OIL TECHNOLOGISTS' ASSOCIATION OF INDIA

FEBRUARY-MAY 2010

EASTERN REGION
NEWS LETTER

OTA

FOR LIMITED CIRCULATION

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FROM THE PRESIDENT'S DESK

Of late functional foods and Neutraceuticals have come into prominence due to the increasing interest among the common man as mode of relief from ailments and potential of providing health benefits in a Natural way.

Functional food is the generic term related for food that has been linked to health benefits. The Institute of Medicine's Food and Nutrition Board (U.S.) has defined Functional food as "any food and food ingredients that may provide health benefit beyond the traditional nutrition that it contains". Functional food can be either from plant sources or animal sources.

Prof. Frank. D. Gunstone points out, there has been a shift over recent years from avoiding certain "harmful" foods and towards eating foods and ingredients that promote good health rather than relying on pills and potions.

Functional food ingredients derived from vegetable oil sources in particular "Oryzanol" Phytosterols & Phytostanols have witnessed great interest due to their cholesterol reducing properties. And Lipids represent one of the most important of the active ingredients and components of functional foods and neutraceuticals.

Phytosterols come from foods such as vegetable oils, cereals, fruits and vegetables. Phytostanols are mainly found in corn, wheat, rye and rice etc. A blend of Ricebran oil and Safflower oil in the ratio of 7:3 has been shown to provide the most effective lowering of Cholesterol level (Sugano. M. Tsuji, Japan).

Cholesterol derived from animal sources is easily absorbed and contributes in varying degrees to raised blood cholesterol. In contrasts, phytosterols and phytostanols are poorly absorbed and are therefore only present in very low levels in circulating blood. Clinical trials have shown that eating larger quantities of phytosterols and phytostanols from diets rich in cereals and vegetables inhibit absorption both dietary and endogeneous cholesterol with resultant decreases in serum cholesterol level. The exact way cholesterol absorption is inhibited is not completely understood but various theories have been proposed.

In addition to the Cholesterol lowering properties phytosterols and phytostanols indirectly reduces the risk of heart disease, which is one of the main causes of death at present.

F.D.A. (U.S.A.) approved the use of SOYA health claims in relation to coronary heart diseases. Claims can state that diets low in saturated fat and cholesterol that include 25 gms of soy protein a day may reduce the risk of heart disease.

F.S.S.A. (India) may think of giving similar approval of Health claim to Oryzanol rich proven cholesterol reducer Refined Ricebran Oil, now available in plenty in India. Some research using isolated phytosterols indicate potential benefits in relation to prostrate enlargement and prostrate cancer. Human studies with the incorporation of

Beta sitosterol for six months to the patients suffering from enlarged prostate showed significant progress with increased urine flow and less discomfort.

The availability of phytosterol products is gradually becoming widespread as consumers become more aware of the benefits associated with various functional food.

(S. K. Roy)
President

Input/Ack : Dr. Michelle Jones, Oils & Fats int

ABOUT OURSELVES

1. Prof. Sunit Mukherjee, Prof. A. K. Guha, Mr. S. K. Roy, Dr. J. Chakraborty, Prof. D. C. Sen were invited as guest speakers in the one day interactive Research Seminar on

Technology Challanges For Producing Premium Value Products : Neutraceuticals

On the 31st March, Conducted by
The Department of Food & Biochemical Engineering, Technology
Jadavpur University jointly with A. F. S. T. (India) Prof. Sunit Mukherjee was the Chief Guest and Reference Lecture was delivered by S. K. Roy.

2. Mr. T. K. Mitra, Life Fellow Member & Director of M/s. Kamitter & Co, Calcutta has donated Rs. 15,000/- (Rupees Fifteen Thousand only) to The OTAI (EZ) to perpetuate the memory of his Late father Sisir Kumar Mitra.

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CARDIOVASCULAR HEALTH BENEFITS OF TOMATOES

(REVIEW)

Prof. (Dr.) Asim K. Duttaroy, PhD, D.Sc., FICN, FI Biol
University of OSLO, Norway

ABSTRACT

Emerging epidemiological and intervention data support the connection between increased tomato consumption and reduced risk of cardiovascular disease. Tomato contains several antioxidants including lycopene, polyphones, trace elements and vitamins, and these are known to inhibit atherosclerotic processes. Recent studies have demonstrated that tomato also contains several potent ant platelet compounds. The ingestion of these tomato components significantly affects ex vivo platelet function when supplemented in human volunteers. The reported cardio protective effects of tomatoes are therefore also potentially linked to a modulation of platelet function. Platelet aggregation is a central mechanism in the pathogenesis of acute coronary syndromes, including myocardial infarction and unstable angina. Since tomato may reduce both platelet hyperactivity and atherosclerosis process, it makes an ideal food for the cardiovascular system. This review primarily addresses the recently discovered ant platelet factors in tomatoes and their possible role in the maintenance of the cardiovascular health.

Keywords : ADP, Antioxidants, Ant platelet factors, atherosclerosis, Cardiovascular disease, Fruits, Human volunteers, Lycopene, Platelet aggregation, Thrombin, Thrombosis, Tomato, Tomato juice.

Introduction :

During the last 50 years, the fruit of the cultivated tomato (Lycopersicon esculentum) has become a popular and highly consumed food [1]. Tomato contains several components that are beneficial to overall health, including vitamin E, trace elements, flavonoids, phytosterols and several water-soluble vitamins [2–4]. Tomato is also a rich source of foliate, vitamin C and potassium [3, 5]. Moreover, the antioxidant activity of lycopene as well as several other carotenoids and their abundance in tomato, makes it a rich source of antioxidants [2–4]. In addition, consumption of vitamin A precursors such as b- and g-carotene, present in modest levels within tomato or tomato-based foods, make this fruit a great booster of vitamin A activity. Table 1 lists the major constituents of tomatoes. Many of these nutrients may function individually, or in concert, for protecting cells via several mechanisms including inhibition of free-radical-mediated oxidative damage, responsible for the genesis of atherosclerosis according to the most widely accepted theory. This hypothesis has been supported by in vitro, limited in vivo, and many epidemiological studies that associate reduced cardiovascular risk with consumption of antioxidant-rich foods. Other cardio protective functions provided by the nutrients in tomatoes may include the reduction of low-density lipoprotein (LDL) cholesterol, homocysteine, platelet aggregation and blood pressure. Because tomatoes include several nutrients associated with theoretical or proven effects and are widely consumed year round, they may be considered a valuable component

of a cardio protective diet. The antioxidant and free-radical-scavenging properties of polyphenol compounds have possible protective roles in reducing risk of cardiovascular diseases (CVDs) in humans. In fact, individuals in the Mediterranean area have a lower risk of several important chronic diseases, including CVD and a number of types of cancer (breast, colon and prostate cancer) when compared with their North American and other European counterparts [2, 6, 7]. These differences may be associated with nutritional traditions. Consumption of tomatoes appears to be one such tradition that may account for the lower risk associated with diseases in people from this geographical area [2, 6, 7]. In addition to vitamins and antioxidants, water-soluble ant platelet compounds present in tomatoes are capable of inhibiting platelet aggregation both in vitro and in vivo [8]. Therefore, the presence of both antioxidants and newly identified ant platelet compounds makes tomato a beneficial fruit in preventing CVD. There are several excellent reviews available on overall health benefits of tomatoes, including cardiovascular health [1, 6, 9–11]; however, this review will focus mainly on the beneficial effects of tomato on the cardiovascular system with special reference to platelets, one of the important limb of the cardiovascular system.

Epidemiology

Recent epidemiologic studies that have focused on tomato and tomato products have associated their intake with a reduced risk of degenerative diseases [9, 12, 13]. There is epidemiological evidence that consumers of tomatoes have a lower risk of many types of chronic diseases, including CVD and different forms of cancer [6, 14, 15]. The Harvard Health Professionals Follow- Up Study first showed that high intake of tomato-based products was linked to lower prostate cancer risk [9, 12, 13]. Later, the protective role of tomato was confirmed,

but the mechanisms remain unclear [16]. There is evidence supporting the role of lycopene in the prevention of CVD stems primarily from epidemiological observations in normal and atrisk populations [17–21]. Geographic pathology has produced important data which show that populations with a regular intake of tomato or tomato products, such as those found in the Mediterranean region, have a lower incidence of chronic diseases; in particular, CVD [10]. Further investigations consolidated the epidemiological evidence that lycopene could be a causal factor for the preventive effects of tomatoes/tomato products. Note that, in these studies, lycopene may rather represent a biomarker of exposure of the subjects to tomato and/or tomato product consumption than a biomarker of effects. In recent epidemiological studies, tissue and serum levels of lycopene were inversely related to the risk of CVD.

The strongest population-based evidence for the beneficial effects of lycopene comes from a recently reported multi-centre case-control study (EURAMIC) that evaluated the relationship between adipose tissue antioxidant status and acute myocardial infarction. Subjects (662 cases and 717 controls) from 10 European countries were recruited for maximizing variability in exposure within the study [22–24]. After adjusting for age, body mass index, socio-economic status, smoking, hypertension and maternal and paternal history of the disease, only lycopene, and not b-carotene, levels were found to be protective against CVD. The protective potential of lycopene was maximal among individuals with the highest polyunsaturated fat stores [23]. These results are consistent with a protective effect of adipose tissue levels of lycopene on myocardial

infarction risk. This suggests that lycopene may be operating under a tissue-specific antioxidant mechanism. In a cross-sectional study comparing.

Lithuanian and Swedish populations showing diverging mortality rates for CVD, lower blood-lycopene levels were found to be associated with increased risk and mortality from CVD [25]. In an Austrian stroke prevention study, lower levels of serum lycopene and a-tocopherol were reported in individuals from an elderly population at high risk for microangiopathy-related cerebral damage [26]. Although the epidemiological studies conducted so far provide convincing evidence for the role of lycopene in CVD prevention, it is at best only suggestive and not proof of a causal relationship between lycopene intake and risk of CVD. Such proof can be obtained only by performing controlled clinical dietary intervention studies, where both the biomarkers of the status of oxidative stress and the disease are measured.

