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CONTENTS

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From The Editor's Desk

India is totally dependent on Imported oils, mainly Palm Oil, being imported from Indonesia and Malayasia. We have imported about 9.5 million ton of palm products during 2014-15 oil year, we are spending about Rs. 65,000 crores per annum for our edible oil requirement.

These countries, namely, Malayasia & Indonesia, taking advantage of this compulsive situation, has further played tactical manoeuvre by reducing export duty on R.B.D. Palamolein and high duty on crude Palm Oil. Thereby forcing the importing country to import R.B.D. Palamolein instead of C.P.O.

India has imported 14.4 million ton of edible oils in November' 14 to October' 15.

Domestic edible oil industry and the cultivators of oil seeds are affected by the huge import of edible oil at a cheaper price.

In the context of this anomaly, Govt. of India should ensure that the domestic producers & refiners are not affected and may think of revising the duty structure.

Wish you all a happy & prosperous New Year !!

S. K. ROY
Editor

HAPPY NEWS

Dr. A. S. Khanna has been unanimously elected as the President of The Homeopathic Association of India, Behala Chapter, Kolkata. Hearty congratulations from the OTAI Family.

STOP PRESS

OTAI family wishes very Happy Birthday to Prof. Sunit Mukherjee on his 85th Birthday on 1st March, 2016.

ABOUT OURSELVES

70th Annual Convention & National Conference on the Process & Product Development for Better Economy Benefits of the Oils & Fats Industry was held from 20th to 22nd November, 2015 at C.G., CRI, Calcutta.

Dr. Muraleedharan, was the Chief Guest, Mr. B. K. Swaika was Guest of Honour. Dr. Ranjit Chakraborty, President, EZ delivered the welcome address. S. K. Roy, President, OTAI, addressed the national scientific community. Prof. D.K. Bhattacharya delivered the theme lecture. Chief Guest and the Guest of Honour also addressed the scientific community as well.

Prof. Sunit Mukherjee and S. K. Roy, President, OTAI were honoured with Life Time Achievement Award.

C.E.C. Member Dr. Mahua Ghosh, concluded the opening session as convenor with warm vote of thanks. Dr. Rajiv Churi was honoured with prestigious J.G. Kane Memorial Award.

It was well attended and a great success.

2. Prof. Sunit Mukherjee delivered a lecture on 19th December, 2015 on "Extrusion Cooking — A Book to the Food processing Industry". It was well attended and appreciated by the members present.

Annual Social Meet was held in the premises of Calcutta Blind School on the 26th January' 2016. Members and their guests participated in various events of sports for all age groups. Among the members present and actively participated Mr. J. P. Singh, President EZ, and Mrs. Singh, Dr. D. C. Sen, Hon. Secretary, Mr. B. P. Manchanda, Hon. Treasurer, Prof. Ranjit Chakraborty & S. K. Roy, former President OTAI, Prof. Sunit Mukherjee, Dr. J. Chakraborty. The whole credit for conducting the programme goes to Dr. A. S. Khanna & Mrs. Kusum Khanna, whose planing, execution and unitiring services for making it a grand success. Credit also goes to Mr. B. P. Manchanda for his endeavours and personal supervision of the various aspects of the Annual Social.

EXTRUSION COOKING — A BOON TO THE FOOD PROCESSING INDUSTRY

Prof. Sunit Mukherjee

OTAI-EZ on 19th December, 2015

I have digged out little bit from my old days which is about 45 years from now back in the years between 1973 & 1976 when we had the privilege to work on cooker extruder.

Food extruders, can be of two kinds one is forming extruder and the other is cooker extruder. Almost all pasta products are made from forming extruders. With little modification it is possible to increase temperature & pressure in the extruder, when translucent half cooked product comes out, which is known as half product. But in cooker extruder pressure and temperature can be increased further so that a fully cooked product comes out which can be called a RTE or ready to eat food. RTE processed food can be manufactured mainly in three ways. Dry roasting or toasting or baking or puffing, secondly by cooking with water and drying in a roller direr or spray drier & thirdly by extrusion cooking.

One ‘Brady’ cooker extruder was imported from United States and installed in our cornflakes plant in north Calcutta in 1973. This is a collect extruder more specifically, a crop cooker developed by Brady operations of Kohring Farm Division at Des Moines in Lowa. The object was to develop sufficient heat so that it can destroy trypsin inhibitors and other antinutritional facrots in soybean. The heat is generated exclusively by friction. Further objective was to use it at the farm level for producing livestock rations which can go to the farmers in US and Canada. These extruder were designed for operation after coupling with a firm tractor run by diesel engine or gas.

This is apparently a crude machine. I am talking about the year 1970. But the machine is highly innovative. It is unbelievable that the pressure and subsequent temperature is controlled manually during operation by a cup and cone arrangement. The cone is at the tip of the shaft and cup is stationery and fitted in front & is operated manually by screw. Screw is rotated manually when hot product is coming out from annuler space. When the gap between cup and cone is less, pressure develops & temperature also increases. It is very very unsafe and risky also.

This is the first cooker-extruder in Calcutta. Why Calcutta, whole eastern India. One extruder was there in Barelly, UP producing nutrinugget. Another one was there is Anand, Gujrat. Both these extruders were high cost machines. But ours was the only one in the country which is low cost cooker extruder collet type. We had conducted large number of trials in the machine. Soy has moderate amount of oil which act as lubricant. Rice bran also has nearly similar amount of soil.

It did work well with rice bran, because of uniform heating the bran was well stabilised. We did the work on rice bran stabilisation for the first time in the country, in cooker extruder. We stored for 10 months and compared the data with control.

Some data on rice bran stabilisation is shown below —

Table - 1 FFA Development During Storage in Extrusion Cooked Parboiled Rice Bran

Cooking temp., °F	Months				
	0	1	3	6	10
Control	1.64 (9.76)[1]	1.98 (8.80)	6.79 (7.95)	33.56 (6.49)	35.73 (7.02)
220	1.67 (5.26)	1.69 (5.48)		3.65 (6.12)	6.89 (6.85)
250	2.52 (4.74)	2.10 (5.00)	4.50 (--)	4.42 (5.56)	8.08 (5.82)
280	1.51 (4.56)	1.23 (4.52)			
300	1,83 (3.46)	1,50 (4.10)			

Figure within parentheses indicates corresponding moisture.

We were a part of a worldwide program which intended to reduce mainutrition in children and pregnant & lactating women by providing low cost nutritious food processed with locally grown commodities. The partners helping in the project are US AID (Agency for International Development) & USDA.

The indirect support was available in nutrition programme by FAO, UNESCO & UNICEF. Experimental work was carried out at Colorado State University, Fort Collins & countries like India, Bolivia, Srilanka, Phillippines, Colombia, Kenya, Indonesia, Mexico, Tanzania, Chile, Costarica and a few others. Teh first low cost extruder was brought by CARE in Calcutta in 1973. Trians were started in Oct 1973. Dr Judson Harper Head, Agricultural engineering started in CSU in Oct 1974 one year after our experiment.

Large number of trials were conducted. Most important finding was that in the collet extruder addition of water of optimum quantity can produce well puffed & crisped product and added water dried out at the exit temperature of extruder. There is no need of an additional drier. So far it was believed that oil lubricates the barrel. It did work well with soybean. When it comes to a low oil product the machine is jammed, it was tried with water as a lubricant but it clogs, we optimised the addition of water to 8-10% which lubricates well and an expanded product appears.

