OIL TECHNOLOGISTS' ASSOCIATION OF INDIA

FEBRUARY 2014 - JUNE 2014

EASTERN REGION

FOR LIMITED CIRCULATION

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S. K. Roy has taken over as President OTAI & Mr. Janardan as Vice President (H.Q.) for the year 2013-15.

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FROM THE EDITOR'S DESK

Fish Wish

Fish is rich source of protein of high biological value and also rich in Omega-3 fatty acid. These long chain Omega-3 fats make blood thinner and unclog the arteries and prevent heart disease. They are also good source of vitamin-D.

All Shellfish, including prawns, crabs and lobsters, are high in dietary cholesterol.

You should eat at least 150 gm of fish, three times a week. Most people don't eat that much, because the whole process of buying, cleaning and storing is messy. Fish is rich in protein of high biological value and also has Omega-3 fats. These long chain Omega-3 fats make the blood thinner and unclog the arteries and prevent heart disease. They are a also good source of Vitamin D.

We don't need to worry about fish. Like promfret, surmai, rawas, which come from the deeper part of the sea. The fishing boats go deep into the sea to get these fish. It is the coastal water that is polluted. So, shallow water fish like bangda, Bombay Duck, and prawns may contain higher-level of toxins and may be avoided.

As far as mercury level in the fish is concerned, the trace amount of mercury found in some fish does not always pose a health risk. This is because most fish are a rich source of selenium that binds with mercury forming a new compound, thereby making mercury unavailable for absorption in our body. Also, if you take a multivitamin, it is most likely that it contains at least 100-150 mcg of selenium in the supplement.

Fish consumption benefits, include better cardiovascular health and better IQ in children. There are many studies that suggest that Omega-3 in fish reduces inflammatory disease (psoriasis, asthma, and arthritis) auto-immune disease in those who eat more fish. Increasing Omega-3 in your diet and reducing Omega-6 fats is beneficial for nearly all lifestyle related diseases.

Prawns do contain Omega-3, but they are not a significant source of these good fats. Oily fish such as salmon, rawas, surmai, bangda, tuna, sardines, hilsa and trout are quite rich in Omega-3 fats.

For those who do not consume fish, may source Omega-3, from our mustard oil, fresh dark green leafy vegetables, raw walnut, flax seed oil etc.

S. K. ROY
Editor

with inputs / courtesy from
Dr. Anjali Mukerjee

About Ourselves

Report of the Workshop conducted by OTAI (EZ)

A two days workshop & practical short course on **"FSSAI STANDARDS OF EDIBLE OILS AND DERIVED PRODUCTS VIS-À-VIS ANALYTICAL METHODOLOGIES"** was organized by Oil Technologists' Association of India (EZ) in collaboration with Dept. of Chemical Technology, University of Calcutta on 27-28 February 2014 at the auditorium of Chemical technology dept., University College of Sc. & Technology, University of Calcutta, 92, A.P.C. Road, Kolkata-700009.

Total 14 participants from various Laboratories, Oil processing units and research laboratories were joined in the programme.

The programme was inaugurated by Head, Dept. of Chemical Technology and All India President, S. K. Roy, OTAI, President, EZ, Dr. Ranjit Chakrabarty, Mr. Ais Kumar, AO, FSSAI, Kolkata Area, Prof. D. K. Bhattacharyya were present as distinguished guest. There were seven theoretical lectures delivered by Mr. Ais Kumar, AO, FSSAI, Prof. D. K. Bhattacharyya, Dr. Mahua Ghosh, Dr. Avery Sengupta, Smt. Surashree Sen Gupta. The topics covered were FSSAI ACT; Basic Chemistry of Fats & Oils; Analytical Methodologies for assessment of quality and safety of edible oils (Traditional and New Oils introduced) and their products; Analytical Methodologies for characterizing Blended Oils and for detection and estimation of minor constituents of oils; Analytical Methodologies for characterizing chemically and enzymatically interesterified fat products, Interesterified fats from hydrogenated fats and fractionated fats and cocobutter substitutes from cocoabutter; Chromatographic Techniques of analysis of Fats & Oils; Introduction to ISO : IEC 17025:2005 i.e. General requirements for the competence of testing and calibration laboratories. An extensive demonstration on laboratory techniques including TLC, GLC, HPLC was given.

The programme provided an opportunity to the participants, to learn from the Basic to Applied Scientific Knowledge / Analytical methodologics which will equip them to understand & deliver the desired result.

PROGRAMME

Thursday, February 27

09.30 hr : Registration

10.00 hr : Inauguration

11:00 hr : Lecture 1 : Previous Standards (PFA, BIS and AGMARK) and current standards (FSSAI) laid down for Edible Oils and Derived Products by **Sri Ais Kumar**, AO, Kolkata Area, FSSAI.

12:00 hr : Lecture 2 : Lipid Chemistry by **Dr. Mahua Ghosh**.

12.45 hr : Lecture 3 : Analytical Methodologies for assessment of quality and safety of edible oils (Traditional and New Oils introduced) and their products by **Prof. D. K. Bhattacharyya**.

13:30 hr : Lunch.

14:00 hr : Lecture 3 : Role of Chromatography in oil analysis by **Dr. Mahua Ghosh**.

15.00 - 17.00 hr : Practical Demonstration of Analytical Methods.

Friday, February 28

10.30 hr : Lecture 1: Analytical Methodologies for characterizing blended Oils and for detection and estimation of minor constituents of oils and derived products by **Ms. Surashree Sen Gupta**.

11.15 hr : Lecture 2 : Analytical Methodologies for characterizing chemically and enzymatically interesterified fat products, Interesterified fats from hydrogenated fats and fractionated fats and cocobutter substitutes from cocoabutter by **Prof. D. K. Bhattacharyya**.

12.00 hr : Discussion on special queries.

13.00 hr : Lunch.

14.00 hr : Practical Demonstration.

16.00 hr : Lecture 3 : Introduction to ISO:IEC 17025:2005 i.e. General requirements for the competence of testing and calibration laboratories by **Dr. Avery Sengupta**.

17.00 hr **Valedictory.**

HIGH TRANS, TRANS CONJUGATED LINOLEIC ACID-RICH TRIACYLGLYCERIDE PRODUCTION BY PHOTO-IRRADIATION

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ABSTRACT

Recent studies have shown that a 20% trans, trans conjugated linoleic acid (CLA)-rich soy oil significantly reduces heart disease and diabetes risk factors in obese rats. Furthermore, trans,trans-CLA has been reported to have superior anti-carcinogenic activity than other CLA isomers. Therefore, a more concentrated source of trans, trans-CLA oil would be highly desirable. The objectives of this study were to (1) determine the yield of trans,trans-CLA isomers resulting from photo-irradiation of Tonalin® (BASF Global, Florham Park, NJ, USA) and identify trans,trans-CLA positional isomers; and (2) derive a mathematical model of kinetics of trans,trans-CLA TAG formation from Tonalin®. Fifty-five percent trans,trans-CLA rich oil was obtained in about 140 min when Tonalin® was photo-isomerized with 0.35% iodine, which is almost three times more than is possible with photo-isomerized soy oil. Photo-isomerization of Tonalin® requires about 2 h, compared to 12 h for photo-isomerization of soy oil. This reaction is a first-order reversible reaction with the forward rate constant (k f) = 13.17 × 10-3min-1 and backward rate constant (k b) = 5.334 × 10-3 min-1. The major isomers identified were trans-9, trans-11-and trans-10, trans-12-CLA.