Table 1 Nutrient composition of tomatoes (per 100 g)1

Nutrients	Raw tomatoes	Catsup	Tomato juice	Tomato sauce	Tomato soup
Potassium (mg)	237	382	229	331	181
A-tocopherol (mg)	0.54	1.46	0.32	2.08	0.50
Vitamin A (IU)	833	933	450	348	193
Vitamin C (mg)	12.7	15.1	18.3	7.0	27.3
Folate (mg)	15	15	20	9	7
b-carotene (mg)	449	560	270	290	75
a-carotene (mg)	101	0	0	0	0
Lycopene (mg)	2573	17007	9037	15 152	5084
Lutein+zeaxanthin (mg)	123	0	60	0	1
Phytoene (mg)	1860	3390	1900	2950	1720
Phytofluene (mg)	820	1540	830	1270	720

Beneficial Effects of Tomatoes on the Cardiovascular System Effects of Tomatoes on Atherosclerosis Antioxidant nutrients are believed to slowdown the progression of atherosclerosis because of their ability to inhibit damaging oxidative processes. Lycopene is one such dietary antioxidant that has received much attention of late. Lycopene has been suggested to have several mechanisms of action including inhibition of LDL oxidation [27]. Lycopene is an open-chain hydrocarbon containing 11 conjugated and two non-conjugated double bonds arranged in a linear array. Lycopene, because of its high number of conjugated dienes, is the most potent singlet oxygen quencher among the natural carotenoids [28]. Although evidence for a relationship between in vitro LDL oxidation and risk of CVD is not fully established, LDL oxidation is now recognized as representing an important early event in the development of atherosclerosis.

Other possible mechanisms include enhanced LDL degradation, LDL particle size and composition, plaque rupture and altered endothelial functions. However, there is convincing evidence indicating that reactive oxygen species (ROS) generated both endogenously and also in response to diet and lifestyle factors may play a significant role in the etiology of atherosclerosis and CVD. Central to this oxidative hypothesis

is the oxidation of LDL as the primary initial step leading to its uptake by macrophages inside the arterial wall, and formation of foam cells and atherosclerotic plaque. Although genetic factors and age are important in determining risk, several other factors, including hypertension, hypercholesterolemia, insulin resistance, smoking and diet are also major risk factors associated with CVD [29–31]. Oxidative stress induced by ROS is also considered to play an important role in the etiology of several chronic diseases, including CVD [32–34]. Oxidation of circulating LDLs that carry cholesterol to the blood stream to oxidized LDL (oxLDL) is thought to play a key role in the pathogenesis of atherosclerosis, which is the underlying disorder leading to heart attack and ischaemic strokes [32–34]. LDL consists of a large-molecular-weight protein, apolipoprotein B, neutral and polar lipids and a mixture of lipophilic antioxidants including b-carotene and vitamin E. As a result of oxidative modifications of the native LDL molecule, several biologically active molecules can be formed, including protein adduct products with breakdown products of oxidized fatty acids that facilitate recognition of modified LDL by macrophage scavenger receptors. In addition to influencing the formation of foam cells and plaque in arterial walls, components of oxLDL can also influence other events that are related to increased risk of CVD. These include their ability to increase cholesterol accumulation by macrophages; produce proteins that are chemo tactic to monocytes and cytotoxic to a variety of cells causing endothelial injury; alter gene expression in arterial cells, leading to increased expression of colony-stimulating factors; increase expression of adhesion molecules at the endothelial cell surface; inhibit an endothelium-dependent relaxation factor and promote vasospasm; inhibit vasodilatation; increase binding to type-1 collagen; and enhance coagulation pathways and platelet aggregation. In addition, oxidized components of LDL can promote migration and proliferation of smooth muscle cells, formation of foam cells and fatty streaks in the arterial intima and cause eventual rupture of arterial plaques. Therefore, inhibition of LDL oxidation may play an important role in preventing CVD. To date, very few such intervention studies have been reported in the literature. In one study, where healthy human subjects consumed a lycopene-free diet for a period of 2 weeks, their serum lycopene levels decreased by 50% by the end of week 2 and, at the same time, an increase of 25% in in vivo lipid oxidation was observed [35]. In a small dietary supplementation study, six healthy male subjects consumed 60 mg/day lycopene for 3 months [36]. At the end of the treatment period, a significant 14% reduction in their plasma LDL cholesterol levels was observed [36]. In a randomized, crossover dietary intervention study, 19 healthy human subjects (10 males and 9 females), non-smokers, not on any medication and vitamin supplements, consumed lycopene from traditional tomato products and nutritional supplements for 1 week. Although there were no changes in serum total cholesterol and LDL and high-density lipoprotein (HDL) cholesterols, serum lipid peroxidation and LDL cholesterol oxidation were significantly decreased as the serum lycopene levels increased [2]. However, despite an inverse association found for high intakes of tomato-based products, dietary lycopene was not strongly associated with the risk of CVD. This indicates that other unidentified compounds in tomatoes may have cardio protective effects. Some 725 middle-aged men, free of coronary heart disease and stroke, took part in a Kuopio Ischemic Heart Disease Risk Factor (KIHD) study. Men within the lowest quartile for serum levels of lycopene had a 3.3-fold increased risk of an acute coronary event or stroke as compared with other groups within the study [37]. In a second study,

association between plasma lycopene concentration and intimae-media thickness of the common carotid artery wall was examined [17]. This research was part of an Antioxidant Supplementation in Atherosclerosis Prevention (ASAP) study, in which 520 asymptomatic men and women participated [38]. It was found that low plasma levels of lycopene in men were associated with an 18% increase in IMT when compared with men whose plasma levels were higher than the median. In women, this difference was not significant [17, 38].

Plasma lipid and its metabolism are well-established risk factors of CVD. Increased risk of VD has been associated with elevated triglycerides, total cholesterol and LDL cholesterol (LDL-C) and with decreased HDL cholesterol (HDL-C). It was reported that phenolic compounds were associated with antioxidant activity and played an important role in stabilizing lipid per oxidation.

Flavonoids are very efficient scavengers of peroxyl radicals, and the action could be related to their capacity to reduce and chelate ferric iron, which catalyses lipid per oxidation. Tomatoes contain a variety of polyphenols such as quartering, kaempferol and naringenin, which are hypothesized to have both antioxidant and ant carcinogenic effects. Clinical evaluation showed that plasma ant oxidation and phenolic contents were increased after administration of fresh tomato and tomato juice [39]. TG levels were decreased after administration of fresh tomato and tomato juice. HDL-C was found to increase whereas LDL-C was found to decrease after the consumption of fresh tomato and tomato juice. This revealed that tomato phenolics probably played an important role in health promotion. Determining the function of tomato phenolics on human health merits further exploration. A number of in vitro studies have shown that lycopene can protect native LDL from oxidation and can suppress cholesterol synthesis. High intake of tomato juice prevents LDLs oxidation and thiobarbituric reactive species formation in healthy men. In a J-774 A.1 macrophage-like cell line, lycopene treatment at a concentration of 10 mM produced a 73% inhibition of cholesterol synthesis [36].

A slightly lower inhibition of cholesterol synthesis was also observed with b-carotene. In this study, both of these carotenoids augmented the activity of the macrophage LDL receptor. However, in another study, dietary enrichment of endothelial cells with b-carotene but not lycopene inhibited the oxidation of LDL [40]. Antioxidant effectiveness depends on a variety of factors such as stability of the antioxidant radical intermediate, quenching ability of both singlet oxygen and peroxyl radicals, and the physical position of the antioxidant in the membranes of the model system. In this study, it seems that b-carotene is highly effective at inhibiting endothelial cell-mediated oxidation of LDL compared with lycopene. The authors suggested that the process of enriching the LDL particles with the antioxidant might play an important role in this regard. However, further work is required for a definitive conclusion. Predictability of in vitro LDL oxidation as a marker of atherosclerosis or coronary heart disease has been questioned in recent years. In animal intervention studies where an increase in resistance of extracted LDL to in vitro oxidation was shown to occur, correlation to a reduced risk of atherosclerosis was not always observed.

Use of well-defined subject populations, standardized outcome measures of oxidative stress and disease and lycopene ingestion that is representative of a normal healthy dietary intake is essential for development of a meaningful interpretation of the results

in terms of therapeutic applications. Some of the conflicting epidemiological observations being reported in the literature may be connected to issues related to lycopene absorption. In general, circulating and adipose tissue levels of lycopene seem to be better indicators of disease prevention than dietary intake data. Lycopene has been shown to be absorbed better from processed tomato products than from fresh tomatoes. Careful consideration must be given to all of these factors in designing future studies for evaluating the role of lycopene in the prevention of CVD.

Anti-thrombotic Factors in Tomatoes Platelet aggregation is fundamental to a wide range of physiological and pathological processes, including the induction of thrombosis and arteriosclerosis [41–43].

Normal homeostasis is initiated when platelets are exposed to the sub-endothelial matrix, where they adhere to collagen via specific cell-surface receptors [43–46].

This adhesion step is followed by platelet activation that is accompanied by synthesis and release of pro-aggregatory molecules such as thromboxane (Tx) A2 and ADP, which amplify platelet responses to collagen and recruit additional platelets to the site of injury [43–46]. The concerted action of collagen, ADP and TxA2 activates specific signaling pathways, generating a number of second messengers and leads to functional expression of a GPIIb–GPIIIa complex of the fibrinogen receptor on the platelets [43–46]. Figure 1 shows the activation of platelets by different aggregating agents. Pro-haemostatic mechanisms appear to be counterbalanced and regulated by a number of physiologic anti-haemostatic molecules that work in a concerted and redundant manner, resulting in the release of prostacyclin (PGI2), nitric oxide and endotheliumdependent hyperpolarizing factor by the endothelium as well as ADP-hydrolyzing activity associated with endothelial cell membrane apyrase (CD39) [46–49]. Aggregation of platelets by agonists is mediated, in part, through the intracellular formation of prostaglandin (PG) G2, PGH2 and TxA2 from arachidonic acid, 20 : 4n-6 [46–49].