Here are the data,

Table - 2 Trials on Brady #206 Crop Cooker (hp - 100, rpm - 580)

Expt. Number	Raw Materials[1] Composition to Parts by Weight	Processing Conditions Steady State Temperature, °F	Final Product		
			Average Moisture	Average Bulk Density g/ml	Densite, g/ml (mean ± S.E.)
16.	degermed corn 100 water 10	300	6.1	0.123	0.201 ± 0.023
17.	parboiled rice 100 water 8	285	6.0	0.131	0.228 ± 0.0213
18	milo (Sorghum Vuigure) 100 water 10	280	5.5	0.140	0.232 ± 0.014
19.	wheat 100 water 12	320	6.3	0.26	0.553 ± 0.0186
20.	dried tapioca chips 100 water 10	290	5.1	0.1643	0.269 ± 0.0132
21.	wheat 75 dehusked bengalgram 25 water 10	320	4.85	0.276	0.616 ± 0.0098
22.	wheat 75 dehusked bengalgram 15 water 10	310	4.5	0.437	0.912 ± 0.0256

1. Passes through 20 mesh.

When I arrived in Colorado for the International Workshop in June 2, 1976 on “Low Cost Extrusion Cookers” & met Dr. Jud Harper, he told me that you have made an excellent invention. Addition of 10% water has changed the face of Industry. The collet extruders are now working at par with the cooker extruder. But he never mentioned this in the meeting rather he showed his data with 10% moisture. We had our trials in Oct 1973 while jud had it in Oct 1974. This is disturbing & embarrassing too.

I always try to bring analogy of the work done by Dr. Subhas Mukherjee on test tube baby, whenever I give a lecture on any subject. This is with regard to extraction of Ova. The laparoscopic extraction is complicated, unsafe & difficult. Subhas extracted Ova via trans Vaginal route, just by a hypodermic syringe. This is safe, simple & easy, and being followed throughout the world in all IVF Clinics. So a simple innovation can shake the world.

Dr. Subhas Mukherjee did not get his due recognition from the Govt. or from the scientific community. But we are happy that the facts are now known to the world, and even if those remian in the archives we shall feel proud that we were not wrong in our thoughts and actions.

The talent of Tagore could visualise our emotions deeply. That is why he wrote —

“আজি হতে শতবর্ষ পরে
কে তুমি পড়িছ বসি
আমার কবিতাখানি কৌতূহলভরে
আজি হতে শতবর্ষ পরে।”

——

OBITURY

Mr. H. Lahiri left for heavenly abode on the 25th December, 2015. He has served OTAI in various capacities, like Hon. Treasurer, Hon. General Secretary and Executive Committee Member Eastern Zone, Kolkata for decates.

His unitiring and dedicated services rendered to OTAI, is an example to reckon with.

A condolence meeting was held in the OTAI (EZ) to pay homage and pray for his departed soul to rest in peace.

OTAI (EZ) stands by his bereaved family at this hour of grief.

PERFORMANCE OF REGULAR AND MODIFIED CANOLA AND SOYBEAN OILS IN ROTATIONAL FRYING

Roman Przybylski, Eliza Gruczynska, Felix Aladedunye

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ABSTRACT

Canola and soybean oils both regular and with modified fatty acid compositions by genetic modifications and hydrogenation were compared for frying performance. The frying was conducted at 185 ± 5°C for up to 12 days where French fries, battered chicken and fish sticks were fired in succession. Modified canola oils, with reduced levels of linolenic acid, accumulated significantly lower amounts of polar components compared to the other tested oils. Canola oils generally displayed lower amounts of oligomers in their polar fraction. Higher rates of free fatty acids formation were observed for the hydrogenated oils compared to the other oils, with canola frying shortening showing the highest amount at the end of the frying period. The half-life of tocopherols for both regular and modified soybean oils was 1-2 days compared to 6 days observed for high-oleic low-linolenic canola oil. The highest anisidine values were observed for soybean oil with the maximum reached on the 10th day of frying. Canola and soybean frying shortenings exhibited a faster rate of color formation at any of the frying times. The high-oleic low-linolenic canola oil exhibited the greatest frying stability as assessed by polar components, oligomers and non-volatile carbonyl components formation. Moreover, food fried in the high-oleic low-linolenic canola oil obtained the best scores in the sensory acceptance assessment.

Keywords : Frying stability - Canola oil - Soybean oil - Tocopherols degradation - Sensory assessment - Polar components - Thermo-oxidative degradation.

Ack/Courtesy :
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INTRODUCTION

Frying is one of the most popular food preparation methods and consumption of fired foods has increased significantly in the last decades because they are fast to prepare, relatively cheap, with appealing typical flavor, golden brown color, and a crism texture[1]. However, during frying, usually performed at elevated temperatures, the following chemical reactions, among others, occur: oxidation, hydrolysis, oligomerization, isomerization and cyclization. As a result, changes in frying oil occur and a wide variety of degradation products are produced, including volatile components and non-volatile polar and oligomeric compounds [2]. The physical and chemical changes occurring during frying affect both the frying performance of the oil and the sensory characteristic of the fried food [2, 3].

The exposure of oils to oxygen during frying makes oxidation the most prevalent of all degradation processes [2]. Thus, the oxidative stability of oils and fats is one of the most important factors used in oil quality assessment. The susceptibility of frying oils to thermo-oxidative degradation have been related to the level of fatty acids un-saturation and several modifications to reduce the contributions of these acids, especially α-linolenic acid has been done. Partially hydrogenated fats offer better resistance to thermo-oxidative degradation, extending fry-life and until recently, were the main frying medium for industrial and institutional frying operations. However, in response to current *trans* fats labelling regulations, a new generation of frying oils with modified fatty acids and other constituents have been developed utilizing breeding, and interesterification, among others.

Several studies have examined the frying stability of modified oils [4-7]. Warner and Mounts [7] established that the level of linolenic acid can be a decisive factor describing frying performance of soybean and canola oils. However, these authors did not take into account potential effect of linoleic acids which may have similar destructive effect [8].

Przybylski and Zambiazi [9] using neural network system established that only 50% of oil oxidative stability can be predicted using fatty acid composition as the defining factor. Other similar studies have also suggested that thermo-oxidative stability of oils and fats cannot be accurately predicted based solely on the fatty acid composition, other endogenous minor components play an important role in the oil degradation during frying [6, 10, 11]. However, many of these studies were conducted with French fries as the sole food product, or by heating oil in the absence of food. It has been observed that the types of chemical reactions taking place during frying are different from those happening during heating without food [2]. Whereas heating of oil without frying food is usually more destructive. Further, various components of the fried food are known to participate in the degradation reactions occurring during frying, affecting the overall performance of the oil [12].

The aim of the present research was to compare the frying performance of modified and regular canola and soybean oils during rotational frying of different food products, mimicking a typical institutional frying operation.

MATERIALS AND METHODS

Oils and Foods

Commercially refined, bleached and deodorized, regular and modified canola and soybean oils were obtained from Richardson Oil Processing (Lethbridge, Canada). Five oils were used as follows : regular canola oil (CAN), high-oleic low-linolenic canola oil (HOLLCAN), canola hydrogenated frying shortening (HCAN), regular soybean oil (SOY) and hydrogenated soybean frying shortening (HSOY).The same batch of French fries par-fried in HOLLCAN; battered chicken and fish sticks par-fried in regular canola oil were used in the frying experiments.

Frying Procedure and Sampling

The frying was performed at 185 ± 5°C for 7 days using HCAN, HSOY and CAN oils and 11 days frying was applied for HOLLCAN and SOY oils. Frying was done in restaurant style stainless steel fryers (General Electric Company, New York, USA) using 3.5 L of oil which was replenished every second day with 500 ml of fresh oil. The oil examined were conditioned at 185°C for 2 h prior frying. Par-fried French fries, battered chicken and fish sticks were fried in succession forming one rotational cycle and nine cycles were run daily in each oil. For the cycle, a batch of 400 g of each product was fried for the following times: French fries for 5 min, battered chicken for 7 min, and fish sticks for 7 min. Daily, 3.6 kg (8 lbs) of each product was fried in each oil giving a total of 10.8 kg (24 lbs) fo food per frying day and a load of 3.1 kg (6.9 lbs) of food per 1 L of oil.