Keywords

Photo-isomerization Conjugated linoleic acid trans,trans-CLA cis,trans isomerization gas chromatography High performance liquid chromatography Soy oil.

Abbreviations

CLA – Conjugated linoleic acid ; GC – Gas chromatography ; FID – Flame ionization detector ; PDA – Photodiode array detector ; TAG – Triacylglycerides ; FAME – Fatty acid methyl esters ; [ct] – Concentration of cis,trans-and trans, cis-CLA isomers (mmol/L) ; [tt] – Concentration of trans,trans-CLA isomers (mmol/L) ; k – Rate constant for the reaction (min-1) ; K – Equilibrium constant for the reaction ; t – Time (min) ; eq – Equilibrium ; 0 – Initial concentration ; f – Forward reaction ; b – Backward reaction

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INTRODUCTION

Dietary conjugated linoleic acid (CLA) has anti-cancer, anti-atherogenic, anti-obesity, and anti-diabetic properties. Most of these health benefits are attributed to cis-9,trans-11 and trans-10, cis-12 isomers of CLA. About 3.4-4.0 g of CLA is required daily to realize these health benefits. However, traditional CLA sources, such as dairy and other ruminant meat products, contain <1% CLA. Therefore, a typical healthy diet does not deliver sufficient CLA to produce significant clinical effect. This could be achieved by increasing consumption of dairy and beef products, but would result in undesirable increases in dietary saturated fat and cholesterol. Thus, there is a need for a food source that is rich in CLA and is also low in cholesterol and saturated fat.

A 20 % CLA-rich soy oil has been obtained by photo-isomerizing the olefinic C=C double bonds of the linoleic acid moiety within soy oil by homogenous iodine catalysis. Soy oil is an excellent candidate for this process because it contains 50% linoleic acid and is low in saturated fat and cholesterol free. However, almost 90 % of the 20% CLA formed was trans,trans-CLA in contrast to bovine food sources that consist primarily of trans-10, cis-12 and cis-9, trans-11 isomers. For soy oil, Jain and Proctor reported the kinetics of linoleic acid olefinic group photo-isomerization to be a relatively slow conversion of the cis,cis olefinic group to cis,trans-CLA and trans,cis-CLA groups, which were then rapidly converted to thermodynamically more stable trans,trans isomers. A subsequent nutritional study with obese Zucker rats showed that 0.5% dietary trans,trans-CLA rich soy oil significantly reduced both total serum cholesterol and serum LDL by almost 50% and reduced liver weight and liver lipids by 39 and 35%, respectively, relative to control rats fed on 0.5 % conventional soy oil diet. In addition, glycosylated hemoglobin, a diabetes indicator, was slightly, but significantly, reduced. Increased peroxisome proliferator-activated receptor gamma (PPAR-γ) expression was reported in rats receiving trans, trans-CLA rich oil, relative to the control. Other studies show that the trans,trans-CLA isomers efficiently inhibited bovine endothelial cell proliferation, decreased accumulation of triglycerides in pre-adipocytes and induced mitochondria mediated apoptosis. It was shown that trans,trans-CLA increased interleukin-1 receptor antagonist which is associated with a decrease in risk of coronary heart diseases and acted as a potent anti-carcinogen and decreased the tumor necrosis factor (TNF-a) in human skin cells. In in-vivo studies, trans,trans-CLA has been reported to have superior anti-carcinogenic activity compared to conventional CLA isomers.

Since the health benefits of trans,trans-CLA are emerging, there is an increasing realization of the value of an oil with more trans,trans-CLA than is currently possible with photo-isomerized soy oil. Ju and Jung showed that soy oil hydrogenation could be manipulated to produce 12% trans,trans-CLA by adding sulfur with nickel as a catalyst; however, this

process was accompanied with the formation of 19% elaidic acid which is undesirable in food-grade oil. trans,trans-CLA FAME were produced from synthetic CLA free fatty acids using BF3-methanol catalyzed methylation; however, this method was unable to directly produce trans,trans-CLA TAG and the process is laborious and time consuming taking over 24 h to complete.

The goal of the present study was to determine the feasibility of producing trans,trans-CLA rich TAG by photo-isomerizing a commercial oil containing 80% cis,trans-and trans,cis-CLA isomers within the TAG (Tonalin®). The objectives were to: (1) determine the yields of trans,trans-CLA isomers within photo-irradiated Tonalin® and identify trans,trans-CLA positional isomers; and (2) model the kinetics of trans,trans-CLA TAG formation from Tonalin®.

EXPERIMENTAL PROCEDURES

Materials

Tonalin® TG 80, an 80% mixture of cis-9,trans-11 and trans-10, cis-12 isomers of CLA (1:1 ratio) with 20% of other fatty acids mainly C16:0, C18:0 and C18:1, was obtained from BASF (Florham Park, NJ, USA) and used throughout the study. Resublimed iodine was used as a catalyst (EM Science Cherry Hill, NJ, USA). Magnesol®, a commercial source of magnesium sulfate was obtained from The Dallas Group of America, Inc. (Whitehouse, NJ, USA). The HPLC-grade solvents, hexane and acetonitrile, were from VWR International, West Chester, PA, USA. Other chemicals used were of reagent grade.

Yields of trans,trans-CLA in Photo-Irradiated Tonalin®

Photo-Isomerization of Tonalin®

Samples of trans, trans-CLA rich TAG were produced from Tonalin®, by adapting the method of Tokle et al. First, 5g of Magnesol® was added to 100g of Tonalin® and mixed for 20 min to remove minor polar components and peroxides. The solution was filtered using Whatman #4 filter paper under vacuum and heated to 55°C. Then, 0.35% iodine was dissolved in Tonalin®. The oil was then allowed to stand to cool with occasional stirring. Three samples weighing 5g each were taken from the solution and placed in 7ml borosilicate vials. These vials were attached to an illuminated laminar flow photo-irradiation unit with photon flux (power) set to 3.14mW, and samples were collected after 0, 20, 40, 80, 120, 180, 240, 300 and 360min of irradiation. Each photo-irradiation treatment was run in triplicate.