In contrast, PGI2, an arachidonic acid metabolite of endothelial cells, is the most potent natural inhibitor of platelet aggregation. Prostaglandin-induced inhibition of platelet aggregation is mediated through an increase in cyclic AMP (cAMP) synthesis via activation of adenylate cyclase. Activation of adenylate cyclase is initiated by binding of PGI2 or PGE1 to specific platelet surface receptors. Alternatively, cAMP levels in platelets can also be increased by inhibiting cAMP phosphodiesteraseactivity[46–49].

Hyperactivity of platelets and, their adhesion and aggregation at the site of injury in atherosclerotic vessel walls is critically important to the pathogenesis of CVD [42, 45, 47, 50, 51]. Furthermore, there is increasing evidence that acute clinical manifestations of coronary atherosclerotic disease are caused by plaque disruption and subsequent platelet-thrombus formation [52, 53].

Coronary atherosclerotic lesions appear in early life and towards the end of the second decade of life; asymptomatic atherosclerosis lesions are present in most people living in industrialized societies. Platelet activity is thought to play a major role in the development as well as, in the stability of atherosclerotic plaques [52, 53]. In support of the path physiological role of platelets, platelet inhibitory drugs such as aspirin have been observed to reduce the incidence of myocardial infraction, stroke and death from CVD in secondary prevention trials [54]. However, the ant platelet effects of aspirin are actually relatively weak, and the drug also has been shown to cause severe

gastrointestinal disturbances and bleeding problems in some patients. Given the high incidence of CVD in developed countries, there is great need for identification of effective ant platelet compounds. These should inhibit platelet aggregation without increasing bleeding time (a problem associated with glycoprotein IIb/IIIa antagonists) in order to circumvent problems in patients who are taking aspirin as a prophylaxis for ulcers [54]. Recently, aspirin's ant platelet limitations have progressively underscored the critical need for improved platelet aggregation inhibitor therapy that is not only effective, but also safe and well tolerated. This concept has stimulated research into prevention of platelet hyperactivity by several means, including dietary supplementation [8, 55–58].

Effects of Tomato Extracts on Human Platelet Aggregation Table 2 shows the ant platelet aggregation effects of different fruit extracts on human platelets in vitro. The maximum inhibitory effect (70–75%) was found to be with tomato and kiwi fruit extracts, whereas apple and pear exhibited very little activity (2–5%). Grapefruit, melon and strawberry showed intermediate activities on platelet aggregation (33–44%). The pH of all the fruit extracts was acidic in nature; therefore, the pH of the extracts was adjusted to pH 7.4 in order to avoid any effect of acidic pH on the platelet aggregation response. With the exception of avocado, apple, nectarine, banana and mango, a 100% juice (w/v) extract was used [8]. A dose-dependent inhibition of platelet aggregation was observed for the tomato extract; maximum inhibition (72%) was obtained when 50 ml (100% juice) of tomato extract was added to 500 ml of prepared platelets. Most of the antiplatelet properties of tomatoes reside in the juicy part of the fruit.

Table 2 Effects of fruit extracts on inhibition of human platelet aggregation in vitro1

Fruit	Scientific names	Family	% Fruit	% Inhibition of platelet aggregation
Tomato	Lycopersicon esculentum	Solanaceae	100	70.0+12.0
Kiwifruit	Actinidia deliciosa	Actinidiaceae	100	72.0+5.0
Grapefruit	Citrus paradisi	Rutaceae	100	44.2+8.1
Melon (Honeydew)	Cucumis melo	Cucurbitaceae	100	42.1+12.0
Strawberry	Fragaria virginiana	Rosaceae	100	33.1+7.0
Melon (Cantelope)	Cucumis melo cantalupensis	Cucurbitaceae	100	27.5+11.0
Banana	Musa paradisiaca	Musaceae	50	22.4+5.0
Mango	Mangifera indica	Anacardiaceae	50	22.1+6.3
Pineapple	Ananas comosus	Bromeliaceae	100	19.8+9.4
Orange (Jaffa)	Citrus sinensis cv. Jaffa	Rutaceae	100	18.5+7.6
Grape (green)	Vitis vinifera	Vitaceae	100	16.4+8.9
Plum	Prunus mexicana	Rosaceae	100	15.6+9.1
Grape (red)	Vitis vinifera	Vitaceae	100	13.8+7.8
Avocado	Persea americana	Lanraceae	20	12.1+4.5
Nectarine	Prunus persica nucipersica	Rosaceae	50	9.1+4.2
Apple	Malus domestica	Rosaceae	50	5.2+2.1
Pear	Pyrus fauriei	Rosaceae	100	2.0+2.0

The ant platelet potential of the fruits tested appeared to be opposite to that of their antioxidant activity, which was reported earlier by Wang et al. (1996). According to them, strawberry had the highest antioxidant capacity followed by plum, orange, red grape, kiwi fruit, pink grapefruit, white grape, banana, apple, tomato, pear and honeydew melon. Since the ant platelet activity in fruits is quite different from their antioxidant properties, it is possible that these activities are the result of the presence of compounds that have a different chemical structure.

Tomato extract used in a dose-dependent manner inhibited ADP-induced platelet aggregation in vitro. However, tomato-derived compounds also inhibit thrombin-induced platelet aggregation. Anti-thrombotic properties of tomato have also been demonstrated in a rat model. Dilapidation of the tomato ultra filtrate (100 000_g) obtained from the tomato extract demonstrated that the ant platelet factor(s) were not lipid-soluble compounds. The dilapidated

aqueous fraction was further purified by gel filtration using a Biogel P2 column. These ant platelet compounds in tomato, had a molecular mass less than 1000 Da, were highly water-soluble and were stable after boiling [8].

Further Characterization of Tomato Extract The aqueous tomato extract consisted largely of soluble sugars (85–90% of dry matter), which showed no in vitro ant platelet activity [59]. The non-sugar material that was isolated (total active fraction, tAF) accounted for 4% of the aqueous extract dry matter and showed strong inhibition of platelet aggregation in vitro. Sub-fractionation of tAF into AF1, AF2 and AF3 fractions by semi preparative HPLC allowed the range of components with significantly different modes of ant platelet activity. The fractions AF1, AF2 and AF3 contributed 32, 13 and 55% to the total dry matter of tAF, respectively [59]. AF1 is highly active against ADP- and collagen-mediated platelet aggregation, and it contains a range of nucleosides and derivatives, including adenosine, cytidine, inosine, guano sine [59], AMP and GMP. Several other components that inhibit platelet aggregation have been isolated, but not yet identified.

Sub fraction AF2 shows significantly less inhibition of ADP- and collagen-induced aggregation but significantly greater inhibition of thrombin-induced aggregation than do the other sub fractions (see Table 3). AF2 contains a range of low-molecular-weight compounds, many of which are sensory components of the tomato and are present at very low concentrations. The main components of the AF3 sub fraction are phenolic compounds.

Simple phenolic acids (e.g. ferulic and caffeic acids) and some glycosidic derivatives have been identified. In addition, several flavonoids have been isolated, including quercetin, kaempferol and lute Olin [59]. This sub fraction inhibits arachidonate-induced aggregation to a significantly greater extent than do the other sub fractions. Most of the isolated components with ant platelet activity are not flavonoid derivatives, and their characterization and individual ant platelet activity profiles remain to be reported.

A possible mechanism by which tomato extract components inhibit different pathways of platelet aggregation has been suggested from the observation that tAF and its sub fractions prevent activation of integrin aIIbb3 (i.e. GPIIb/IIIa). Expression of this integrin

is specific to platelets and megakaryocytes. Its activation is essential for platelet aggregation, which it mediates by binding fibrinogen or von Will brand factor (vWF). In resting platelets, GPIIb/IIIa is maintained in a low-affinity state for ligand binding, which allows platelets to circulate freely.

On activation, receptor-specific inside-out signals are generated, which activates GPIIb/IIIa and increases its affinity for adhesive ligands. Inhibition of the GPIIb/IIIa activation step (which is common to multiple aggregation pathways) could underlie the wide-ranging effects of tAF.

The mechanism of action of these ant platelet factors is not known. Basal platelet camp concentrations are unaltered by tomato extract active components in vitro, which suggests that phospholipase-C-enzyme-familymediated cascade reactions (which can affect GPIIb/IIIa activation) may be at the root of the observed antiaggregatory activity [60]. The effects of AF1–AF3 on platelet receptor-binding capacity as well as on phosphoinositide metabolism and shape change must also be

Table 3 Inhibition of platelet aggregation by tomato aqueous extracts, the total active fraction (tAF) isolated from the aqueous extracts and its sub-fractions1

Tomato extracts/subfractions	ADP (10 mM)	Collagen (4 mg/l)	Arachidonic acid (500 mg/l)	Thrombin (2 units/l)
Inhibition of platelet aggregation (IC50)				
Tomato extract	2.0+0.1	2.7+0.1	6.8+0.1	8.0+0.1
tAF	0.05+0.01	0.05+0.01	0.5+0.1	0.7+0.1
AF1	0.06+0.01	0.04+0.01	0.9+0.1	1.0+0.1
AF2	0.40+0.01	0.59+0.01	0.5+0.1	0.2+0.1
AF3	0.17+0.01	0.30+0.01	0.1+0.0	0.8+0.1

1Adapted from [59].

Half maximal inhibitory concentration (IC50) values represent the final concentration(g/l) of test substance required in platelet-rich plasma or washed platelet suspension for inhibition of platelet aggregation by 50% under standardized conditions.

examined before mechanisms can be confidently suggested. In addition to preventing platelet activation and aggregation, tAF reduces the expression of P-select in (i.e. CD62P) on the platelet surface in response to AD induced platelet activation in whole blood. In resting platelets, P-select in is localized in the membranes of platelet a-granules. On platelet activation, it is redistributed to the platelet surface, where it initiates adhesion to leukocytes.

Under conditions of blood flow and shear stress, this glycoprotein promotes platelet cohesion and stabilizes newly formed aggregates. Thus, tAF components can potentially affect the size and longevity of platelet aggregates. The observed effects on P-select in also imply that tAF components inhibit the release of a-granule components in activated platelets, which affects many pro-aggregatory molecules. Human Trials Using Tomato Extract.