Fatty Acid Composition

Fatty acids were methylated prior to analysis by gas chromatography (GC) based on the AOCS Official Method Ce 1-62 [13]. The resulting fatty acid methyl esters (FAME) were analyzed on a Trace GC Ultra gas chromatograph (Thermo Electron Corporation, Rodano, Italy) using a Trace TR-FAME capillary column (100 m x 0.25 mm x 0.25 μm; Thermo Scientific, Waltham, MA, USA). Hydrogen was used as carrier gas with flow rate of 1.5ml/min. Column temperature was programmed from 70 to 160°C at 25°C/min and held for 30 min, then further programmed to 210°C at 3°C/min. Initial and final temperatures were held for 5 and 30 min, respectively. Splitless injection was used utilizing PTV injector. Detector temperature was set at 250 °C. FAME samples, 1 μL, were injected with AS 3000 autosampler (Thermo Electron Corporation, Rodano, Italy). Fatty acids were identified by comparison of retention data with authentic standards purchased from Nu-Chek-Prep (Elysian, MN). *Trans* isomers in the oils are quantified as a group and presented as the sum of all *trans* isomers of oleic, linoleic and linolenic acids.

Polar Components (PC)

The total amount of PC was determined by the gravimetric method after column chromatography separation of non-polar fraction according to the AOAC Method 982.27 [14]. Two fractions were collected: (1) the non-polar one eluted with hexane:isopropyl ether (90:10 v/v); (2) the polar one removed with isopropyl ether : methanol (90:10, v/v). The last fraction was analyzed for composition.

Polar Components Composition

The polar fractions obtained above were analyzed using high performance size exclusion chromatography (HPSEC) following the ISO Method 16931-2007 [15]. Separation was performed on a Finnigan Surveyor liquid chromatograph (Thermo Electron Corporation, Waltham, MA). Components were separated on three Phenogel columns connected in series (500 Å, 100 Å and 50 Å, 5 µm, 300 x 4.60 mm; Phenomenex, Torrance, CA), using tetrahydrofuran (THF) as the mobile phase at a flow rate of 0.3 mL/min, and columns held at 30°C. A 10 µL sample was injected, and components were detected with a Sedex 75 evaporative light scattering detector (Sedere, Alfortvile, France), operated at 35°C with air pressure of 2.5 bar. Using this system the following compounds were separated and quantified: oligomers, oxidized triacylglycerols (OTG), diacylglycerols (DAG), monoacylglycerols (MAG) and free fatty acids (FFA). Diolein, monolein and oleic acids were used as standards for DAG, MAG and FFA, respectively. Since the non-oxidized triacylglycerols had been removed from the polar fractions following the AOAC Method 982.27 [14], the peak with retention time similar to triolein was taken as oxidized triacyglycerols. Components eluting before the OTG were quantified as oligomers. The contribution of specific compounds is presented as relative percentage based on the peak area.

Free Fatty Acids (FFA)

FFA content expressed as a percentage of oleic acid was determined by AOCS Official Method Ca 5a-40 [13].

Tocopherols

Tocopherols were analyzed following AOCS Official Method Ce 8-89 [13] using a Finnigan Surveyor HPLC (Thermo Electron Corporation, Waltham, MA) with a Finnigan Surveyor Autosampler Plus and Finnigan Surveyor FL Plus fluorescence detector, set for excitation at 292 nm and emission at 394 nm. The column was a normal-phase Microsorb 100 silica

(250 x 4.60 mm; 3 µm; Varian, CA). Of each sample, 10 µL was injected and separated by mobile phase consisted of 7% methyl-tert-butyl-ether in haxane with a flow rate of 0.6 mL/min. The tocopherols were quantified using external calibration for eah isomer separately.

Anisidine Value

The anisidine value (AV), a measure of secondary oxidation products, was determined according to ISO Method 6885-2004 [16].

Color Analysis

The spectrophotometric color test of the frying oils was performed following the AOCS Official Method Cc 13c-50 [13] at 490 mm using a DU-65 spectrophotometer (Beckman, Fullerton, CA).

Sensory Assessment of Food Fried

A 37-member consumer panel rated food acceptance on a 10 point scale where a score of 1 was assigned as bad and 10 for excellent quality [17]. Panelists were selected to represent average consumers, and the group was instructed on how to evaluate fried products. To make results more reliable panelists at every session had access to good quality fried food prepared by frying the specific product in fresh oil, used as a reference. Sensory evaluation was run daily using products from the middle of the frying cycle. Sensory evaluation was performed in a room with excellent ventilation where panelists were separated by space preventing communication. Results are presented as the combined averages, calculated for the 7 days of frying period. Calculated standard deviation illustrates the distribution of the panelists' sensory scores.

Statistical Analysis

Data are presented as means ± standard deviations (SD) from triplicate experiments, and each measurement was duplicated. Data were analyzed by single factor analyses of variance (ANOVA) using SPSS package (version 10.0) Statistically significant differences between means were determined by Duncan's multiple range tests for $P < 0.05$.

RESULTS AND DISCUSSION

Composition of the Oils and Products

The fatty acid and tocopherol composition of the fresh oils are listed in Table 1. The composition of CAN was typical for canola oil with leic acid dominating and 8.5% linolenic acid, however, HOLLCAN contained a higher amount of oleic acid (71%) and a lower contribution of linolenic acids (Table 1). The lowest amount of linolenic acid (0.2%) was observed in partially hydrogenated canola oil. The regular soybean oil had a typical fatty acid composition with 6.7% of linolenic acid, and linoleic acid (53%), twice the amount found in the hydrogenated counterpart (Table 1). As expected, the modified oils were lower in unsaturated fatty acids, particularly in the contribution of linoleic and linolenic acids (Table 1). Both hydrogenated oils have higher n-6/n-3 ratio, 10.8 and 21.6, compared to regular oils, 2.3 and 8.0 for CAN and SOY, respectively, Whereas the contributions of trans isomers in the hydrogenated oils were 16 and 15 times higher than the respective regular oils (Table 1). The contribution of saturated fatty acids in assessed oils was similar for both canola type oils and typical for SOY and HSOY, HCAN, however, contained lower amounts of saturated fatty acids compared to both soybean oils (Table 1).

Table 1 - Fatty acid and tocoherol composition of frying oils (% w/w)

Fatty Acids	**HOLLCAN**	**CAN**	**HCAN**	**SOY**	**HSOY**
C16:0	3.8 ± 0.3	4.2 ± 0.3	4.7 ± 0.4	10.2 ± 0.2	10.8 ± 0.3
C18:0	1.5 ± 0.3	1.9 ± 0.4	4.2 ± 0.3	4.4 ± 0.2	6.1 ± 0.2
C18:1	71.4 ± 0.8	60.6 ± 0.9	51.9 ± 0.7	22.6 ± 0.5	33.4 ± 0.8
C18:2	18.2 ± 0.7	19.6 ± 0.3	2.6 ± 0.2	53.6 ± 0.6	25.1 ± 0.4
C18:3	1.7 ± 0.2	8.5 ± 0.2	0.2 ± 0.1	6.7 ± 0.4	1.2 ± 0.1
C18:1*t*	0.2 ± 0.03	0.1 ± 0.02	26.7 ± 1.1	0.0	14.8 ± 1.2
C18:2*t*	0.4 ± 0.02	0.5 ± 0.02	7.9 ± 0.9	0.7 ± 0.08	6.6 ± 0.1
18:3*t*	0.4 ± 0.02	1.5 ± 0.01	0.4 ± 0.1	0.8 ± 0.06	0.9 ± 0.1
Groups and ratios of fatty acids					
Total trans	1.0	2.1	35.1	1.5	22.4
SAT	6.5	7.3	10.1	15.5	17.7
MUFA	73.1	62.4	53.3	22.7	33.7
PUFA	19.9	28.3	2.6	60.3	26.2
n-3	1.7	8.5	0.1	6.7	1.2
n-6	18.2	19.6	2.6	53.6	25.0
n-6 / n-3	10.8	2.3	18.9	8.0	21.6
Tocopherols (μg/g)					
Alpha	270 ± 8	251 ± 5	211 ± 8	126 ± 3	79 ± 4
P8	94 ± 4	99 ± 3	84 ± 4	28 ± 2	21 ± 5
Gamma	440 ± 9	474 ± 4	367 ± 9	1428 ± 12	1003 ± 9
Delta	9 ± 1	11 ± 1	9 ± 1	284 ± 6	383 ± 8
Total	**815**	**837**	**672**	**1,877**	**1,518**