CLA Isomer Determination by GC-FID

Methyl esters were prepared by the base-catalyzed methanolysis method as proposed by Christie. Initially, a 100-mg sample was weighed into a 25-ml centrifuge tube and 500ÊìL of 1% heptadecanoic acid methyl ester (17:0, internal standard), 2ml of toluene,

and 4ml of 0.5m sodium methoxide in methanol were added to the centrifuge tube and the tube was purged with nitrogen gas. The centrifuge tube was heated to 50°C for 10min and then cooled for 5min. After the tube had cooled, 200ìL of glacial acetic acid was added to the centrifuge tube to prevent the formation of sodium hydroxide. Then, 5ml of distilled water was added to the centrifuge tube followed by 5ml of hexane, and the tube was vortexed for 2 min. The hexane layer was extracted and dried over anhydrous sodium sulfate in a 7ml glass vial. The extracted layer was then taken from the glass vial and placed in a gas chromatograph vial. Methyl esters were analyzed by gas chromatography (GC) by using an SP 2560 fused silica capillary column (100 m × 0.25 mm i.d.× 0.2ìm film thickness; Supelco Inc., Bellefonte, PA, USA) with a flame ionization detector (FID) (model 3800, Varian, Walton Creek, CA, USA). Two-microliter samples, prepared in hexane, were injected using an autosampler CP8400 (Varian). Helium was used as a carrier gas with a flow rate of 2ÊmL/min. Samples were run in (20:1) split-mode. The GC-column injection-port temperature was set at 240°C. The column temperature was programmed as 60°C for 1min, then increased at 20°C/min to 170°C and held at this temperature for a further 50min. The FID settings were as follows : detector temperature = 270°C, He makeup flow rate = 34ml/min, H_2 flow rate = 30ml/min, air flow rate = 300 mk/min. Triplicate determinations were conducted for each photo-irradiated and non-photo-irradiated Tonalin® treatment.

Kinetics and Rate Constants of trans, trans-CLA TAG Formation from Tonalin®

The cis,trans-plus trans, cis-CLA concentrations [ct] and trans,trans-CLA concentrations [tt] within irradiated Tonalin® TAG versus irradiation time data were employed in several plots to investigate the possible irreversible zeroth-order; irreversible first-order reaction; irreversible second-order and reversible first-order reactions. The R^2 value of each plot was obtained and the highest R^2 value plot with no significant lack of fit was considered to best describe the reaction kinetics. Rate constants were then determined.

Identification and Quantification of trans, trans-CLA Positional Isomers in Photo-Irradiated Tonalin® TAG

Silver-Ion HPLC Separation and Quantification of CLA Isomers

GC-FID fatty acid analysis does not distinguish between trans, trans positional isomers; therefore, a silver-ion HPLC analysis was performed to identify and quantify trans, trans-CLA positional isomers in TAG produced by photo-irradiation from Tonalin® TAG. Silver-ion chromatographic separation was performed in duplicates by using the method of Shah et al. that was adapted from Sehat et al. Two ChromSpher 5 Lipids analytical silver-impregnated columns each 4.6 mm i.d. × 250 mm stainless steel; 5 Im particle size (Chrompack, Bridgewater, NJ, USA) in series were used. The column temperature was kept constant at 23°C by using a temperature control module (Waters Corporation, Milford,

MA, USA). Approximately 40ìg of irradiated samples FAME in 20 ìL hexane was injected using the Waters 717 plus autosampler and a Waters model 600 system, equipped with a quaternary pump (Waters Delta 600), pumping at a rate of 1ml/min. An isocratic solvent system consisting of 0.1% acetonitrile in hexane was used. The column effluent was connected to a photodiode array (PDA) detector (Waters Model 2996), measuring absorbance at 233 mm. The CLA peaks were identified by using the retention times reported by Shah et al. Sehat et al. and Yurawecz and Morehouse under the same chromatographic conditions.

Statistical Analysis

Statistical software JMP 10 (SAS Institute, Cary, NC, USA) was used throughout the study to conduct analysis of variance and statistical bivariate regression analysis. The means of the treatments were compared with Tukey's significance test.

Results and Discussion

Yields of trans, trans-CLA in Photo-Irradiated Tonalin®

Figure shows the decrease in the cis, trans and trans, cis-CLA concentration and increase in the trans,trans-CLA concentration resulting from irradiation of Tonalin® TAG with time. The trans,trans-CLA isomers levels increased at the expense of the cis,trans and trans, cis-CLA isomers; however, the cis,trans and trans, cis-CLA isomers could not be completely isomerized to trans, trans-CLA isomers. The reaction tends to approach equilibrium at around 300 min as there was no statistically significant difference in the concentrations of cis, trans and trans,cis-CLA and trans, trans-CLA for time treatments after 300 min. The equilibrium concentrations of cis, trans and trans, cis-CLA isomers ($[ct]_{eq}$) and trans, trans-CLA isomers ($[tt]_{eq}$) were 66.77 and 167.85 mmol/L, respectively. An oil possessing almost 55% trans, trans-CLA was produced from Tonalin® by photo-irradiation, which is about three times more than can be produced from soy oil by photo-irradiation. This is because Tonalin® TAG contains a relatively high initial concentration of cis, trans and trans, cis-CLA isomers that are rather absent in soy oil. Additional studies of the kinetics of the reaction were pursued to obtain a better understanding of why the yield increased.

Decline in cis, trans and trans, cis-CLA concentration and increase in trans,trans-CLA concentration with time during photo-isomerization of Tonalin®, with 0.35% catalytic iodine. Plot shows the means of cis, trans and trans, cis-CLA and trans, trans-CLA concentrations at different time intervals with overlaid mathematical model-derived curves using Eq.

Table shows the fatty acid composition of Tonalin® TAG before and after photo-irradiation as the equilibrium is approached. The fatty acids composition of the two was similar except for that of CLAs, which were significantly affected because of the photo-isomerization of cis, trans and trans, cis-CLA isomers to trans, trans-CLA isomers within Tonalin® TAG.

Table 1

The fatty acid composition of Tonalin® before and after photo-irradiation analyzed by GC-FID in triplicate

Fatty acid	Pre-processing (mmol/L)	Post-processing (mmol/L)
Palmitic acid	$4.04 \pm 0.06_a$	$3.96 \pm 0.06_a$
Stearic acid	$7.65 \pm 0.06_b$	$7.56 \pm 0.06_b$
Oleic acid	$45.93 \pm 0.06_c$	$45.89 \pm 0.06_c$
Linoleic acid	$0.59 \pm 0.06_d$	$0.47 \pm 0.03_e$
trans, cis-and cis, trans-CLA	$232.25 \pm 0.09_f$	$67.88 \pm 0.03_g$
trans, trans-CLA	$2.27 \pm 0.03_h$	$167.85 \pm 0.03_i$

Means in the same row with the same letter are not significantly different by Tukey's significance test.

