, there is also a focus on revitalising the coconut sector. In acreage terms, coconut is the fourth most important crop, after palm oil, rubber and paddy rice; but land is at a premium. It is hoped that a combination of proactive policies and strategic investments - known as the Coconut Industry Roadmap - will lead to improved yields, to compensate for the decreasing land area devoted to coconut.

India is now officially the world's biggest producer of coconuts, with total output approaching 16M tonnes/year - about 27% of world supply. (Indonesia's contribution to world supply is more than 25%, and the Philippines below 22%). However, the 2.5-3.5 tonnes/ha copra yield noted for NSP in Indonesia (tall varieties) is said to be two to three times more than typical yields in India.

FIGURE 1: WORLD COCONUT OIL PRODUCTION

Year	Coconut oil Production (M Tonnes)
1996/97	3.74
1997/M	3.37
1998/99	2.72
1999/00	3.37
2000/01	3.59
2001/02	3.17
2002/03	3.14
2003/04	3.29
2004/05	3.46
2005/06	3.47
2006/07	3.26
2007/08	3.49
2008/09	3.55
2009/10	3.63

SOURCE: USDA

FIGURE 2: VIRGIN COCONUT OIL STANDARD

Colour	Water white
Flavour	Nature fresh coconut aroma
Taste	Mild coconut taste
FFA	<0.2%
Moisture	<0.2%
PV	3 meg/kg oil
Additive	Nil
Contaminants	<20%
Heavy Metals	no more than 50μm

SOURCE: USDA

India set to boost exports

As with Indonesia, most of the coconut harvest in India is used in households. It is a "homestead crop" found in most rural gardens, where it is tapped for "toddy" before the fresh nuts are collected for multiple culinary uses within the home. On top of this, India's industrial production of coconut products is almost entirely consumed within the country, with little exported up to now. But that may be about to change.

In 2009, India's Coconut Development Board - which has been instrumental in the various support initiatives aimed at developing the country's coconut industry - was declared an export promotion council (EPC) by the ministry of commerce. Under the new foreign trade policy (2009-2014), the EPC status gives the board new responsibilities to promote exports of all coconut products other than those made from husk and fibre. These efforts are expected to focus on the Middle East, where there is a large ethnic population, representing an existing market for traditional coconut products; and also on new markets, including those for (westernised) food-and-health-related products such as virgin coconut oil, and "coconut-based convenience foods". The focus is on the whole nut, from copra, coconut oil and desiccated coconut through to coconut shell crafts and activated carbon derived from coconuts shells.

Diversification is the key

The Philippines, the world's pre-eminent supplier of coconut products, is said to exports over 40 coconut products, including cocochemicals and coir products, the so-called "coconut matting" obtained from the fibrous tissue surrounding the fresh nut. Marketing shell, coir, desiccated coconut and such products all contribute to the profitability of coconut processing, but a new wave of value-added products has now been identified.

In both India and Sri Lanka, there is a strong and growing interest in these new products -making virgin coconut oil. canning tender coconut and bottling coconut water, for example - but they all achieve added value through raising quality standards through the production chain.

Virgin coconut oil (YCO), for example, must be obtained from copra that has been carefully produced, so that free fatty acid levels are kept very low. and premium quality is maintained. Traditionally, much of the copra produced at village level is dried using coconut fibre as fuel. Crude drying operations of this type produce copra of such low quality that, according to one observer, the derived oil would need to be analysed for polycyclic hydrocarbons before being processed for tood applications. It is clear that more "hygienic" processing - from harvesting coconuts and drying copra through to processing for value added products - would be essential for this concept to succeed.

Ever since the mid-1990s, when it was discovered that the antiviral compound monolaurin is produced in the body when coconut oil is digested, interest in the health aspects of coconut products has been growing in industrialised countries; and VCO has been on the market now in Europe. USA and Japan for several years.

There are several different processing methods that can be used to obtain VCO, but the quality of the oil must be certified as complying with appropriate standards if it is to be told as such in international markets (see Figure 2, left).

As with conventional (refined) coconut oil, VCO is high in saturated fat and low polyunsaturated fat content, giving it high oxidative stability: and it is now well established that coconut oil is digested differently from the longer chain oils and fats, so that it has "cardio-protective" value compared to other saturated fats.

In view of its monolaurin effect, coconut oil has been claimed to be a palliative treatment for viral conditions. Latest claims include defence against the global outbreak of the MINI 'swine flu' and help in the fight against Type II diabetes, following publication of research in Australia.

Coconut oil's health functional benefits, and its ability to raise the metabolic rate have become recognised internationally by sports nutritionists. But the "cardio-protective" effects of other coconut products have also been given a recent boost. There is nothing new about drinking coconut water in the countries where coconuts are grown, but the product is now entering the beverage markets of the western world.

Hard on the heels of its launch of carbonated milk drinks in the USA in 2009, the Coca Cola company has been reported to be considering buying a stake in a California-based producer of a coconut water drinks. This news came after rival PepsiCo announced last August that it had acquired Brazilian coconut water producer, Amaeoco Nordeste Ltda. Coconut water is seen as one of the fastest growing beverages in Brazil and the USA. ***Bill Lavers is consultant editor at Oils & Fats International.***

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