SAT saturated fatty acids, Oils *HOLLCAN* High oleic low linolenic canola, *CAN* regular *RBD* canola, *HCAN* hydrogenated canola frying shortening, *SOY* standard *RBD* soybean oil, *HSOY* hydrogenated soybean frying shortening, *P8* Plastochromanol, derivative of gamma tocotrienol.

Trans combined amount of trans isomers of oleic, linoleic and linolenic acids. Fatty acids with *t* represents trans isomers.

The composition and content of tocopherols in fresh oils was typical for the specific group of oils, where soybean oils contained twice as much tocopherols as canola oils. The latter oils have twice the amount of the gamma isomer than the alpha isomer, whereas in soybean oils the gamma isomer dominated with a significant contribution of delta isomer (Table 1). Among the tested oils, HCAN contained the smallest amount of tocopherols, but with a distribution of isomers similar to typical canola oil.

Composition of lipids in fried products in Table 2 is presented. The fatty acid composition of hydrogenated soybean shortening (HSOY) and in fried French fries offer a good indication of the kinetics of oil / fat exchange between frying medium and fried products (Figs. 1, 2). All the products fried in these experiments were par-fried in canola oil with the exception of French fries par-fried in HOLLCAN. Both oils had different fatty acid composition than HSOY (Table 1). This frying shortening was replaced by oil from French fries continuously during every day of frying as indicated by the changes in fatty acid composition (Fig. 1). The contribution of MUFA increased by almost 10% after the first day of frying and continuously increased everyday up to the level close to canola oil at the end of frying. At the same time, the amout of *trans* and saturated fatty acids decreased by almost 50% (Fig. 1).

Table 2 - Lipids composition of par-fried foods used in frying experiments

Fatty Acids	**Par-fried**		
	Battered		**French fries**
	Chicken	**Fish**	
Groups and ratio			
C16:1*t*	0.68	1.42	1.53
C18:2*t*	0.53	0.33	0.48
C18:3*t*	0.65	0.49	0.54
Total trans	1.86	2.24	2.55
SAT	9.28	8.81	8.12
MUFA	67.37	58.61	70.27
PUFA	21.49	30.35	19.06
n-3	1.82	9.50	1.85
n-6	19.67	20.85	17.21
n-6 / n-3	10.8	2.2	9.3
Tocopherols (μg/g)			
Alpha	271 ± 5	278 ± 5	321 ± 8
P8	99 ± 3	99 ± 3	94 ± 4
Gamma	494 ± 4	502 ± 4	492 ± 9
Delta	11 ± 1	11 ± 1	9 ± 1
Total	**875**	**890**	**916**

For abbreviations explanations see Table 1

More dramatic changes in fatty acid compositions were observed in French fries prepared in the HSOY shortening (Fig. 2). After the first day of frying the contribution of MUFA decreased from 70 to 42% and slowly increased to 53% over the next 5 days of frying (Fig. 2). Since soybean shortening contained high amounts of saturated and trans fatty acids, the amount of these groups increased significantly ($P < 0.05$) in the French fries during the 1st frying day with little or no changes thereafter (Fig. 2). Similar changes were observed for other food products assessed in this study (Data not included). These results clearly showed the dynamic of fat exchange between the frying medium and the fried product, including the effect of the frying oil on the nutritional quality of the prepared food.

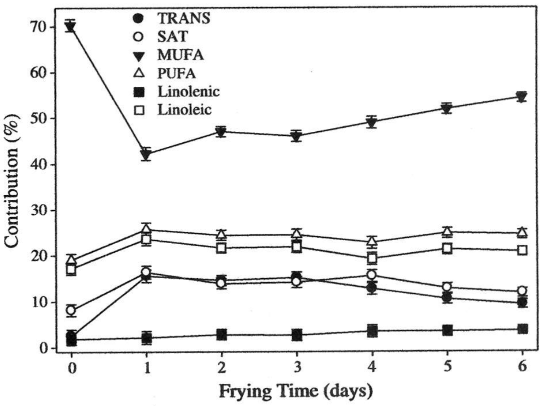

Fig. 1 Changes of selected fatty acids in hydrogenated soybean during frying products par-fried incanola oil. Results are averages from triplicate repetition of experiments where each measurement was duplicated.

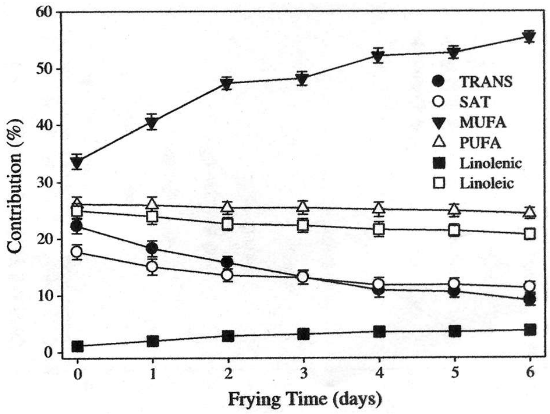

Fig. 2 Changes of fatty acids in French fries in hydrogenated soybean shortening. French fries were par-fried in HOLL canola oil. For explanations see Fig. 1.

Polar Components (PC)

Figure 3 illustrates changes in polar components during rotational frying in different oils. Measurement of polar components offers the most accurate assessment of the thermo-oxidative degradation of frying oils. Unsaturated fatty acids are among several compositional factors affecting the formation of polar compounds [7]. The rate of polar components formation was similar in all tested oils for the first 6 days of frying, subsequently the amount of polar compounds reached a plateau for SOY and HOLLCAN. This indicates that the amount of formed polar compounds was equilibrated with the degraded portion of these components, which were transformed into other compounds. Removal of polar components by fried food and replenishment with fresh oil could also contribute to the observed flattening of the PC. As can be expected, oils with elevated amounts of linolenic acid oxidized faster, producing more polar components (Fig. 3). We observed that HSOY, which had less than half of the linoleic acid compared to regular soybean oil, degrated at the same rate as the latter as measured by the formation of polar components (Fig. 3, Table 1). This indicates that the amount of this acid is still too high to improve the oil frying stability. It is also possible, however, that during processing, particularly hydrogenation, components were formed that promoted faster oxidative degradation, including residues of the catalyst. After 6 days of rotational frying, CAN, HSOY and SOY had 27% of polar components, which is above the discarding level set by some European countries [18]. In HOLLCAN and HCAN polar components were formed 40% more slowly and, at the end of the 6th day of frying, the amount of these compounds was below the discarding level. At the same time, the polar compounds plateaued and stayed at the same level for the next 5 days of rotational frying in HOLLCAN (Fig. 3). Matthause [4] found similar performances for both oils as measured by polar components formation. Warner et al. [7] stated that modified canola oils were more stable than the regular oil during frying, based on total polar component formation.