Kinetics and Rate Constants of trans,trans-CLA TAG Formation from Tonalin®

The plots to investigate the possible irreversible zeroth-order; irreversible first-order; irreversible second-order reaction did not successfully describe the data. There was a significant lack of fit for these plots ($P < 0.05$) and R^2 values were <0.7. Additionally, the linear regression analysis results showed that the plot of $-\ln([ct]-[ct]_{eq})$ versus time gave a straight line with R^2 value of 0.96 and showed no significant lack of fit (PÊ>Ê0.05) indicating that the reaction was first-order reversible (data not shown).

For first-order reversible reactions, the rate of approach to equilibrium is proportional to the fractional distance from equilibrium. Drenth and Kwart suggested that for a reversible first-order reaction, the rate of reaction is initially fast and the rate gradually decreases as the equilibrium is approached. Since Fig., a plot of cis, trans-and trans, cis-CLA isomer concentration vs time, reflects this trend, first-order reversible reaction kinetics is suggested for the conversion of cis, trans and trans, cis-CLA isomers to trans, trans-CLA isomers within photo-irradiated Tonalin® TAG.

The rate constants k_f (rate constant for forward reaction), k_b (rate constant for reverse reaction), and K_{eq} (equilibrium constant) were determined for the unimolecular reversible first-order reaction.

At equilibrium K_{eq} was determined as :

$$K_{eq} = k_{fkb} = [tt]_{eq}\,[ct]_{eq} = 167.8\text{mmol/L}67.77\text{mmol/L} = 2.476$$

(1) The reaction scheme for isomerization of olefinic groups of cis,trans- and trans, cis-CLA isomers (ct) into trans,trans-CLA isomers (tt) olefinic groups is given below:

$$cis,trans\ and\ trans,\ cis\text{-}CLA \Rightarrow_{kfkb} trans,\ trans\text{-}CLA$$

(2) The value of K_{eq}, 2.476 ± 0.01, demonstrates that the rate of forward reaction was more than double that of the reverse reaction. As the reaction proceeded, the rate of formation of trans, trans-CLA isomers decreased as the equilibrium was approached. Therefore, to maintain a high trans, trans-CLA formation rate, a large concentration of cis,trans-and trans, cis-CLA substrate or a low concentration of trans, trans-CLA has to be maintained. Continuous stirring could also accelerate the reaction rate and approach to equilibrium. Due to the reaction being endothermic, increased temperature would increase K_{eq}, thereby favoring formation of greater amounts of stable trans, trans-CLA.

Because $[tt]_0$ (initial concentration of trans, trans-CLA isomers) is negligible relative to $[ct]_0$ (initial concentration of cis,trans- and trans,cis-CLA isomers), it was assumed that $[tt]_0 \approx 0$. To determine the terms k_f and k_b, the rate law equation for reversible first order kinetics was employed :

$$\ln([ct] - [ct]_{eq}) = (k_b + k_f)t - \ln([ct]_0 - [ct]_{eq})$$

(3) Linear regression analysis of the plot $-\ln([ct]-[ct]_{eq})$ vs time produced the straight line with slope of 0.0185/min which is equal to the sum of forward and backward rate constants. Espenson described this sum of rate constants as a “natural” rate constant and is the inverse of the intrinsic time constant for the single exponential that defines approach to equilibrium. Thus, the progress towards the equilibrium was characterized by this natural rate constant. The forward and backward reaction rate constants were obtained by combining Eqs. and : $k_b = 5.334\ (\pm 0.03) \times 10^{-3}\ min^{-1}$ and $k_f = 13.17\ (\pm 0.02)0 \times 10^{-3}\ min^{-1}$.

These findings are in contrast with those of Jain and Proctor who described the kinetics of linoleic acid olefinic group photo-isomerization to trans, trans-CLA isomers within soy oil TAG. They proposed consumption of soy oil linoleic acid olefinic group to cis, trans- and trans, cis-CLA isomer was a second-order reaction, which was also the rate determining step limiting the formation of trans, trans-CLA isomers. In this Tonalin® study, the formation of trans, trans-CLA isomers from cis, trans and trans, cis-CLA isomers within Tonalin® TAG is one step reaction. This explains the rapid trans, trans-CLA isomers formation during photo-irradiation of Tonalin® TAG relative to the trans, trans-CLA isomers formed by photo-irradiation of linoleic acid olefinic groups in soy oil TAG.

Identification and Quantification of trans,trans-CLA Positional Isomers in Photo-Irradiated Tonalin®

Silver Ion HPLC chromatograms of photo-isomerized Tonalin® TAGs were obtained. The CLA peaks were identified based on the retention times reported by Shah et al. Sehat et al. and Yurawecz and Morehouse under the same chromatographic conditions (Supplementary material). The control Tonalin® FAME chromatogram did not show any trans, trans-CLA isomer peaks. The photo-irradiated Tonalin® contains mainly two trans, trans positional CLA isomers (trans-9, trans-11 and trans-10, trans-12). The relative concentrations of CLA isomers formed are shown in Table. Slightly more trans-10,trans-12-CLA was formed compared to trans-9, trans-11-CLA. The cis, trans-CLA and trans, cis-CLA isomers constituted about 10.58% of the total CLA.

Table – 2

The relative concentrations of CLA isomers formed in photo-irradiated Tonalin® TAG identified by silver-ion chromatography

CLA isomers	Relative concentration (%)
trans-10, trans-12	46.43 ± 0.04
trans-9, trans-11	42.99 ± 0.04
trans-10, cis-12	8.63 ± 0.02
cis-10, trans-12	0.22 ± 0.02
cis-9, trans-11	1.29 ± 0.02
trans-9, cis-11	0.44 ± 0.01

Conclusions

A method to produce about 55% trans,trans-CLA-rich TAG by photo-isomerization in 140min from Tonalin® was developed producing two major trans, trans-CLA positional isomers viz trans-9, trans-11-CLA and trans-10, trans-12-CLA. This is a convenient method to produce trans, trans positional CLA TAG and could be scaled up for the production and separation of trans, trans-CLA.

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COOIT's Trade Estimate for Rabi Oilseed Production and Availability of Vegetable Oils during 2013-14 Season

35th All India Rabi Seminar on Oilseeds, Oil Trade & Industry was held on 9th March, 2014 at New Delhi and arrived at trade estimate of Rabi Oilseeds crop and availability of vegetable oils from Rabi Crop during 2013-14 season as under :

Rabi Oilseeds Area & Crop.