LIFE CYCLE ASSESSMENT OF SURFACTANTS : A REVIEW

Noorazah Zolkarnain

Introduction :

Nowadays, consumers are becoming more concerned about the environmental problems that are occurring around the world. Global warming, depletion of the ozone layer, emissions of greenhouse gases and increased exploitation of raw materials are examples of such problems. The environmental risks of surfactants have also been assessed regularly in the past decades by various industrial groups, governmental regulatory organizations and multi-stakeholder organizations (Stalmans and Sabaliunas, 2004). There is a need to find solutions to overcome these risks. In order to achieve that, a right tool is needed to assess and optimize the environmental quality of a system over its whole life cycle. At present, life cycle assessment (LCA) is the best tool for such a purpose.

Life Cycle Assessment (LCA)

Interest in LCA has been growing enormously in recent years. The Society for Environmental Toxicology and Chemistry (SETAC)'s Code of Practice defines LCA (Vijaya, 2007) as follows :

'LCA is a process for the evaluation of the environmental burdens associated with a product, process or activity by identifying and quantifying energy and materials used and wastes released to the environment, to assess the impact of those energy and materials used and released to the environment and to identify and evaluate opportunities to effect environmental improvements. The assessment includes the entire life cycle of the product, process or activity, encompassing extracting and processing raw materials, manufacturing, transportation and distribution, use, reuse, maintenance, recycling and final disposal.'

The four phases in the process of evaluation by LCA according to ISO 14040 are :

- definition of the purpose, goal, functional unit and system boundaries.
- inventory analysis, including data collection for all processes and allocation or system expansion between products and co-products.
- evaluation of the environmental impacts; and
- interpretation of the results and identification of significant issues.

The LCA results become more useful, credible and closer to reality when all these four phases are repeated several times. *Figure 1* shows the four phases in the LCA framework.

In general, the first phase which consists of the goal and scope needs to be clearly defined before LCA can be carried out. It covers the purpose, system boundaries and procedures for each LCA study. The definition of the functional unit is an important step in order to indicate the specific unit that will be used in the LCA study.

Phase 2 is the most time-consuming. It involves measurements and compilation of data on the consumption of raw materials and energy, emissions and discharges to the environment over a certain period of time. The inventory data can be obtained and analysed according to the requirements of various LCA software in the market, such as SimaPro (Netherlands), GaBi (Germany), Team (Ecobilan-UK), Umberto (Germany), Regis (Switzerland) and JEMAI-LCA Pro (Japan).

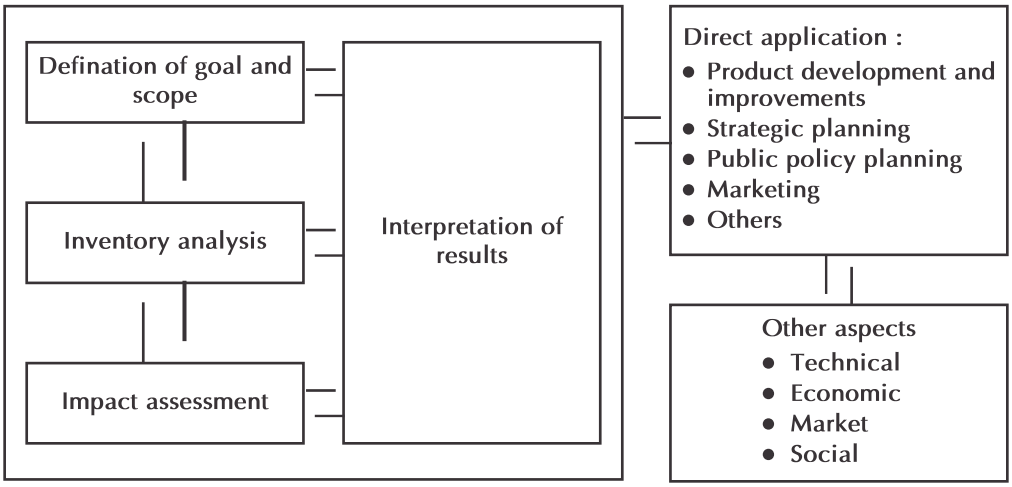

Figure 1. Life cycle assessment (LCA) framework - the four phases of an LCA.

Phase 3 is important in that it evaluates the impact to the environment that comes from the life cycle study. There are three different well-known life cycle impact assessment (LCIA) methodologies, and they are EDIP 97, CML 2001 and Eco-Indicator 99 (Dreyer et al., 2003). Most LCA studies carried out in Europe have used Eco-Indicator 99 as their preferred methodology. The general impact assessment parameters that are commonly used in Eco-Indicator 99 are listed in *Table 1*.

In Phase 3, normalization and weighting are also carried out, Normalization has two purposes in an LCA study. Firstly, it provides an impression of the relative magnitudes of the potential impacts and resource consumptions. In normalization, the impact potentials and resource consumptions which have been determined are compared with an impact which is common for all impact

PARLIAMENT NEWS

Lok Sabha Unstarred Question No. 1861 Answered on 9th March 2010

OIL PRODUCTION CAPACITY

Shri Rajiv Ranjan Singh Alias Lalan Singh, Shri Jagadish Sharma.

Will the Minister of Consumer Affairs, Food and Public Distribution be pleased to state:

(a) whether only a fraction of the total installed capacity for production of edible oil in the country is being utilised;

(b) if so, the details hereof and the reasons therefor indicating the total installed capacity and its utilisation in the country during each of the last three years and the current year, State-wise; and

(c) the steps taken for optimum utilisation of the installed production capacity ?

Answer :

Ministry of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food & Public Distribution (Prof. K. V. Thomas).

(a) & (b) : The capacity utilization of edible oil industry in the country is about 35%. The details of installed capacity and capacity utilization are annexed.

(c) The production and utilization of the installed capacity is based on demand and supply which varies from time to time. At present the import duty on crude edible oil is zero which encourages the industry to process crude edible oils for optimum utilization of the installed capacity. The industry also processes oilseeds procured from domestic market.

Annexure - 1

Annexure referred to in reply to parts (a) of the unstarred question No. 1861
Answered on 9.3.2010 in the Lok Sabha
Status of the Vegetable Oil Industry
(Estimated as on January 2010)

Type of vegetable oil Industry	No. of Units	Annual Installed Capacity (Lakh MT)	Average Capacity Utilisation
Oilseed Crushing Unit	1,50,000 (Approx)	450 (In terms of Seeds)	15-25%
Solvent Extraction Units	810	350 (In terms of Oil-bearing Material)	31%
Refineries attached with Vanaspati Units	135	55 (In terms of oil)	45%
Refineries attached with Solvent Units	310	38 (In terms of oil)	25%
Independent Refineries	615	45 (In terms of oil)	32%
Average of all Refineries	1060	138 (In terms of oil)	35%
Vanaspati	128	38 (In terms of Vanaspati, Bakery Shortening & Margarine)	35%

Annexure referred to in reply to parts (a) & (b) of the unstarred question No. 1861 Answered on 9.3.2010 in the Lok Sabha.

Statewise Installed Capacities (of working units) and Production of Vegetable Oils

(in Mts.)

Status/UTs	Production (Nov. Oct.)							
	2006-07		2007-08		2008-09		2009-10 (Dec.09 to Jan.10)	
	Installed Capacity	Production	Installed Capacity	Production	Installed Capacity	Production	Installed Capacity	Production
North Zone								
Haryana	81000	17201	66000	20251	66000	15752	16500	2096
Himachal Pradesh	-	-	-	-	-	-	-	-
J & K	46500	6563	46500	5919	46500	6478	11625	316
Punjab	359800	169294	359800	169314	351300	163652	87825	40712
Rajasthan	180900	97848	165900	86091	197900	58892	49475	14508
Uttar Pradesh	298000	280441	357000	260660	363000	302012	90750	51777
Total North	**1027700**	**587553**	**1047700**	**564633**	**1077200**	**558740**	**269300**	**112291**
South Zone								
Andhra Pradesh	300300	106846	270300	105969	282300	115421	70575	26862
Karnataka	60000	17297	60000	19866	60000	33652	15000	4744
Kerala	42000	4853	42000	5325	42000	5700	10500	1632
Pandicherry	7500	3214	16500	663	16500	757	4125	154
Tamil Nadu	169500	63442	252000	85337	252000	113963	63000	25897
Total South	**579300**	**195642**	**640800**	**217160**	**652800**	**269483**	**163200**	**59289**
East Zone								
Assam	-	-	-	-	-	-	-	-
Bihar	18000	2423	48000	16600	123000	13333	30750	2881
Jharkhand	18000	8411	18000	9242	18000	9134	4500	1272
Orissa	-	-	-	-	-	-	-	-
West Bengal	28800	102883	483000	78837	668000	83395	166500	20761
Total East	**324000**	**113717**	**549000**	**104679**	**807000**	**105862**	**201750**	**25014**
West Zone								
Chhattisgarh	-	-	-	-	-	-	-	-
Gujarat	559600	142990	499600	190008	557600	249546	139400	45750
Madhya Pradesh	225000	40778	225000	32876	244500	56691	61125	8129
Maharashtra	267000	65037	442000	93990	483000	94954	120750	13649
Total West	1051600	248805	116600	316874	1285100	101191	321275	67528
Grand Total	**2982600**	**1145717**	**3404100**	**1203346**	**3822100**	**1335286**	**955525**	**264122**
Capacity Utilisation %	-	35	-	38	-	35	-	28

Estimated Production of Edible Oils from Major oilseeds (Lakh tons)

States	2006-07	2007-08	2008-09	2009-10 (Kharif)
Andhra Pradesh	3.62	9.30	4.87	2.02
Gujarat	5.23	11.27	7.17	4.09
Karnataka	3.15	4.34	4.09	4.09
Madhya Pradesh	16.28	17.79	17.86	16.13
Maharashtra	10.39	13.62	8.04	6.27
Punjab	0.22	0.16	2.18	0.20
Rajasthan	14.10	11.39	11.65	3.05
Tamil Nadu	3.03	3.21	1.65	0.31
Uttar Pradesh / Uttaranchal	2.95	3.29	2.63	0.20
Others	6.51	6.43	4.68	1.62
Total	**65.49**	**80.79**	**64.82**	**35.76**

Lok Sabha Unstarred Question No. 1969 Answered on 9th March 2010

AVAILABLE OF EDIBLE OIL

Dr. Raghuvansh Prasad Singh

Will the Minister of Consumer Affairs, Food and Public Distribution be pleased to state:

(a) Whether the Government has assessed the availability and demand of edible oil in the country;

(b) if so, the details and outcome thereof;

(c) whether the Government proposes to import edible oil;

(d) if so, the details therof, and

(e) the steps taken for proper and safe storage of edible oil ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food & Publication

Prof. K. V. Thomas

(a) & (b) : Yes, Madam. The net availability of edible oil from all domestic sources, during the current year 2009-2010 (November to October) has been assessed as 82.81 lakh tonnes and demand/consumption during the same period assessed as 181 lakh tonnes. The gap between production and supply of edible oil is met through

imports. Imports of edible oil estimated during 2009-10 is 98.00 lakh tonnes.