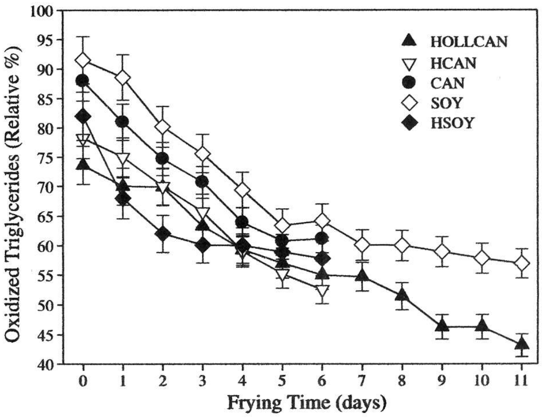

Fig. 3 Formation of polar components during rotational frying in different oils. For abhreviations see Table 1. For Explanations see Fig.1.

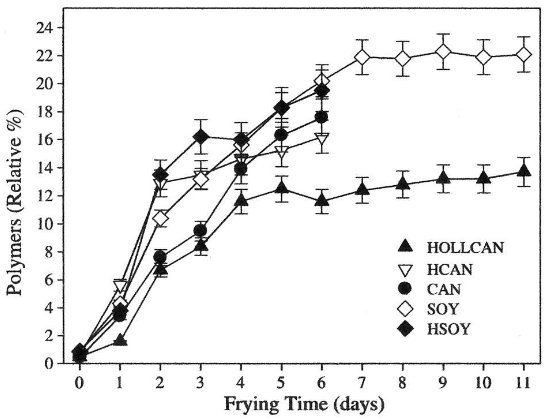

Fig. 4 Oligomer formation during rotational frying in different oils. For abhreviations see Table 1. For explanations see Fig. 1.

Oligomers and Oxidized Triacylglycerols

Oligomers are one of the products formed from oxidized triacylglycerols and are good indicators of oxidative stability of oil during frying. As a consequent of standard processing, mainly during deodorization, the amount of oligomers formed is affected by the applied temperature and time [18]. We found in freshly processed oils about 1% of oligomers but during frying the amount of oligomers increased as the frying time expanded. Oligomers were formed faster in oils containing linoleic and linolenic acids, reaching 23 for SOY and 14% HOLLCAN, other oils were between those two (Fig. 4). For both soybean oils, oligomers formation was at the highest rate indicating that a certain level of linoleic acid can have a stimulating effect on thermo-oxidative degradation of oil [19]. Interestingly, canola oil with a higher amount of linolenic acid but a lower contribution of linoleic showed a significantly ($P < 0.05$) lower formation of oligomers during rotational frying than the soybean oils (Fig. 4). No significant improvement in thermo-oxidative stability as measured by oligomer formation was observed for HCAN compared to CAN despite the fact that the amount of PUFA was 11 times higher in the latter. On the other hand, HOLLCAN showed the best thermo-oxidative stability, as assessed by the lower amount of oligomers formed, irrespective of duration of frying (Fig. 4). The poorer performance of HCAN, despite the much lower amount of PUFA (2.6%), is affected by processing, particularly hydrogenation and secondary deodorization, where some reactions leading to faster formation of oligomers are initiated. We also observed that in hydrogenated oils tocopherols degraded at a faster rate than in non-hydrogenated, causing less antioxidant available to protect oil from oxidation [6, 11].

Oxidized triacylglycerols (OTG) are the primary products formed during PUFA oxidation and they react and are degraded further to form a host of secondary compounds, including oligomers [20]. The contribution of OTG decreased consistently over the frying period, again a faster decrease in the contribution of OTG was observed for HSOY (Fig. 5).

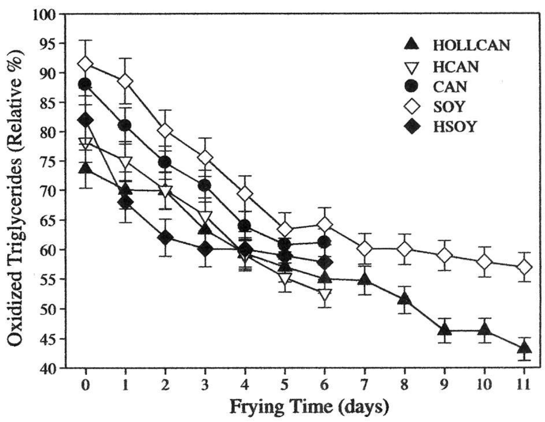

Fig. 5 Changes in oxidized tracylglycerols during rotational frying in different oils. For abhreviations see Table 1. Measured OTG are primary oxidation products and easily decomposed into variety of secondary compounds. For explanations see Fig. 1.

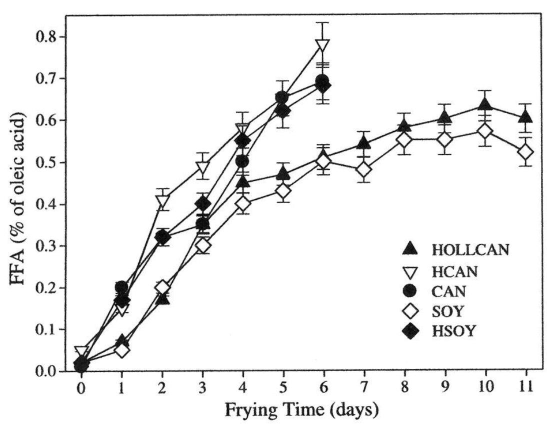

Fig. 6 Formation of free fatty acids during rotational frying in different oils. For abhreviations see Table 1. For explanations are Fig. 1.

Free Fatty Acids

Free fatty acids (FFA) are formed during hydrolysis of TG and as degradation products from oxidized TG (OTG). The amount of FFA increased slowly during rotational frying and did not exceed the limit of 2% established by European regulations [22]. The content of PFA in fresh oils was lower than 0.1%, indicating good quality processed oils. During frying in HCAN and HSOY, a faster rate of FFA formation was observed compared to the other oils (Fig. 6). Petukhov et al, [21] showed similar FFA results for HCAN where a faster rate of these components accumulation was observed than in other canola oils. Warner and Mounts [7] showed higher amounts of FFA formed during frying in SOY oil, contrary to the results from this study. Faster formation of FFA in hydrogenated oils can be stimulated by compounds formed during hydrogenation and secondary dedorization, including residue of catalyst used in the previous. Generally low amounts of FFA were formed during frying and this parameter is not suitable to be used as a quality indicator for frying oils (Fig. 6). Newly developed frying oils usually form smaller amounts of FFA than frying fats used commonly for this process [18].

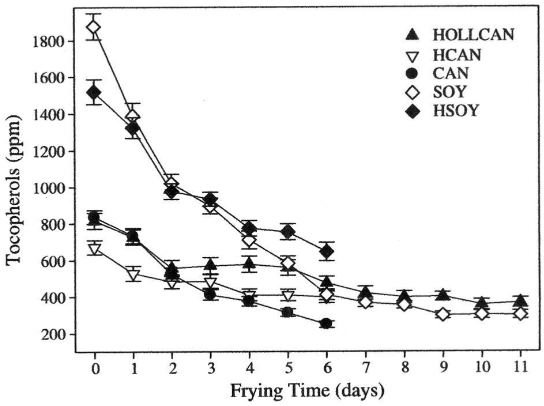

Fig. 7 Degradation of tocopherols during rotational frying in different oils. For abhreviations are Table 1. For explanations see Fig. 1.