Oilseeds	2013-14		2012-13		Change	
	Area* Lakh Ha	Crop Lakh T.	Area Lakh Ha	Crop Lakh T.	Area Lakh Ha	Crop Lakh T.
Groundnut	8.32	17.67	9.13	17.14	(-) 0.81	(+) 0.53
Rape/Mustard	71.32	72.25	67.26	67.01	(+) 4.06	(+) 5.24
Sunflowerseed	4.29	3.95	5.12	4.65	(-) 0.83	(-) 0.70
Sesameseed	0.99	3.02	0.72	2.61	(+) 0.27	(+) 0.41
Safflowerseed	1.79	1.01	1.50	0.86	(+) 0.29	(+) 0.15
Linseed	3.57	1.20	3.36	1.17	(+) 0.21	(+) 0.03
Other Oilseeds	0.48	--	0.67	--	(-) 0.19	--
Total	**90.76**	**99.10**	**87.76**	**93.44**	**(+) 3.00**	**(+) 5.66**

- Area as per GOI data as on 20th February, 2014

Oilseeds Production :

Oilseeds	2013-14			2012-13	Change
	Kharif	Rabi	Total		
Groundnut (in shell)	47.15	17.67	**64.82**	43.34	(+) 21.48
Soybean	102.30	--	**102.30**	107.00	(-) 4.70
Rape/Mustard/Toria	1.50	72.25	**73.75**	68.51	(+) 5.24
Sunflowerseed	1.85	3.95	**5.80**	6.15	(-) 0.35
Sesameseed	3.50	3.02	**6.52**	6.01	(+) 0.51
Castorseed ®	11.20	--	**11.20**	13.47	(-) 2.27
Nigerseed	0.70	--	**0.70**	0.80	(-) 0.10
Safflowerseed	--	1.01	**1.01**	0.86	(+) 0.15
Linseed	--	1.20	**1.20**	1.17	(+) 0.03
Sub Total	**168.20**	**99.10**	**267.30**	**247.31**	**(+) 19.99**
Cottonseed	111.60	--	**111.60**	102.30	(+) 9.30
Copra	7.00	--	**7.00**	6.00	(+) 1.00
Grand Total	**286.50**	**99.10**	**385.90**	**355.61**	**(+) 30.29**

SEA Survey team in last week of February had estimated Rape-Mustard at 74.40 lakh tons. However, due to hail storm in last week of February 2014, damaged the standing crop and hence crop was reduced by COOIT to 72.25 lakh tons.

General Observations :

1. The area under Rabi Oilseeds Crop 2013-14 increased to 99.10 lakh hectares from 93-44 lakh hectares last year i.e. up by 5.66 lakh hectares.

2. **Revision of Kharif Crop :**

   The following revision has been made in kharif crop 2013-14 estimated earlier at the Kharif Convention held on 19th Oct., 2013 at Delhi.

Crop	**Revised Estimate (9.3.2014)**	**Earlier Estimate (19.10.2014)**
Castorseed	**11.20 Lakh Tones**	12.70 Lakh Tones

3. Rabi Groundnut Crop has marginally increased by 0.53 lakh tones to 17.67 lakh tones from 17.44 lakh tones of last year.

4. Rapeseed-mustard including Toria crop increased to 73.75 lakh tones from 68.51 lakh tones of last year, up by 5.24 lakh tones.

5. The overall Rabi Oilseeds Crop 2013-14 increased to 99.10 lakh tones from 93.44 lakh tones last year, up by 5.66 lakh tones.

6. The overall 9 oilseed crops (Kharif & Rabi) for the current year (2013-14) is estimated at 267.30 lakh tones compared to 247.31 lakh tones of last year, up by 19.99 lakh tones.

7. The total vegetable oil availability from Kharif and Rabi Oilseeds crops for the year 2013-14 (Nov-Oct) is estimated upward at 85.25 lakh tones comapred to 80.32 lakh tones.

8. The import of vegetable oil during 2013-14 (Nov-Oct) in spite of higher crop, is likely to increase by about 5.00 to 6.00 lakh tons and estimated in the range of 110.00 to 112.00 lakh tons from 106-79 lakh tons in previous year (2012-13).

GRAPES : CHEMICAL COMPOSITION, EXTRACTION AND APPLICATION

by

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ABSTRACT

Archaeological evidences found along the time attest the existance of grape vine long before apparition of the human being. Although a long period of time the grapes were consumed only as fresh products regarded as a valuable gift of nature, the application of wine processing operations resulted in the development of grape vine cultures used on this purpose. The numerous studies performed along the years on the chemical composition of the grapes made evident their potential using in various industries. Many studies are to be found in scientific literature on the chemical composition of the grapes, extraction of the active compounds and their use, these topics being discussed in the present paper.

Keywords : Grape vine, grapes, extraction, characterization, uses.

INTRODUCTION

The grape vine (Vitis vinifera) is subtropical plant attaining 35 m length and adapted to the climate conditions of the temperate zone. The fruits are known as grapes put together in clusters. The grape of wild varieties is of about 6 mm diameter and colored in dark purple to black when matured. The cultivited varieties have instead much larger grape attaining 30 mm being of different colours : white, white-greenish or purple. Three areas are of a greater significance for the grape vine cultivation: the European Mediterranean area (Europe has more than 80% of the grape vine area and about 75% of the wine world production) together with the areas in Northern Africa and Near East, the Europe temperate area with hot summers and the subtropical and temperate areas with hot summers in South America, Northern America and South Africa (Bernaz, 2007).

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Ack. : BULETINUL INSTITUTULUI POLITEHNIC DIN IAȘI Publicate de UNIVERSITATEA TEHNICĂ "GHEORGHE ASACHI" din IAȘI ● Tomul LIX (LXIII) Fasc. 3 ● Secția CHIMIE și INGINERIE CHIMICĂ (2013) ● EDITURA POLITEHNIUM

Romania is one of the great world wine countries due to the geopgraphical location and the various relief configurations which assure favorable natural conditions for the grape vine cultivation. The districts with the largest wine areas are : Vrancea, Galati, Vaslui, Dolj, Constanta, Iasi, Buzau, Bacau, Olt, Prahova, Mehedinti, Tulcea, Vâlcea, Alba, Arges, Timisoara and Arad (Brândza, 1997).

HARVEST OF GRAPES

The grapes develop through several stages along their vegetation, namely: growing, maturation, ripening and over-ripening. The gathering time is crucial since is every the ratio between organic acids and sugars, between various acids, between sugars, between pectine etc are different. Besides, the quantity and quality of the final products are much dependent on the harvesting time (Baractaru, 1968). In choosing the proper harvesting time the appearance and qualitative and gustative features as well as the resistance of grapes during their transport and storage are to be considered. The quality of the grapes was found to be the best in the harvesting moment when the maturation is stopped. The apparition of the qualitative features of the grapes is connected to certain physiological and biochemical phenomena developing during growing and maturation and also to the harvesting moment (Popa, 1982).

Theoretically the grapes attain the optimum maturation moment when their color is turned from green into yellow-greenish and then into yellow-golden. The peel becomes more elastic and less resistant, the taste is pleasant and sweet and when a grape is detached from the cluster no other one is replacing it meaning that the growing is over. The seeds become brownish in color and can be easily separated from the pulp. The grape stalk begins to lignify near the stem. The grapes can be detached easier with no difficulty.

When the sugar content and the weight of 100 grape berries do not increase any more the grapes are proper both quantitatively and qualitatively for being harvested. A high quality wine able to be properly stored is obtained when the sugar content exceeds 200 g/L. The fact also deserves mention that the harvesting technique is crucial for the high quality of the grapes (Popa, 1982).