(c) & (d) : The import of edible oils (except coconut oil) is allowed under Open General Licence (OGL). At present the Government does not propose to import edible oil on tis own account. However, in order to provide relief to consumers from rising prices, the Central Government launched a Scheme for Distribution of subsidised imported edible oils through States / UTs during 2008-09 under which the designated PSUs, viz., PEC, STC, MMTC and NAFED imported edible oils and handed over to States/UTs for distribution among ration card holders at the rate of 1 Kg. per ration card per month. Till January 2009, the Central Government gave a subsidy of Rs. 15 per kg. Thereafter, the subsidy was increased to Rs. 25 per kg. till March, 2009.

At present, the Scheme is extended upto 31st October, 2010.

(e) : Public Sector Units hire storage facilities for meeting their requirement.

Rajya Sabha Unstarred Question No. 1680 - Answered on 12th March 2010

PLANTATION OF OLIVE SAPLING

Shri Vijay Jawaharlal Darda

Will the Minister of Agriculture be pleased to state :

(a) whether the Rajasthan Agriculture Board, a micro irrigation firm and an Israeli farm-tech company have planted 50,000 olive saplings near jaipur during 2008-09.

(b) if so, whether their growth is progreassing as per pre-determined norms and time-frame;

(c) by when the yields of olive expected from these saplings for use in India; and

(d) whether any share of the yields will be given to the Israeli farm-tech company or they would be financially compensated for their services / technology ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food and Public Distribution.

Shri K. V. Thomas.

(a) Yes Sir, The Rajasthan State Agriculture Marketing Board, Jaipur, Plastro Plasson Industries (India) Limited, Pune & Indolive Limited, Israel as equal partners have formed Rajasthan Olive Cultivation Limited (ROCL) and have taken up olive plantation. 90236 olive plants over an area of 182 ha at seven sites in Rajasthan including 2975 olive plants in 2.00 ha in Bassi near Jaipur have been planted.

(b) The Olive plants have developed profuse vegetative growth and the present growth parameters are encouraging.

(c) Fruiting is expected theird year onwards from plantation. First plantation was done in March, 2008.

(d) In the Shareholder's Agreement M/s. Indolive Ltd., has been offered equity in lieu of their technical services.

Rajya Sabha Unstarred Question No. 1772 - Answered on 12th March 2010

SUBSIDY FOR COCONUT OIL

Shri P. R. Rajan

Will the Minsiter of Consumer Affairs, Food and Public Distribution be pleased to state:

(a) the total subsidy given for palm oil in this financial year;

(b) the reasons why such a subsidy has not so far been given to coconut oil despite the request of the Government of Kerala; and

(c) whether the Central Government intends to give subsidy for edible oils especially produced in the country including Coconut oil to boost the economy as well as to help the farmers ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food & Public Distribution.

Prof. K. V. Thomas

(a) In order to give relief to consumers from rising prices and to augment domestic availability of edible oils in the country, the Government has implemented a Scheme for distribution of subsidised imported oil through State/UTs. The subsidy approved by the Government is as follows :

Period	Subsidy (Rs. per kg)
July 2008 to January 2009	15
January 2009 to March 2009	25
April 2009 to March 2010	15
April 2010 to October 2010	15

An amount of Rs. 48,80,11,245/- has been paid to the PSUs towards subsidy on refined palm oil imported under the Scheme during the current financial year (2009-10).

(b) The purpose of the Scheme is to provide relief to consumers and to augment domestic availability of edible oils. Subsidy under the 'Scheme for distribution of subsidised imported edible oils through States / UTs' is therefore restricted to edible oils imported by PSUs and supplied to the States / UTs for distribution.

(c) There is no proposal at present to give subsidy to edible oils produced in the country as the primary objective of the Scheme is to augment availability of edible oils in the country.

Lok Sabha Unstarred Question No. 2987 - Answered on 16th March 2010

ASSITANCE FOR OIL PALM CULTIVATION

Shri Kodikkunnil Suresh

Will the Minsiter of Agriculture be pleased to state:

(a) whether the Government has provided any financial assistance to the Oil Palm India Ltd. in Kerala to expand oil palm cultivation the State;

(b) if so, the details thereof;

(c) whether the said organisation has submitted any proposal to seek financial assistance from the Union Government; and
(d) if so, the details thereof alongwith the action taken thereon ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food and Public Distribution.

Prof. K. V. Thomas

(a) & (b) : Yes, Madam, Government of India has released following funds to Oil Palm India Ltd. (OPIL) for implementing Oil Palm Development Programme under Centrally Sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) in the State of Kerala.

(Rs. in Lakh)

State	2008-09	2009-10
Kerala	60.00	35.19

(c) & (d) The Government of Kerala / OPIL had submitted the Annual Action Plan (AAP) of OPIL for implementation of Oil Palm Development Programme under ISOPOM for the year 2009-10. The Government of India approved AAP of OPIL for an amount of Rs. 85.66 lakh including 65.19 lakh as Central Share for the year 2009-10. An amount of Rs. 35.19 lakh has been released for 2009-10.

categories and of which the consequences on the environment, resources and working environment are known. Secondly, it presents the results in a form suitable for the final weighting and decision-making (Wenzel *et al.*, 2000). When the impact potentials are normalized, they are expressed in person-equivalent (PE), i.e., fractions of the contribution to the impact derived from the average person.

Weighting is obtained by multiplying the normalized impact potential or resource consumption by the weighting factor. The weighting factor for an environmental impact must reflect the seriousness of the effect potentially being caused by the impact and the possible consequences of this effect relative to the other environmental effects (Wenzel *et al.*, 2000).

Lastly, Phase 4, the final one, completes the assessment by deriving posible improvements or enhancement to products or processes in order to reduce their impact on the environment.

There are many amongst the population who are still unaware of the importance of LCA of a substance or service. In practical terms, LCA can help minimize the magnitude of pollution, and maximize the recycling of materials and wastes in the production processes. By conducting LCA, stakeholders can also save the non-renewable resources like energy and ecological systems. In recent years, LCAs have been actively adopted by the public and private sectors as practical steps to help conserve the environment. Nowadays, it is widely accepted that products and services need to be environmentally, socially and economically sustainable (Saouter *et al.*, 2004). Environmental sustainability requires that the products improve lives, with minimum environmental impact in terms of consumption of both energy and materials, and the production of emissions and solid wastes.

However the problems associated with LCA should not be underestimated. They included data discrepancies and reliability, defining the system and the system boundary, access to information and possibility, misuse of the assessment for commercial advantages (Charlton and Howell, 1992).

LCA OF SURFACTANTS

Surfactants are organic compounds that are amphiphilic, meaning they contain both the water-attracting hydrophobic groups (their 'tails'), with the latter made up of long chain hydrocarbons. Therefore, they are soluble in both organic solvents and in water. Generally, sufactants are classified into four primary groups, namely, anionic, cationic, non-ionic and amphotenic/zwitterionic (dual charge) *(Table 2)*.

TABLE 1. ASSESSMENT PARAMETERS (Eco-Indicator 99)

Impact Category	Characterization	Damage Category
Emissions		
Carcinogens	DALY kg^{-1}	Human health
Respiratory organics	DALY kg^{-1}	Human health
Respiratory inorganics	DALY kg^{-1}	Human health
Climate change	DALY kg^{-1}	Human health
Radiation	DALY kg^{-1}	Human health
Ozone layer	DALY kg^{-1}	Human health
Ecotoxicology	PAF.m^2. yr kg^{-1}	Ecosystem quality
Acidification	PDF.m^2. yr kg^{-1}	Ecosystem quality
Eutrophication	PDF.m^2. yr kg^{-1}	Ecosystem quality
Land use		
Decrease diversity	PDF.m^2. yr kg^{-1}	Ecosystem quality
Resource depletion		
Metals/minerals	SE kg^{-1}	Resources
Fossil fuels	SE kg^{-1}	Resources

Source : Sumiani (2007).

Note : DALY : disability adjusted life years (years of disabled living or years of life lost due to the impacts).
PAF : potentially affected fraction (animals affected by the impacts).
PDF : potentially disappeared fraction (plant species disappeared as result of the impacts).
SE : surplus energy (MJ) (extra energy that future generations must use to excavate scarce resources).

TABLE 2. TYPE OF SURFACTANTS

Surfactant Group	Surfactant
Anionic	Linear alkylbenzene sulphonates Alkyl sulphates Alkyl ether sulphates
Non-ionic	Alcohol ethoxylates Alkyl polyglucosides
Cationic	Monoalkyl quatemary ammonia compounds (quats) Dialkyl quats Esterquates
Amphoteric/zwitterionic	Amine oxides Alkyl betaines

Surfactants play an important role as active ingredients in products such as detergents, fabric softeners, emulsifiers, paints and adhesives. The enviornmental properties of the surfactant in detergents have been studied in detail over the last 40 to 50 years. These studies were initially triggered by the occurrence of foaming in sewage treatment plants and in the rivers in the mid-1960s (Stalmans and Sabaliunas, 2004). Since the early 1970s, the detergent industry has initiated wide-ranging programmes to assess and ascertain environmental safety of major surfactants.

In Europe, the detergent industry players have been conducting LCA studies since a long time ago. Saouter (2003) reported that Procter & Gamble (P&G) participated in a life cycle inventory (LCI) study group comprising more than 13 surfactant producers and detergent formulators. The objective of this study was to assess quantitatively the resource requirements and environmental releases associated with the production of surfactants from oleochemical vs. petrochemical feedstocks.