Tocopherols

The changes in the amount of tocopherols during frying are presented in Fig. 7. Tocopherols act as antioxidants, thus the oils in which they decay rapidly will exhibit lower oxidative stability [6]. Soybean oils showed the fastest rate of tocopherol degradation, and after 3 days of frying half of the tocopherols had disappeared, a similar half-life was observed for CAN. The slowest degredation of tocopherols was observed for HOLLCAN where, after the 6th day of frying, the amount of these components decreased by 50%. These results are in good agreement with previous findings stating that greater oxidative stability of HOLLCAN and CAN oils appeared to be affected by slower rates of tocopherol degradation [6]. Matthaus [4] also found a shower degradation fo tocopherols in HOLLCAN compared to partially hydrogenated canola oil during frying for up to 72 h. Oil with a faster degradation of tocopherols such as soybean oils resulted in a faster development of polar components during frying (Fig. 3).

Assessing relative decomposition of the individual tocopherol isomers (data not presented) we found that γ-tocopherol degraded at the fastest rate, followed by δ-tocopherol with α-tocopherol being the most stable. Gordon and Kourimska (22) showed an opposite degradation rate of tocopherols to the results of current study. However, Aggelouxis and Lalas [23] and Matthaus [4] data supported the order of tocopherols decomposition established in this study.

Anisidine Value (AV)

The ansidine value is used to assess relative amounts of non-volatile carbonyl compounds formed as secondary degradation products from fatty acid hydroperoxides; its changes are presented in Fig. 8. A rapid increase in AV was observed for all the oils for the first 3 days of frying, thereafter slowing down to a plateau after the 6th day of frying (Fig. 8). This leveling of the AV can be attributed to the addition of fresh oil every 2nd day of frying and transfer of these components into the fried food. HOLLCAN consistently displayed lower AV than other oils, regardless of the frying time. Conversely, the highest values were found for SOY, indicating extensive degradation of oxidized unsaturated fatty acids. Th significantly higher AV for SOY compared to other oils can be attributed to its high level of PUFA, a group of fatty acids most prone to oxidative degradation. Both HCAN and HSOY tended to have lower AV than the regular ones. Those results were anticipated based on their lower amount of PUFA compared to CAN and SOY (Table 1). The data from these investigations were in good agreement with a previous study by Tompkins and Perkins [24]. On the basis of their results the hydrogenated soybean oils consistently exhibited lower AV than the non-hydrogenated one. Considering the earlier results reported by Matthaus [4], the lowest AV were found for the partially hydrogenated rapeseed oil while the high oleic rapeseed oil displayed the highest AV.

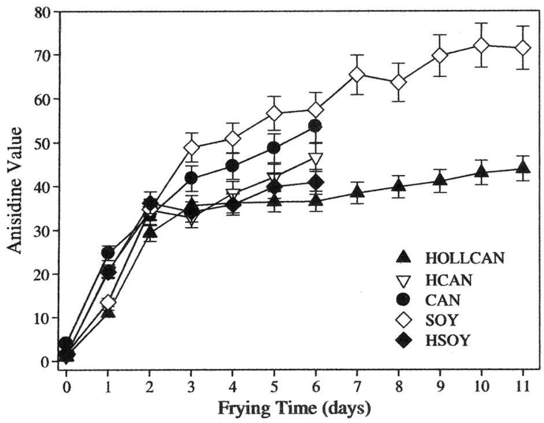

Fig. 8 Non-volatile carbonyls formation during rotational frying in different oils. For abhreviation see Table 1. For explanations see Fig. 1.

Color Changes

Within all the evaluated frying times, formation of the coloring components was stimulated in the oils examined (Fig. 9). HOLLCAN and SOY had significantly lower absorbance values than all of the other oils. No significant formation between HCAN and HSOY, and these two oils exhibited the highest color values at any of the measured frying times. Within the whole frying period evaluated, the average of 95 and 97% increases in color were elicited, as measured by optical densite for HCAN and HSOY, respectively. As far as CAN is concerned, the results indicated that the color at the 5th day of frying was comparable to the absorbance value at the 2 day of HCAN usage. The absorbance measured for CAN after 5 days of frying was as high as the value obtained for HOLLCAN at the 11th day of the oil usage. Darkening process of oils during frying is attributed mainly to the nonenzymatic browning compounds formation, as a result of the Maillard reaction [25]. Development of the coloring agents is used in the food industry for rapid monitoring of frying oils quality. However, it is noteworthy that the darkening of oils may also be influenced by trace pigments and tocopherols degradation in the frying oils [26].

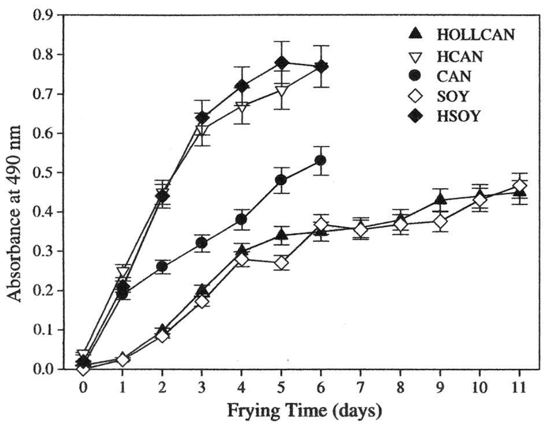

Fig. 9 Changes in color during rotational frying in different oils. For abhreviation see Table 1.

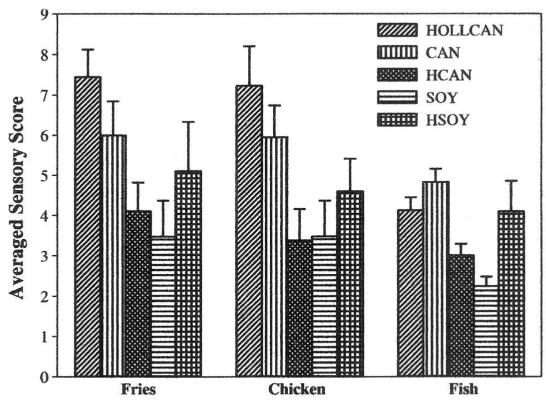

Fig. 10 Averaged acceptance sensory scores for products fried in different oils. For abhreviations see Table 1. Scores are averages for all panelists' scores assigned for the individual product calculated for the 7-day frying period.

Sensory Assement of Food Fried

As far as sensory assement is concerned, the taste, the color, the crust and the inner composition of food have profound implications. Figure 10 illustrates the results of sensory evaluation of the food products fried in selected oils. The evaluation of the French fries prepared in SOY exhibited the lowest value with the score of 3.5 compared to the other oils. Although the value obtained for HSOY (5.2) was higher than for SOY, this was not statistically significant and indicated a similar devaluation of the product. After 6 days of frying in HCAN, the French fries did appear to have a lower sensory assessment (4.2) than those fried in HOLLCAN and CAN. The products fried in both HOLLCAN and CAN with the scores of 7.5 and 6.0, respectively, were still suitable for human consumption after completion of frying. Regarding the sensory evaluation of the chicken sticks, the same trend was observed. The results indicated the apparent advantages of using HOLLCAN in the deep frying process as well as the poorest sensory assessment after frying in HCAN and SOY. The evaluation of the fish sticks exhibited lower values compared to the other products assessed with the minimum score of 2.3 reached for SOY.

The scores received for HSOY and HOLLCAN were twice as high as for SOY. No significant difference was observed in the sensory scores for HOLLCAN and CAN while the product fried in HCAN exhibited a significantly lower score. After completion of frying, the fish sticks friend in CAN appeared to have the highest sensory assessment (4.8) compared to the other oils. However, all the fish sticks were found to have poor sensory acceptance, regardless of the type of oil used.