CHEMICAL COMPOSITION AND EXTRACTION

As regards the general chemical composition, the grapes contain sugars, the simple sugars prevailing among them, mineral salts and water, in different contents from one variety to another and various limits from one year to another. These components in the newly gathered product vary between the percentages listed in Table 1 (Țârdea *et al*., 2010).

Table-1

Chemical Composition of Grapes

Components	Content, [%]
Water	70-85
Sugars (glucose, fructose, pentose, pectin)	15-25
Organic acids (tartaric, malic, citric, salicyclic as free or bound forms)	0.5-2
Mineral salts (prevailing in the following order : K, P, Ca, Mg, Na, Si, Cl, Fe, Al, Mn, Cu, Zn etc)	0.3-1
Ascorbic acid	0.003
Tannins	0.01-0.1
Nitrogen containing compounds	0.03-0.17
Vitamins (thiamine, riboflavine, piroxidine, nicotinic acid, pantotenic acid etc)	9-84%

The clusters were found by Ţârdea *et al*., (2010) to contain the following components : water 78-80%, pentosan 0.5-1.5%, tartaric acid 0.5-1.5% malic acid 0.1-0.5%, tanins 3-5%, polypeptides 1-1.2%, proteins 0.5-0.8%, fatty acids 0.01-0.02%, minerals 2-3% and cellulose 5-10%.

The grape berries represent 93-97% of the weight of grapes and consists of peel, pulp and seeds. The wine varieties contain 450-1000 berries per kg of grapes and the seeds and peel have a higher weight compared to the table grapes. Generally, the peel represents between 4-20%, the pulp between 73-95% and the seeds between 2-7% of the berry weight. The peel is the external cover of the grape that protects the pulp and the grape being at the same time the location where the colored and flavor compounds accumulate. The chemical composition of the peel is extremely complex compared to the cluster the last containing a wax layer named pruine responsible for the velvet aspect. According to Ţârdea *et al*., (2010) the grape berries contain a great number of substances as given in Table 2.

Table-2

Chemical Composition of Grape Berries

Chemical Components	Seeds, [%]	Pulp, [%]	Seeds, [%]
Water	75-80	80-85	25-45
Glucose	–	7-12.5	–
Fructose	–	8-13	–
Saccharose	–	0.1-0.15	–
Pentosans	0.5-1.0	0-0.1	4.5
Tertaric Acid	0.2-0.5	0.3-0.8	–
Malic acid	0.01-0.02	0.05-0.1	–
Citric acid	–	0.02-0.09	–
Gluconic acid	–	0.01-0.02	–
Tannins	0.5-1.0	0.01-0.02	5.8
Anthocyans	0-2	–	–
Amino Acids	0.02-0.1	0.5-1.0	–
Polypeptides	0.2-0.3	0.01-0.2	0.5-2.0
Proteins	0.05-0.01	0.01-0.1	0.2-0.5
Biogenic amines	–	0-0.02	–
Fatty acids	0.08-0.2	0.01-0.05	9-18
Phytosterols	0.01-0.04	–	–
Protopectins	0.01-0.05	–	–
Pectins	–	0.5-0.2	–
Gums	0.02-0.1	0.01-0.5	–
Terpenols	0.01-0.1	Traces	–
Perpenic glycosides	0.1-0.5	Traces	–
Mineral compounds	0.5-1	0.2-0.3	2-4
Cellulose	3-4	0.1-0.2	44-57
Vitamins (B, H, PP, C)	–	0.01-0.08	–

As mentioned in another study on the grapes the pruine represents about 1.5% and the water content 50-80% of the fresh peel weight. The remaining 20-50% is the dry substances that could attain 60% in certain varieties as well as during the dry years. Among sugars the cellulose attains 4%, followed by pentoses and pentosanes (1-1.2%), pectic substances, gums and mucilage (1%), and very low amount of glucose and fructose. The nitrogen containing components varies between 0.5-2% and the ash between 0.5-1% of the peel weight. The acids are to be found especially as their salts instead of free compounds and that is why the pH value is higher than in the pulp juice (Popa, 1982).

The nature and amount of the components in the pulp are much different from one grape variety to another, maturation degree, weather conditions etc. For instance, the grape berries in Africa and Asia contain 50 μg beta carotene in 100g berries. The variety and weather conditions as well as the maturation degree affect the grape composition and the color (Chair *et al*., 2012). A study on the grape extracts used in the cosmetic products made evident the phenols to attain a rather high content followed by that of carbohydrates and of acids. The contents of the pehnols able to be extracted are of about 10% in pulp, 60-70% in seeds and 28-35% in peel (Chair *et al.,* 2012).

The grape seeds contain 6-20% oil of the yellowish, yellow-brown or yellow-greenish color. It is eatable, of a good taste similar to that of olive oil. As mentioned in a study of (Dorobantu & Beceanu, 2007) the grape seeds contain the following components before drying: water (30-40%), tannins (3-7%), minerals (1-2%), oil (8-10%), cellulose (44-57%) and lignin (25-28%). In view of preservation and for prevailing the alteration of the grape seeds causing the worsening of the oil quality and content the seeds must be dried till a moisture content of about 6-7% after their separation from the marc. The dried marc contains 40-65% seeds with 12-22% oil. Thus, from 100 kg dried marc 15-25 kg of seeds are obtained able to give 1.5-3.0 L oil by extraction.

The grape seeds coming from the fermented marc have lower oil content, of about 6-10%, and a higher free acidity. The seeds of various varieties from the fermented marc have about 9% oil attaining 12% in certain varieties such as the variety *Black Babeasca*. The lowest oil contents were found in the varieties White *Fraga* and *Seivillard*, of 8.95% and 6.1%, respectively, exceeding the lower value mentioned in literature. The seeds of the black varieties have higher oil content than the white ones (Dorobantu & Becceanu, 2007).

As for the chemical composition, the grape seed oil is rich in linolenic (70-75% in the extraction oil and 60-62% in the filtered oil) and oleic acid (13-28% of the total fatty acids) and tocopherols α, γ, δ (Chair *et al*., 2012). In this connection, Fernandes *et al*., (2013) have studied the chemical composition of the grape seed oil and pointed out its importance for supplying tocopherols (85.5-244 mg/kg) as well as certain acids: linoleic, oliec, palmitic and stearic. The seed oil is also a rich source of poly-unsaturated (63.64-73.53%), the mono-unsaturated and saturated fatty acids being in much lower amounts, of 14.19-21.29% and 11.64-14.94%, respectively.

The *resveratrol* was much studied as a particularly important phenolic component in grapes for its beneficial action on the human health. In this connection, Casas *et al*., (2010) have studied the extraction of resveratrol from the grape seeds, peel and pulp with supercritical CO_2. The authors have also investigated the influence of pressure (100, 400 bar) and temperature (35, 55°C) on the extraction process finding the high pressure and low temperature to afford the best results. Pascual-Matrí *et al*., have studied the extraction of resveratrol with supercritical fluid from the grape peel and found the extraction to be best performed at 40°C, 150 bar, ethanol/water ratio of 7:5 (by vol.) and extraction time of 15 min.