In Japan, LCA was used for evaluating whether or not their products are environmental-friendly Lion Corporation evaluated the impact of the production of methyl ester sulphonates (MES) detergent on the environment by conducting LCA. The LCA study covered the comparison of carbon dioxide (CO2) emissions between MES from palm oil and linear alkylbenzene sulphonates (LAS) from petroleum. It was established that in the production process, LAS showed a higher amount of CO2 emissions compared to MES. This better performance of the plant-based surfactant, MES, was attributed mainly to the utilization of carbon-neutral material (Lion Corporation, 2007).

In Germany, Henkel has been well-known as a major detergent producer and specialist. They are also using LCA for evaluating their detergent products (Kluppel et al., 1995). The LCA study conducted by the company showed that the production of palm alcohol sulphates generated sulphur dioxide (SO2) and nitogen oxide (NOX) and particulate emissions. The SO2 emissions occurred at the energy intensive transesterification, hydrogenation and sulphating steps. This study also observed that palm oil mills generated high particulate emissions due to burning of fibre and shells for energy generation.

Stalmans *et al.* (1995) studied the LCI of the production in Europe of surfactants the petrolium-based LAS, alcohol ethoxylates (AE), alcohol sulphates (AS) and secondary alkane sulphonates (SAS), and the oleochemical-based alcohol ethoxylates (AE), alcohol ethoxylate sulphates (AES), alcohol sulphates (AS), alkyl polyglucosides (APG) and soap. Inventory data for oeochemical surfactants evaluated were related to the procurement and processing of Malaysian palm

oil and palm kernel oil and also coconut oil from the Phillippines. The boundaries in the study covered plantations, extraction mills, kernel-crushing plants, oil refineries and transportation. In the case of the production of fatty alcohols, the boundary also covered the production of methyl esters for which methanol from natural gas was used as one of the raw materials. The study showed that the production of petrochemical surfactants had different boundaries from that of olechemical surfactants. The boundaries included several operations which comprised drilling, pumping and separation of crude oil from brine water, tank storage, transportation by tankers and pipelines. Additional operations such as desalting, distillation, cracking, hydro-treatment, fractionation or extraction of crude oil into paraffin, olefins, benzene and ethylene were also included.

It was also reported that production of petrochemical surfactants required more energy that oleochemical surfactants. The petroleum-based AE required the highest total energy deman compared to any other surfactant. However, soap manufacture from oleochemicals had the lowest process energy requirement. Interestingly, soap produced from palm and coconut oils required lower process energy compared to those from tallow.

The study also reported that among the many surfactants, AS from petrochemicals gave the highest emission of sulphur oxides. Meanwhile, soap derived from tallow showed high methane and carbon dioxide emissions. This is because the production of tallow is considerably more complex and it is generally associated with a large number of co-products and wastes. It was also highlighted that environmental emissions do occur during the production and transport of all surfactants.

Pittinger (1991) compared the life cycle analysis between AES from oleochemicals and that from pertochemicals, focusing on the characterization of the raw materials, energy requirements and environmental emissions. However, the LCA did not differentiate between co-products and by-products. Three environmental factors - atmospheric emissions, water-borne wastes and industrial soilds - were examined. All these wastes were considered as being discarded or disposed of into the environment.

The study confirmed that different feedstocks for the surfactants have different energy requirements and environmental emissions. Furthermore, it identified that the five major constituents of the atmospheric emissions were particulates, NOX, hydrocarbons, SO2 and CO2. Of these, only NOX and CO2 released during the production process exhibited high impact to global warming due to their greenhouse gas effect. In addition, the report also highlighted the seven components related to water-borne wastes i.e. dissolved solids, biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids,

acid, phosphorus and nitrogen. All these components can cause eutrophication and acidification in the rivers and lakes.

In another study, Pittinger *et al*. (1993) conducted a further LCA on the production of pertochemical surfactants, including LAS, AS, AE and AES, and also oleochemical surfactants AS, AE, AES and MES derived from palm oil, palm kernel oil and inedible tallow. This study indicates that the requirements of natural resources were primarily related to the source of the feedstock and then only to the type of surfactant produced. It also showed that energy requirement of each feedback and surfactant type was different from one another.

The study revealed that the production of petroleum-based AS, AE and AES resulted in the emission of high levels of NO, hydrocarbons and carbon monoxide. In the case of surfactants from palm and palm kernel oils, the atmospheric emissions in the whole chain process were mainly released during the combustion of plant materials in the oil palm plantations and mills. In the process chain for the production of tallow-based surfactants, the emission can be traced to the manufacture of fertilizers, cultivation of corn, the operation of the livestock feedlots and the abattoir for the cattle that produced the tallow.

A review by Stalmans and Sabaliunas (2004) showed that environmental risk assessment was an important issue in the production of detergents and surfactants. Their evaluation concluded that environmental risks associated with the use of modern surfactants such as LAS, AS, AES, AE, esterquats, alkyl polyglucosides, diakyl quarts, amine oxides and alkyl betaines were considered acceptable. They also compiled a comprehensive database on the effects and the environmental fate from the sue of high volume detergent surfactants.

Gert *et al*. (2003) carried out a comparative study on the production of laundry detergents in the United Kingdom. There were eight airborne emissions and four water-borne emissions reported in this study. Under the conditions of the study, it was found that both powder and liquid compact detergents were environmentally the preferred detergents because of the presence of a lower dosage of chemicals in their formulations. As a result, both powder and liquid compact detergents have the advantages of exhibiting lower acidification, aquatic toxicity, climate change, human toxicity and ozone depletion that regular powder formulations. The results are shown in *Table 3*.

From all the above studies, one can realize that production of surfactants can bring about negative effects to the environment. Global warming, climate chaunge, ozone layer depletion and greenhouse gases are some of the most critical impacts from this industrial activity. However, with due prudence and the proper implementation of a sound environmental policy, all these impact can be minimized if not totally avoided.

TABLE 3. LIFE CYCLE IMPACT CATEGORIES PER WASH CYCLE FOR YEAR 2001 BASED ON FORMULATIONS IN THE UNITED KINGDOM

Impact Category	Unit	Powder			Liquid	
		Regular	Compact	Tablet	Compact	Tablet
Acidification	gSO_2eq	0.19	0.16	0.16	0.14	0.15
Aquatic toxicity	m^3PW	33	24	29	26	36
Eutrophication	gPO_4eq	0.66	0.67	0.85	0.92	1.08
Human toxicity	g BW	7.6	6.5	6.6	5.8	6.4
Climate change	gCO_2eq	1 053	978	1 018	933	994
Ozone depletion	$\mu gCFC^{-11}eq$	53	36	43	24	29
Photochemical smog	gC_2H_4eq	0.75	0.83	1.18	0.41	0.50

Source : Gert *et al.* (2003)

CONCLUSION

LCA is an acceptable and a suitable technique for evaluating the environmental impacts from the production of a product. Combining LCA with additional safety assessment can help manufacturers to reduce waste and emissions that could be generated during the production process. At the same time, it provides avenues for making further improvements in transportation, the manufacturing processes, the products, as well as the packaging in order to minimize negative environmental impacts in the whole life cycle of that product.

Currently, manufacturers in Malaysia are in the process of evaluating the environmental impacts of their local products using the LCA approach. However, it may take time before the whole LCA of these products can be completed. Commitment and co-operation from all government agencies, industrial players and manufacturers are important and needed in order to make the LCA approach successful.

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Ack : M.P.O.B. Malayasia.

The ability of tAF to modify the platelet response to stimulation by different agonists was evaluated by examining the changes in platelet aggregation response and expression of platelet activation markers on the platelet surface.

In addition, the ex vivo efficacy of the tomato extract was evaluated in a study designed for examining the acute effect of supplementation with tomato extract, which was given in an orange juice matrix. In a randomized, double-blinded, placebo-controlled crossover, a significant reduction in platelet aggregation was observed 3 h after supplementation with tomato extract [59, 61]. Two different extract-supplemented treatment drinks were prepared in 50 and 200 ml volumes. Each treatment drink contained 18 g tomato extract syrup, which is equivalent to the quantity of tAF found in 6 fresh tomatoes. Inhibition of aggregation was observed for both ADP- and collagen-mediated aggregation in a dose-dependent manner.

Male subjects showed greater sensitivity to the extract, as evidenced by significantly larger reductions in platelet aggregation in response to ADP or collagen, than did the female subjects. No adverse side-effects of the supplementation were reported, and no effects on clotting time variables were detected after supplementation.

Conclusions Epidemiological studies have shown that dietary behavior is an important a etiological factor in various chronic diseases. Tomato contains several antioxidants including lycopene, flavonoids and trace elements, vitamins beneficial to the cardiovascular system. In addition, the presence of several ant platelet factors in tomatoes makes it an ideal cardiovascular food. Modulation of platelet reactivity towards collagen, ADP and thrombin by tomato or tomato products could be of potentially prophylactic and therapeutic benefit in preventing and halting pathologic processes that lead to CVD. The likely clinical benefits of reducing platelet activity in a healthy population by means of a functional food are currently no quantifiable because of a lack of suitable published data.

This fact reflects the difficulties in defining both platelet hyper-reactivity and a target-acceptable level of platelet function. However, it is acknowledged that populations whose diet results in a suppression of platelet activation (e.g. a high-fish diet or a Mediterranean diet) obtain measurable health benefits in terms of reduction of CVD risk. The human study showed that consumption of ant platelet components derived from the tomato, in a supplement drink format suitable for use as a dietary supplement or functional food, led to a significant reduction in ex vivo platelet aggregation after 3 h. The observed acute effects were more wide-ranging than those of aspirin, the only drug widely studied as a potential prophylactic, in that more than one pathway of platelet aggregation is targeted. Persons with high concentrations of some known markers of CVD showed greater sensitivity to supplementation, and overall the range of responses measured seemed appropriate for a primary prevention regime. Consumption of such tomato extracts as a food supplement could benefit public health by helping maintain platelets in an inactivated state and reducing the risk of thrombotic events mediated by platelet activation.