The low evaluations of the products fried in the hydrogenated oils were not surprising since it is well known that hydrogenation imparts an unpleasant characteristic flavor to food. That complex flavor, consisting of several individual odors, such as fruity, flowery or waxy, drastically decreases the quality both of the oil and the fried food [7, 26]. Contrary to results in the current study, warner and Mounts [7] posited that the quality of the French fries prepared in hydrogenated canola oils was significantly better than those fried in a regular one. Considering the low evaluation of the products fried in SOY, the following conclusion can be drawn: undesirable soybean oil odor formed during frying (acrid, fishy, burnt and rubbery) was transferred to the flavor of food [7].

Conclusions

High Oleic low linolenic canola oil displayed the best frying life, greater than the traditionally used hydrogenated frying shortenings as indicated by the lower amounts of polar compounds, oligomers and nonvolatile carbonyl components assessed by the anisidine value. All measured factors describing frying stability of oil are direct indicators of oxidative stability and the amounts of oxidative degradation products formed. Considering the nutritional value, such as low amount of SAT and trace level of trans as well as high amount of oleic acid, HOLLCAN can be recommended as the currently available best solution for frying when elimination of trans fats and nutritional value is considered. Furthermore, HOLLCAN produced consistently fried foods with the best sensory acceptance for all frying times. Change in fatty acid composition in French fries fried in hydrogenated soybean oil (Figs. 1. 2), provides evidence that a complete exchange of lipids between frying oil and fried product occurs. Following this evidence, the lower amounts of thermo-oxidative degradation products formed during frying in the HOLLCAN oil directly affect their amounts to fried foods.

Acknowledgments : We thank Richardson Oil Processing and Dow AgroSciences for facilitating the provision of par-fried foods and oils used for this study. We would like to acknowledge financial support for this research from the Alberta Value Added Corporation and Agriculture Funding Consortium.

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PARLIAMENT NEWS

Lok Sabha Unstarred Question No. 721 - Answered on 24th July 2015

IMPORT OF COCONUT OIL

Shri Mullappally Ramachandran:

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

(a) whether State Trading Corporation has decided to import coconut oil;

(b) if so, the details thereof and the reasons therefor;

(c) whether the Government proposes to withdraw the said decision considering the concern of coconut farmers; and

(d) if so, the details thereof ?

Answer

The Minister of State in the Ministry of Commerce and Industry (Independent Charge) (Smt. Nirmala Sitharaman).

(a) to (d) STC is only a canalizing agency and imports coconut oil for a particular buyer as per the specific approval/license granted by Director General of Foreign Trade (DGFT), STC is at present importing 2000 MY crude Coconut Oil for the requirement of buyer M/s. Marico based on the license issued by DGFT.

Lok Sabha Unstarred Question No. 257 - Answered on 1st December 2015

IMPORT OF EDIBLE OIL

Shrimati Jayshreeben Patel
Shri Dushyant Chautala

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

(a) the quantum of edible oils imported and foreign exchange spent thereon during the last three years along with the reasons therefor.

(b) whether the Government has constituted any special committee to suggest measures to curtail imports and ensuring domestic availability, if so, the details and the outcome thereof;

(c) whether the Government has any plan to create a mission for increasing the domestic production of edible oil so as to meet domestic requirement; and

(d) if so, the details thereof and the action taken by the Government in this regard ?

Answer

Minister of Consumer Affairs, Food & Public Distribution

(Shri Ram Vilas Paswan)

(a): The domestic production of edible oils is insufficient to meet the domestic demand. The shortfall is met through imports. As per Directorate General of Commercial Intelligence & Statistics (DGCIS), the quantum of edible oils imported and foreign exchange spent thereon during last three years are as follows :

Year	Quantity of Edible in lakh tonnes	Amount (Million USD)
2012-13	110.17	11265.12
2013-14	104.68	9390.00
2014-15	127.31	10621.48

(b) No, Madam

(c) & (d) : In order to increase production of oilseeds and hence edible oil, a National Mission on Oilseeds and Oil Palm (NOPE) is being implemented in country since year 2014-15. The Mission envisages increase in production of vegetable oils sourced from oilseeds, oil palm and Tree Born Oils (TBOs). NMOOP comprise of three Mini-Mission (MM) viz MM-I (Oilseeds), MM-II (Oil Palm) and MM-III (TBOs). Under the mission, assistance are being provided to farmers for various components/interventions.

The major interventions/components under the three missions are given below :–

(i) Mini Mission-I : Distribution of certified seeds variety specific targeted seed production, distribution of minikits, plant protection equipments/chemicals, supply of improved farm implements, distribution of sprinkler sets, block demonstration, Training etc.

(ii) Mini Mission-II : Supply of oil palm planting material, maintenance cost of plantations during gestation period, installation of drip irritation, diesel/electric pump set, bore well/water harvesting structure/ponds of oil palm farm, supply of input for inter-cropping in oil palm, construction of vermin-compost units and purchase of machinery & tools etc.

(iii) Mini Mission-III : Integrated development of nurseries & plantation on new wasteland as well as existing wasteland/degraded forest land, maintenance of TBOs plantation till gestation period, support for inter cropping, R&D, distribution of pre-processing, processing and oil extraction equipments, support to TRIFED for promotion of seed collections, training etc.

Unstarred Question No. 714 - Answered on 4th December 2015

IMPORT OF VEGETABLE OIL

Shri Meghraj Jain

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

(a) whether import of vegetable oil is likely to fall during next year, if so, the quantum of vegetable oil imported during each of the last three years and the current year;

(b) the quantity of vegetable oil which is estimated to be imported during next year and its impact on the availability and price of vegetable oil in the country; and

(c) whether any corrective measures have been taken in this regard, if so, the details thereof ?

Answer

Minister of Consumer Affairs, Food & Public Distribution.
(Shri Ram Vilas Paswan)

(a) : No, Sir. The import of vegetable oil may not fall during next year. As per Directorate General of Commercial Intelligence & Statistics (DGCIS), the quantum of vegetable oils imported during last three years and current year are as follows :

Quantity in lakh tonnes

Year	Quantity of Vegitable Oil in imported
2012-13	110.17
2013-14	104.68
2014-15	127.32
2015-16* (upto Sept. 2015)	75.00

* Figure for 2015-16 is provisional

(b) it is estimated that about 140-145 lakh tonnes of vegetable oil will be imported in the next year. With this import availability of vegetable oil will be sufficient to meet the demand at a reasonable price.

(c) In order to increase production of oilseeds and hence edible oil a National Mission on Oilseeds and Oil Palm (NMOOP) is being implemented in country since year 2014-15. NMOOP comprise of three Mini-Mission (MM) viz MM-I (Oilseeds), MM-II (Oil Palm) and MM-III (Tree Born Oils). Under the mission, assistance are being provided to farmers for various components/intervention in order increase oilseed production. Further, in order to protect the interest of oilseeds producting farmers and domestic edible oils from 7.5% and 15% to 12.5% and 20% respectively for discouraging import of edible oils.

Unstarred Question No. 1390 - Answered on 8th December 2015

IMPORT OF CRUDE EDIBLE OIL

Shri Anto Antony

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

(a) the details of crude edible oil imported during each of the last three years and the current year, country-wise.

(b) whether a sharp increase in import of crude edible oil has been noticed recently;

(c) if so, the details thereof and the reasons therefor;

(d) whether there is a demand from the farmers to enhance the import duty of edible oils; and

(e) If so, the details thereof and the response of the Government thereto ?