Cho *et al*., (2006) have applied the ultrasound extraction and the obtained results were more satisfactory that with the conventional extraction method with a solvent. Namely, the yield increased by 24-30% with respect to the conventional method applied under the following conditions: ethanol/water ratio-80:20 (by vol.), temperature 60°C and time 30 min.

The seed grape oil can be obtained by pressing, extraction or distillation. In case of the extraction by solvents the resulting material is submitted to separation for obtaining the oil to be finally refined (Dorohantu &Beceanu, 2007). Furthermore, Conde *et al*., (2007) pointed out that several processing stages are required for a complete extraction since certain active components are of different structures and are not equally placed in grapes. The extraction of seed oil by means of supercritical fluid was found to be more advantageous than the classical method. Thus, Prado *et al*., (2012) have studied the oil extraction from the grape seeds by supercritical fluid on a pilot scale at 35 MPa and 40°C and found these conditions and the duration of 240 mm to assure the best extraction from the economical point of view. Passos *et al*., (2010) have studied such an extraction process by supercritical fluid at various presure (180, 200 and 220 bar) and temperature (40 and 50°C) values and found the extraction rate to increase with increasing pressure and decreasing temperature.

The modern extraction methods were also proved to be more efficient for the extraction of different active components from the grape seed oil. Thus, Da Porto *et al*., (2013) made a comparison between the extraction methods with ultrasounds at 20 KHz, 150 W and 30 min and that performed in a Soxhlet apparatus for 6 h for obtaining the polyphenols from the grape seed oil. With the ultrasound method the fractions containing the active component had to be firstly submitted to macerating for 12 ore and then to extraction for 15 min. The authors concluded the ultrasound method to be much quicker and the polyphenol amount much higher than the Soxhlet extract. Sánchez-Palomo *et al*., (2009) made a comparison between several extraction methods of volatile compounds from must of grapes, namely liquid-liquid and liquid-solid extractions and the simultaneous distillation and extraction. Finally, the authors pointed out that the first two methods could be successfully applied to the determination of the polar compounds such as acids and alcohols.

Pulpod is the portion of the grape between peel and seeds. By the grape processing the pulp release the juice to be further converted into wine by fermentation. The pulp is the most important component since the most part of the main components of the unfermented wine (sugars, acids, nitrogen-containing compounds, mineral compounds etc) come from it. The pulp is colored from yellow (prevailing in the most grapes) to red (characteristic of the *Alicante, Bouschet, Gamay Freaux varieties*). Generally, the pulp does not contain flavoring compounds excepting for some varieties where they are located just under the peel (Stroe, 2012).

The chemical composition of the pulp is very complex. The water amount prevails (about 70-85%) being followed by sugars, acids, phenols, flavoring compounds, minerals. The acids are present as mineral and organic acids. The first are strong acids and hence completely neutralized to ionized neutral salts (sulphates, chlorides, calcium, potassium and manganese phosphates etc). The organic acids are to be found as a free state. The tartaric, malic, citric, oxalic, fumaric and galacturonic acids are the most frequently present. The monobasic acids are present either free or as salts. The polybasic acids may be as a free state, partially modified as acid salts or as neutral salts. The nitrogen-containing compounds have a nitrogen content between 0.6-2.4 g/kg grapes. On the other hand, in must of grapes the content of nitrogen-containing compounds varies between 0.2-1.4 g/L and in red wines between 0.15-0.7 g/L. This diminution of the nitrogen-containing compounds from grapes to wine is due to their precipitation under the action of tannin, to the aeration as well as to the coagulating action of the alcohol during alcoholic fermentation, the yeasts using a part of nitrogen-containing compounds to the synthesis of enzymes and protoplasm. Subsequently the nitrogen-containing compounds diffuse back into the wine by an autolysis process and that is why the wines pulled later off the yeast have a higher content of such compounds (Amerine *et al.*, 1967).

Among the phenolic derivatives in the pulp the tannins and the majority of the colored substances are to be found. The phenolic acids in the grapes fall into two categories: *hydroxybenzoic* and *hydroxycinnamic acids*.

The colored substances belong to two types of phenolic derivatives: flavones and anthocyans. Negro *et al*., (2003) have determined various classes of phenolic compounds in the phenolic extract obtained from the marc of the red grapes, from peel and seeds. The experimental results indicated the phenolic derivatives with significant anti-oxidative action to be abundant in the marc of the red grapes.

The color of the grapes is given not only by the phenolic compounds but also by the chlorophylls and carotenoides. The color of the wines is also influenced by the presence of tanning substances including several organic compounds with similar properties such as: they are water soluble, give colored compounds by certain methods and show the ability of precipitating the proteins (Amerine *et al*., 1967).

The antocyans are the coloring substances in the red wines giving red or blue colors depending on the pH values. The anthocyans occur in grapes when they begin to ripen

and then accumulate continuously along the maturation period. The anthocyans are located in the peel excepting for the tinctorial varieties where they appear also in the pulp. They pass into the must by the maceration of the grape peels, hence of pomance, which can be regarded as a solid-liquid extraction process. Capanoglu *et al*., (2013) have analyzed the content of anthocyans in different processing stages of the grape juice and found the anthocyan amounts to decrease significantly during filteration and clarification.

The flavoring or odoriferous substances are preponderantly located in the peel deep layers and confer to the wine typical features of freshness, expressivity and specific aromas taken as essential criteria for defining the natural character and the quality level. Furthermore, the ethereal oils in the pulp consist of a complex mixture of substances and chemical combinations some of them being known in a lesser extent (Amerine *et al*., 1967).

USES

Due to their high content of anthocians, flavonoids and resveratrol the grapes show a wide range of biological actions such as: inhibitory effect on the oxidation of the low-density lipoproteins, anti-oxidative properties, diminution of the cardiovascular disease risk, anti-inflammatory and anti-microbial effects (Bunea, 2010).

The healing effect of the grapes both as such and as processed products has been known from ancient times. A large number of discoveries ascertained the wine and the grapes application in various skin treatments (Teodorescu *et al*., 1966). Along the time the continuous consumption of grapes was found to be beneficial to the human health in virtue of their action on the skin as well as of their energetic value, diuretic, laxative properties, alkalization and mineralization of the organism supplied also with vitamins (Bilic, 2011).

As mentioned in the previous section, the chemical composition of grapes inclues significant amounts of acids, especially oxalic acid (34 ppm), oil (6-20%) and phenols. The content of phenols attains 10% in pulp, 60-70% in seeds and 28-35% in peel (Stagos *et al*., 2007). The content of active compounds in grape extracts was found to depend on both the chemical composition of the different parts (cluster, leaves, grapes) and the grap variety submitted to extraction.