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THE MAGIC OF ROSEMARY

Prof. Vijai Shukla & Mr. Kaustuv Bhattacharya

Oxidation of oils and fats in personal care products is a common and serious problem for formulators. While synthetic antioxidants can be used, consumers are showing an increasing preferance for 'natural' additives. Prof. Vijay Shukla and Kaustuv Bhattacharya write on the effectiveness of rosemary extract as a natural antioxidant.

The consumer market today is flooded with innumerable skincare products. But whatever the product or brand, they all contain oils or fats, which help moisturise the skin and maintain its condition.

Natural oils and exotic butters are widely used in cosmetics. Evening primrose and borage oils, for example are very common natural oils used primarily because of their high gamma linolenic acid content 9-11% and 18-23% respectively.

Oils with high amounts of polyunsaturated fatty acids - such as camelina, black current seed and flaxseed oils - are also prevalent. Usually obtained from tropical jungles, exotic butters such as shea, mango and sal are among the commonly used exotic butters in skin care products. They are rich in symmetrical monounsaturated triglycerides which are solid or semi-solid at room temperature. Exotic butters are rich in unsaponifiables such as sterols, ubiquinones, fatty alcohols and fatty esters.

COMBATING OXIDATION

The oil or fat content of a cosmetic product can vary from 2-15% in body lotions and creams, to almost 100% in massage oils.

In order to extend the shelf life of their products, producers must combat oxidation, which is a very common and serious problem for any fat-containing product, food or cosmetic. Characteristic changes include malodours and unpleasant tastes that might lead to changes in colours, viscosity, specific gravity and solubility.

Oxidation is believed to occur in three phases, the first being the 'initiation' step where free radicals are gradually formed. The rate these are formed depends on the amount and degree of unsaturation of the fatty acids in the oil. The second step is 'propagation', where a critical level of free radicals has been reached and a faster chain reaction starts. This phase is marked by rapid absorption of oxygen, with the formation of peroxides. The third 'termination' phase involves the recombination of the various species of free radicals, and the oxidation rate falls. But by this time, oxidation has already taken place to a substantial extent and the oil is completely rancid.

The time between initiation and propagation is called the 'induction period' and the longer this period is, the greater the oil's oxidative stability.

Most producers add antioxidants to their products and there is hardly a food or cosmetic

product which does not contain some added preservatives. The antioxidants used are mostly synthetic. However, consumers are becoming increasingly concerned over the possible side effects and are showing a preferance for natural additives.

ROSEMARY'S ANTIOXIDATIVE EFFECTS

The antioxidative, antimicrobial, antiviral, antimutagenic and anticarcinogenic properties of rosemary extract have been will documented.

The mixture of diterpene alcohols present in rosemary extract act as a natural antioxidant. Carnosic acid and carmosol - the main active ingradiant of rosemary extract - are effective scavengers for peroxy radicals, the primary product of oxidation. They also form antioxidant radicals of very low activity, inactivating any further reaction with lipids.

Despite the plant extract's, various benefits, application has been limited because it incorporates a distinctive flavour.

Using rosemary extracts, the International Cosmetic Science Centre A/S in Denmark (ICSC) has developed a process called 'internal stabilisation' by which all exotic butters and natural oils are protected against oxidative deterioration. ICSC has also developed an odour free, flavourless concentrated rosemary extract which can be added externally to oils and butters for protection against oxidation. Test results prove that rosemary extracts can be added to oils and butters to produce skin-care products without synthetic antioxidants and less chemical preservatives.

INTERNAL STABILISATION

The ICSC tested the effectiveness of internally stabilised shea, mango and sal butters and evening primrose and borage oils against oxidation and compared these with control samples not containing any antioxidants. The butters were tested at 120^0 C and the oils at 100^0 C.

For the exotic butters, the induction period (IP) for the control sample of mango butter was 7.7 hours, compared with a value of 20 hours for mango butter internally stabilised with rosemary extracts. With shea butter, the internally stabilised sample showed a four-fold increment from 3.4 to 14.8 hours compared with its control sample. Internally stabilised sal had a value of 13.5 hours, about twice that of its control value of 9.6 hours.

The internally stabilised evening primrose and borage oils also showed high oxidative stability with the IP increasing from 11 to 23 hours for evening primrose oil, and from 5.4 hours to 26 for borage oil.

EXTERNAL ADDITION

Rosemary extracts were also added to shea and mango butters, and evening primrose, borage, flaxseed, blackcurrant seed and camelina oils. Blackcurrant and flaxseed oils

were tested at 80°C and the other oils and butter at 100°C.

Evening primrose oil was selected as a guide and was dosed with 270, 510, 770 and 977ppm of rosemary extract. As the dosage increased, the induction period rose from 6.82 hours for the control to 9.53 hours for the 977 ppm dosage. It can therefore be interpreted that adding about 1,000ppm of rosemary extract increases oxidative stability by about 40%. This could be extrapolated to 200% at an ambient temperature of 20°C.

A dose of 1,000ppm was then added to all the other oils and butters, which all showed an improvement in oxidation stability.

INDUCTION PERIOD (HOURS)

	Control	With rosemary extract
Blackcurrent	35.8	38.5
Flaxseed	25.8	32.4
Borage	5.03	6.32
Camelina	3.78	5.05
Shea butter	9.08	14.9
Mango Butter	11.6	16.8

Rosemary extract was also tested against the natural Vitamin E antioxidants - tocopherol and tocotrienol. A dose of 1,000ppm of each was added to evening primrose oil (EPO). The IP was 7.23 hours for EPO with tocopherol; 9.85 for EPO with tocotrienol and 11.9 for EPO with rosemary extract.

CONCLUSION

The use of rosemary extract as an antioxidant has a number of benefits for cosmetic formulators. It prolongs the shelf-life of their product, without the need for synthetic antioxidants, thus giving a more natural image. Rosemary extract has strong antiinflammatory and anti-aging properties. It also has strong antimicrobial properties which can reduce the amount of chemical preservatives in the final formulation.

In addition, it has stronger antioxidant properties compared to natural antioxidants such as tocopherols and tocotrienols.

Prof. Vijai Shukla is the president and Kaustuv Bhattacharya is the research and development scientist, at the International Cosmetic Science Centre in Denmark.

Ack : Oils & Fats International, U. K.

Rajya Sabha Unstarred Question No. 2348 - Answered on 16th April 2010

PRICE OF EDIBLE OILS

Shri Vijaykumar Rupani

Will the Minister of Consumer Affairs, Food and Public Distribution be pleased to state :

(a) whether it is a fact that the price of edible oils is continuously increasing in last three years.

(b) the details of prices of edible oil in the years 2007, 2008 and 2009;

(c) whether Government has taken any measures to control the prices; and

(d) if not, the reasons therefor ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food & Public Distribution.

(Prof. K. V. Thomas)

(a) & (b) The average wholesale prices of major edible oils in 2008, musturd oil, groundnut oil, soyabean oil, sunflower oil and RBD palmolein have increased by 28.4%, 0.34%, 21.4%, 19% and 5.6% respectively as compared to prices in 2007. However, the prices of these edible oils, mustard oil, groundnut oil, soyabean oil, sunflower oil and RBD palmolein have declined by 19.2% 10.3%, 21.2%, 32.9% and 23.1% respectively during 2009 as compared to prices in 2008. The details of average wholesale prices of major edible oils in the domestic market during the last three years are as under :

(Rs. per Quintal)

Year	Mustard Oil	Groundnut Oil	Soyabean Oil	Sunflower Oil	RBD Palmolein
2007	4807	6729	4733	5319	4621
2008	6172	6752	5746	6329	4862
2009	4884	6058	4526	4249	3752

Source : The Solvent Extractors' Association of India

(c)&(d) : The Government have taken the following measures to contain the prices of edible oils :

(i) The custom duties on crude and refined edible oils have been reduced to nil and 7.5% respectively since 01.04.2008. It has been decided that this duty structure would be continued till 30.9.2010.

(ii) The Government have banned export of all major edible oils from the country since 17.03.2008 upto 30.9.2010.

(iii) Allowed State Governments to impose stock limits on edible oils and oilseeds.

(iv) The Government have launched a Scheme on 28.07.2008 to distribute upto 10 lakh tons of edible oils to State/UTs at a subsidy @ Rs. 15/- kg. which was enhanced to Rs. 25/- kg. from Junuary, 2009 to March, 2009. The Scheme is believed to have helped to soften the prices of edible oils in domestic market as per feed back received from State Governments. The Scheme has been continued in the current year also with a subsidy of Rs. 15/- per kg. to import upto 10 lakh tons of oils till 31.10.2010. So far, fourteen State Governments/UTs had intimated their requirements of edible oils, have been allocated edible oil under the Scheme. A quantity of 2,15,500 tons of edible oil has been contracted for import under the scheme upto 01.04.2010.

Rajya Sabha Unstarred Question No. 3069 - Answered on 23rd April 2010

PLAN TO INCREASE PRODUCTION OF PULSES AND OILSEEDS

Shri Raj Mohinder Singh Majitha; Shri Shivanand Tiwari

Will the Minister of Agriculture be pleased to state :

(a) whether it is a fact that Government has formulated a new plan to increase the production of pulses and oilseeds in the country during the financial year 2010-2011.

(b) If so, the outlines of this plan and State-wise number of villages of the country selected for implementation of this plan and the basis on which those villages have been selected; and

(c) the targeted production and the amount allocated for expenditure under this plan ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Food and Public Distribution.

(Shri K. V. Thomas).

(a) to (c) : Yes, Sir, To meet the increasing demand of pulses and oilseeds in the country, Government of India has been implementing National Food Security Mission on Pulses in 16 Major Pulses growing states and integrated Scheme on Oilseeds, Pulses, Oilpalm and Maize (ISOPOM) in 14 States of the country.

Besides, under the Macro Management of Agriculture (MMA) scheme, assistance is also provided for pulses and Oilseeds development in the states which are not covered under NFSM and ISOPOM Programme.

NFSM Pulses has been strengthened with additional components and a new programme "Accelerated Pulses Production Programme" has been started from 2010-11.