Answer

Minister of Consumer Affairs, Food & Public Distribution.
(Shri Ram Vilas Paswan)

(a) The details of crude edible oil imported during each of the last three years and the current year, country-wise, as per Directorate General of Commercial Intelligence and Statistics (DGCIS), are given in the table below :

(Qty in lakh tons)

Country-wise Import of Crude Vegetable Oil

Country	2012-13 (F/Y)	2013-14 (F/Y)	2014-15 (F/Y)	2015-16 (upto Sept'15)(F/Y)
Argentina	8.19	10.92	17.27	12.59
Brazil	2.19	2.26	4.4	3.17
Canada	0.16	0	0.07	0
Indonesia	47.45	35.15	40.3	20.68
Malaysia	24.47	16.6	30.21	16.31
Russia	0.1	0	0.56	0.06
Thailand	0.31	1.97	0.9	0.05
U.A.E.	0.54	0.64	2.37	1.04
Ukraine	11.07	10.75	17.28	7.18
Others	1.28	0.73	1.81	1.51
Total	95.76	79.02	115.17	62.59

(b)&(c): There has been an increase in the import of crude edible oils from 79.02 lakh tons in 2013-14 to 115.17 lakh tons in 2014-15 on account of the increase in the gap between domestic production and demand for edible oils. Due to less and untimely rainalll, the production of oilseeds in the country were affected , resulting in a decrease in the domestic production of edible oils.

(d) : No, Madam, no representation has been received in the recent past from farmers to enhance the import duty of edible oils.

(e) Does not arise.

Rajya Sabha Unstarred Question No. 1124 - Answered on 9th December 2015

INCREASE IN IMPORT OF SOYABEAN OIL

Shri Rajkumar Dhoot

Will the Minister of Consumer and Industry be pleased to state :

(a) whether it is a fact that import of soybean oil has increased manifold in the recent past;

(b) if so, the year-wise details thereof for the last two years; and

(c) what corrective measures Government proposes to take to increase domestic production of soyabean oil to reduce imports ?

Answer

The Minister of State in the Ministry of Commerce and Industry (Independent Charges) Smt. Nirmala Sitharaman

(a)&(b) : The details of soybean oil imported in to the country during the last two years and the current year is at Annex.

(c) To increase production and productivity of oilseed crop including soybean, through an integrated and comprehensive approach, Mini Mission-I under the National Mission on Oilseeds and Oil Palm (NMOOP) has been implemented since 2014-15 in 25 States. In order to make the country sell-reliant and address the issues of productivity of oilseeds cultivation, including soybean, modern technologies like improved varieties, ridge-furrow methods of planting, effective water management, application of bio-fertilizer including seed treatment with rhizobium, mechanization, inter-cropping of oilseeds with cereals/pulses and eco-friendly plant protection measures are being promoted through cluster demonstrations, training etc, Seed infrastructure is also being supported under the scheme.

IMPORT OF SOYBEAN OIL DURING LAST TWO YEARS AND CURRENT YEAR (APR TO SEP)

		2013-14		2014-15		2015-16 (APR TO SEP)	
ITCHS	DESCRIPTION	Qty (TON)	VAL (US$ MILLION)	Qty (TON)	VAL (US$ MILLION)	Qty (TON)	VAL (US$ MILLION)
15071000	Soyabean crude oil WIN degummed	1345133.00	1366.41	2317045.18	2113.43	1681312.30	1281.96
15079010	Soybean oil of edible grade	2.23	0.01	5.42	0.02	15.24	0.06
15079090	Soybean oil other than edible grade	27.01	0.06	128.50	0.50	1064.75	1.16
Grand Total		**1345162.24**	**1366.48**	**2317179.08**	**2113.95**	**1682392.28**	**1283.18**

Rajya Sabha Unstarred Question No. 2337 – Answered on 18th December

SHORTAGE OF EDIBLE OIL

Shri K Rahman Khan

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

(a) whether current highmarket price of edible oils, particularly mustard oil, is due to its shortage; and

(b) whether this shortage is manipulated, if so, the corrective measures taken to meet the situation ?

Answer

Minister of Consumer Affairs, Food & Public Distribution
Shri Ram Vilas Paswan

(a) The less and untimely rain has affected production of mustard seed hereby low production of mustard oil which caused rise in tis market price.

(b) No, Sir.

—

Rajya Sabha Unstarred Question No. 2276 – Answered on 18th December 2015

DISTRESS AMONG OIL PALM CULTIVATION OF ANDHRA PRADESH

Dr. K. V. P. Ramachandra Rao

Will the Minister of Agriculture & Farmers Welfare be pleased to state:

(a) whether Government is aware of the distress among of palm cultivators in Andhra Pradesh owing to price slump;

(b) if so, whether Government is taking up any market intervention operations to avert the distressed farmers from committing suicide; and

(c) if not, the reasons therefor ?

Answer

Minister of State in the Ministry of Agriculture and Farmers welfare
Shri Mohanbhai Kundaria

(a) Yes, Sir.

(b) A proposal has been received from Government of Andhra Pradesh for procurement of oil palm Fresh Fruit Bunches (FFBS) under Market Intervention Scheme (MIS) during the current crop season. The proposal is under consideration.

(c) Doesn’t arise.

Lok Sabha Unstarred Question No. 2403 – Answered on 14th December 2015

IMPORT OF OIL SEEDS

Shri Dilip Patel:

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

(a) the quantum and value of different varieties of GMO Oil seeds including white poppy, canola, sunflower and soya seeds imported into the country during each of the last three years and relaxation given in the criteria fixed for their import, country and variety-wise;

b) whether the Government proposes to import different varieties of seeds including canola seeds in higher quantity during the current year and if so, the quantum and value thereof:

(c) whether any relaxation has been given for import permission at the port of exit for seeds and any oil and if so, the details thereof; and

d) whether the Government has any agency/committee to examine the quality of imported seeds and if so, the details thereof ?

Answer

The Minister of State in the Ministry of Commerce and Industry (Independent Charge)
Sat. Nirmala Sitharaman

(a) to (d) : Country-wise and variety-wise India's import of all oil seeds for the last three years and current year (up to September, 2015) is at Annex.

Import of oil seeds is free; only seed quality is 'restricted'. Import of seed is subject to Food Safety and Standard Act, 2006 and Rules there under for sanitary (bacterial contaminants, pesticides, inspection and labelling) purpose and Plant Quarantine (Regulation of Import into India) Order, 2003 for phytosanitary (pest & disease) purpose.

Import Policy of Generally Modified Food, Feed, Genetically Modified Organism (GMOs) and Living Modified Organism (LMOs) is duly notified under ITC (HS) 2012, Schedule-1 (Import Policy). Import of GM food requires prior approval of the Genetic Engineering Approval Committee (GEAC) constituted under Rules, 1989. The above regulations provide for takin punitive action against the importers in case of wrong declaration or import without prior approval of the GEAC.

The Government of India is following a policy of case by case approval of genetically modified (GM) crops. In view of the safety concerns, all crops are tested for its safety, efficacy and agronomic benefits in accordance with the prescribed biosafety guidelines and provisions of Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro Organisms (HMOs)/Genetically Engineered Organisms (GMOs) or Cells, 1989 (Rules, 1989) notified under the Environment (Protection) Act, 1986. The environmental safety assessment includes studies on pollen escape out crossing, aggressiveness and weediness, effect of the gene on non-target organisms, presence of protein in soil and its effect on soil micro-flora, confirmation of the absence of terminator gene and baseline susceptibility studies. The food and feed safety studies include assessment on composition analysis, allergenicity and toxicological studies and feeding studies on fish, chicken, cows and buffaloes. In case, the transgenic crop is not found suitable for release in the environment or human consumption, the product is rejected during the trial stage itself. Permission is granted on case by case basis following regulatory guidelines and procedures stipulated under Rules 1989. In addition, GM seeds also undergo obligatory and elaborate post-entry quarantine processing and molecular and quarantine testing for pest, pathogens & insects before initiating further research on it.

Further, vide Gazette Notification GSR 584 (E), 586 (E), 588 (E) and 589 (E) dated 1st September, 2006, issued by Ministry of Environment, Forests and Climate Change, the seed inspectors, seed analyst and laboratories notified under the Seed Act, 1966 and seed Control Order, 1983 have been empowered under EPA, 1986.

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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