THE GRAPES are used in the cosmetic field since they are an important source of antioxidants and have benefic effects on the complexion. They reduce the wrinkles, acne and confer a younger appearance to the skin. The grapes stimulate the cell recovery and act against the congestion of the skin tissues, make the skin velvety and prevents from discoloring. Grapes can be used to treatments and cosmetic masks for all skin types (Chair *et al*., 2012).

THE WINE plays in important role in cosmetic field. Since ancient times the wine was paid much attention to for the body adornment. Thus, the Persians used often the grape must as toilet product, for a face tenderness and skin softness. One of the oldest methods

for hair blackening consist of rubbing with a black wine and refined oil mixture (Stoian & Namolosanu, 2006).

GRAPE SEED OIL is a rich source of antioxidants, (vitamin E) and essential fatty acids. Due to these components, the grape seed oil can be used especially for treating the skin with tendency of ageing since the oil penetrates quickly the epidermis with no sensation of fatty skin, reduces the water loss from epidermis and restores the skin elasticity. It is extremely efficient in preventing and reducing the wrinkles especially those around the eys. The oil can be applied on the skin as such with no dilution. Due to its properties the oil is also used to obtain hair masks, as ingredient in various cosmetic creams in proportion of 5-90% and for preparing massage oils along with other essential oils (Chair *et al*., 2012; Vicanova *et al*., 2006; Yamakoshi *et al*., 2003).

CONCLUSIONS

Taking all these considerations into account the conclusion can be drawn that the properties made evident in numerous reported studies are indicative of grape vine the as an inexhaustible source of nutritive substances necessary to the human organism and also a valuable ingredient for obtaining cosmetic and pharmaceutical products.

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PARLIAMENT NEWS

Lok Sabha Unstarred Question No. 3933 - Answered on 18th February, 2014

PRICE OF EDIBLE OIL

Shri Liyaraj Singh

Shri Prataprao Ganpatrao Jadhao :

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

(a) whether the prices of edible oil have shown a substantial rise despite good yeild of oilseeds in the country during the current year; and

(b) if so, the details thereof and the reasons therefor along with the corrective steps in this regard ?

Answer

Minister of State (Independent Charge) for Consumer Affairs, Food & Public Distribution (Prof. K. V. Thomas)

(a) : No, Madam. The prices of major edible oils obtained from oilseeds such as Soyabean oil, Mustard oil, Groundnut oil and Sunflower oil have declined by 7.46%, 1.39%, 9.58% and 10.92% respectively, as on 31.01.2014 as compared to the last year.

(b) : Does not arise, in view of (a) above.

Lok Sabha Unstarred Question No. 3852 - Answered on 18th February, 2014

OILSEEDS BOARD

Shri K. Shivakumar Alias J. K. Ritheesh

Will the Minister of Agriculture be pleased to state :

(a) whether the Government has constituted the National Oilseeds and Vegetable Oil Development Board for production, procurement, processing and marketing of oilseeds and vegetable oil in the country;

(b) if so, the details thereof; and

(c) if not, the reasons therefor ?

Answer

Minister of State in the Ministry of Agriculture and Food Processing Industries (Shri Tariq Anwar)

(a) & (b) : Yes Madam. The National Oilseeds and Vegetable Oils Development (NOVOD) Board was established under an Act of Parliament namely "the National Oilseeds and Vegetable Oils Development Board Act, 1983 (No 29 of 1983)" as a statutory body for the development of oilseeds and vegetable oils industry in the country. The mandate of the Board is to promote the development of the oilseeds industry and vegetable oils industry. Functions of the Board include production, processing, marketing, technical and financial assitance, collection, procurement and maintenance of buffer stocks.

(c) : Does not arise in view of (a) and (b) above.

Lok Sabha Unstarred Question No. 3105 - Answered on 11th February, 2014

PROCUREMENT OF GROUNDNUT BY NAFED

Shri Ram Singh Kaswan

Will the Minister of Agriculture be pleased to state :

(a) whether groundnut is being purchased by the NAFED on the Minimum Support Price (MSP);

(b) if so, the details thereof;

(c) whether the farmers in Rajasthan are facing crisis due to non-purchase of groundnut from them;

(d) if so, the efforts being made by the Government to resolve the crisis;

(e) whether the Government has declared that groundnut will be purchased only till 14th February, 2014;

(f) if so, whether the Government proposes to extend the time limit and

(g) if so, the details thereof ?

Answer

Minister of State in the Ministry of Agriculture and Food Processing Industries
(Dr. Charan Das Mahant)

(a) & (b) : Yes, Madam. NAFED has reported procurement of 2,38,954 MT of groundnut under Price Support Scheme (PSS) during Kharif 2013-14 season in the States of Gujarat, Rajasthan, Maharashtra, Uttar Pradesh, Karnataka and Andhra Pradesh.

(c) & (d) : there has been some problem with availability of storage space for carrying out procurement operations and availability of resources with NAFED. Government of India has provided additional credit limit of Rs.531 crore to NAFED for carrying out procurement operations. The two designated agencies namely Rajfed and Tilham Sangha are undertaking procurement of groundnut under PSS on behalf of NAFED.

(e) to (g) : The period of procurement of 90 days notified by the Government of Rajasthan will end on 12/02/2014. However, the Government of Rajasthan has requested to extend the period for procurement of groundnut under Minimum Support Price. The request of State Government has been agreed to in the interest of farmers depending upon availability of storage space and infrastructural facilities for procurement of groundnut in Rajasthan, up to 28/02/2014.

Lok Sabha Unstarred Question No. 3792 - Answered on 18th February, 2014

IMPORT OF PALM OIL

Shri Josh K. Mani :

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

(a) whether the Government has decided to import more palm oil during the current year as compared to the previous years;

(b) if so, the details thereof indicating the quantity of palm oil imported during the last three years and the current years; and

(c) whether the said palm oil has been sold through trading in the open market and if so, the amount of profit earned by the Government agencies therein :

Answer

Minister of State (Independent Charge) for Consumer Affairs, Food & Public Distribution (Prof. K. V. Thomas)

(a) No. Madam.

(b) Edible oil was imported under subsidized edible oil scheme for distribution by States/UTs through Public Distribution System (PDS) with a central subsidy of Rs. 15/- per litre in the past. The scheme ended on 30.09.2013. The details of RBD (Refined, Bleached and Deodorised) palmmolein oil imported under the scheme during the last three years and the current year is given below :–

(Qty. in tons)

2010-11	2011-12	2012-13	2013-14 (Apr.-Sep 13)
426341	503490	424397	200757

(c) No, Madam, RBD palmolein oil was imported for supply through PDS only and has not been sold in the open market.

Prof. D. K. Bhattacharyya
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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

Regarding availability/price enquiries may be made to :
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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 oils and 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 Technologists. 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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* Source : Proceedings of 4th National Seminar on Rice Bran Oil, Kolkata. 7th July, 2001.

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