In addition to this, Finance Minister in his budget speech of 2010-11 announced that an amount of Rs. 300 crores has been earmarked to organize sixty thousand "Pulses and Oilseeds villages" in rainfed areas during 2010-11, to enhance the productivity of dry land farming areas where pulses and oilseeds are grown premominatly. These funds would be provided as additional central assistance under th ongoing scheme "Rashtriya Krishi Vikas Yojana".

The New Plan taken up for implementation in the States of Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh accounting for 83% and 86% area under pulses and oilseeds respectively of the total area of these crops in the country. Therefore, it is proposed to cover 60000 villages in these seven major pulses and oilseeds producing states. Budget allocation has been made in proportion to the area under pulses and oilseeds crops in these states. It is envisaged that productivity of pulses and oilseeds would increase by at least 10% with implementation of the new plan.

The details of state-wise villages, and proposed outley under the programme is as under :

State	No. of Village	Proposed Outlay (Rs. in crores)
A. P.	6600	33.00
Gujarat	5400	27.00
Karnataka	6600	33.00
Maharashtra	14400	72.00
M. P.	10200	51.00
Rajasthan	11400	57.00
Uttar Pradesh	5400	27.00
Total	**60000**	**300.00**

Rajya Sabha Unstarred Question No. 2766 - Answered on 21.4.2010

ASSESSMENT OF AVAILABILITY OF EDIBLE OIL

Shri Dhiraj Prasad Sahu :

Will the Minister of Commerce & Industry be pleased to state :

a) whether Government has assessed the availiability of edible oil for the consumption in the country.

b) if so, whether proper storage are there or not :

c) if not, whether Government have any plan to import edible oil from other countries; and

d) if so, the details thereof ?

Answer

The minster of State in the Ministry of Commerce and Industry.

Shri Jyotiraditya M. Schindia.

a) Yes, Sir.

b) It is estimated that India has produced about 64 lac tons of edible oils in 2009-10 for which proper storage is available in the country.

c) & d) : It is estimated that the consumption of edible oils during the period of 2009-10 is about 154 lac tons. The shortfall has been met by the import of edible oils. The import is being done by the PSUs well as the private sector. To ensure the availability of edible oils at reasonable rates the Government as of now has permitted to import crude edible oils at zero per cent import duty.

Lok Sabha Unstarred Question No. 4000 - Answered on 20th April 2010

IMPORT OF PALMOLEIN OIL

Shrimati Bhavana Gawali Patil; Shri Hansraj G. Ahir.

Will the Minister of Consumer Affairs, Food and Public Distribution be pleased to state :

a) the quantum and value of the Palmolein imported during each of the last three years along with the agencies involved in the import;

b) whether the said oil was imported for distribution through Public Distribution System (PDS);

c) if so, the details thereof;

d) whether the distribution of Palmolein through PDS has been discontinued particularly in Maharashtra;

e) if so, the details thereof and the reason therefor;

f) whether the Government proposes to restart the sale of Palmolein through PDS; and

g) if so the details thereof and the time by which it is likely to be started ?

Answer

Minister of State in the Ministry of Agriculture and Minister of State in the Ministry of Consumer Affairs, Foods & Public Distribution.

(Prof. K. V. Thomas)

a) The quantum and value of refined palmolein imported during each of the last three years are as under :

Year (April-March)	Quantity Imported (MT)	Value (Rs. in Crores)
2006-07	0.69	149.98
2007-08	1.60	320.13
2008-09	11.80	2698.14

Source : DGCI & S, Kolkata, Ministry of Commerce & Industry

Import of edible oils is under Open General Licence (OGL)

(b), (c), (d), (e), (f) & (g) : The Central Government do not distribute edible oils through Public Distribution System (PDS). However, in order to give relief to consumers from rising prices and to augment domestic availability of edible oils in the country, the Government of India had implemented a 'Scheme for distribution of subsidised imported edible oils through States/UTs' during 2008-09 with a subsidy of Rs. 15/- per kg till January 2009 and thereafter Rs.25 per kg. upto March 2009 on edible oil imported by the PSUs and handed over to the States/UTs for distribution under the Scheme. The Scheme has been extended upto 31.10.2010 which envisages an import of upto 10 lakh tons of edible oils with a subsidy of Rs. 15/- per kg of imported edible oil handed over to State for distribution through PDS shops/other outlets as decided by them at a rate upto 1 litre per month per ration card. So far, 14 States including Maharashtra have been given allocation of 72,293 tons of edible oils per month under the Scheme. Upto 9.4.2010, STC, the designated PSU for Maharashtra has handed over about 41,037 tons of refined palmolein to the State for distribution under the current Scheme.

GOVERNMENT NOTIFICATIONS

TARIFF RATE QUOTA FOR IMPORT OF OILS

Government of India
Ministry of Commerce and Industry, Department of Commerce

Public Notice No. 49/2009-2014
New Delhi the 18th March, 2010

Subject : Amendment of para 2.59 relating to procedure for import under the Tariff Rate Quota Scheme and para 2.59.1 relating to eligible entitles for allocation of quota of HBP Vol. 1, 2009-2014.

In exercise of power conferred under Paragraph 2.5 of the Foreign Trade Policy 2009-2014, the Director General of Foreign Trade hereby amends para 2.59 of the Handbook of Procedure (Vol.1) relating to procedure for import under the Tariff Rate Quota Scheme as under :

Attention is invited to Government of India, Ministry of Finance (Department of Revenue), Notification No. 21/2002-Customs dated 01.03.2002 and Notification No. 33/2010-Customes dated 12.03.2010. As per these, import of four items viz., (1) Skimmed and whole milk powder, milk food for babies etc. (0402.10 or 0402.21) and White Butter, Butter oil, Anhydrous Milk Fat (0405) (2) Maize (corn): other (1005.90) (3) Crude sunflower seed or safflower oil or fractions thereof (1512.11) and (4) Refined rape, colza or mustard oil, other (1514.19 or 1514.99) is allowed in a financial year, up to quantities as well as such concessional rates of customs duty as indicated below :

S. No.	ITC Cide No. & Item	Quantity of Quota	Concessional Duty
1 (i)	Tariff Code No. 0402.10 or 0402.21 Skimmed and whole Milk Powder Milk Food for babies etc.	30.00 MTs	0%
(ii)	Tariff Code No. 0405 White Butter, Butter oil, Anhydrous Milk Fat	15,000 MTs	0%
2	Tariff Code No. 1005.90 Maize (Corn) : other	5,00,000 MTs	15%
3	Tariff Code No. 1512.11 Crude Sunflower seed or Safflower oil or fractions thereof	150,000 MTs	50%
4	Tariff Code No. 1514.19 & 1514.99 Rape, Colza, Canola or Mustard oil, Other (Refined)	150,000 MTs	45%

Part (a) of para 2.59.1 of HBP V-I relating to eligible entitles for allocation of quota is hereby amendment to be read as under :

Milk Powder (Tariff Code No. 0402.10 or 0402.21) and White Butter, Butter oil, Anhydrous Milk Fat (0405) : National Diary Development Board (NDDB), State Trading Corporation (STC), National Cooperative Diary Federation (NCDF), National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED), Minerals and Metals Trading Corporation (MMTC), Projects & Equipment Corporation of India Limited (PEC) and Spices Trading Corporation Limited (STCL).

This issues in public interest.

Sd/-
(R. S. Gujral)
Director General of Foreign Trade and
Ex Officio Special Secretary to the Govt. of India

BOOK REVIEW

A book entitled **"Perfumery Materials,Production and Applications"** has been authored by an very eminent **Professor (Dr) D.K.Bhattacharyya, Emeritus Fellow(AICTE)**, Adjunct Professor Bengal Engineering and Science University, former President, O.T.A.I and a Scientist of National and International repute.

The book speaks for itself about his mastery and competence in the discipline Of "Perfumery Materials".

"The book demonstrates the scopes of certain specific reactions and raw materials in producing new synthetics. The enormous scopes of biotechnology involving bio-conversion processes', with isolated enzymes and by fermentation biotechnology involving selective microorganisms has been indicated in making synthetics. The applications of natural aromatic oils in aromatherapy ,food, cosmetics/toiletries, imitation perfumery and allied sector have been included..

Standardisation and evaluation of natural aromatic (essential 0 oils ans incidence of their adulteration have been elaborated in order to ascetain their quality and authenticity for sustaining the business in the industry" says Prof (Dr) R.N. Mukherjee, Former, Professor and Head, Deptt of Chemical Engg, University of Jadavpur. The book will fulfill a long felt want in the discipline of Essential Oils and will cater to the various categories of Scholars, Scientists and Technologistists. The book has already been well appreciated in India and abroad, though published by the Stadium Press L.L.C., USA.

Those interested to procure a copy of this Valued book on Essential Oils may contact Professor D.K.Bhattacharyya at Phone No (033) 2461 9662.

(S. K. Roy)
Editor

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A REVIEW

*The book entitled "**A treatise on Analysis of Food, Fats and Oils**" is an example of unique competence and contribution of the authors, S. K. Roy, N. K. Pramanik and A. R. Sen.*

The book is the first of its kind in India. It covers the traditional and modern analytical methods for the characterization and quality of fats, oils as well as other food items.

The authors are well reputed and qualified and they have applied their collective wisdom and expertise in including and presenting more appropriately and meticulously the analytical methods.

The book can also be viewed as a rarer type as it deals with the statutory and industrial aspects of fats, oils and their products, and pollution control in vegetable oil industry.

In fact these aspects are of extreme use and importance to those concerned with these issues.

The book is already well received by the readers and users in the academic and industiral circles throughout India because of the highly relevent and benefficial methodologies and basic-cum technological information. The book will be recognised in due course of time as one of the top quality analytical books in the area of food, fats and oils.

Prof. D. K. Bhattacharyya
21-6-2003

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Aluminium Foils for Pharma, Vanaspati and Edible Oils, Contraceptives, Cosmetics, Food Packagings, Tea, Spices, Insulation, Lubricants, Blood Bags, Wads, Pouches etc.

Other Products Viz., Glassine Paper Poly Coated, Corrugated Box, Bopp Self Adhesive Tapes, Liners, Pet Bottles.

UP-Coming Projects – Multi Layer Films – Vanaspati and Bag in Box Pouches, Milk Pouches, Lamination Films.