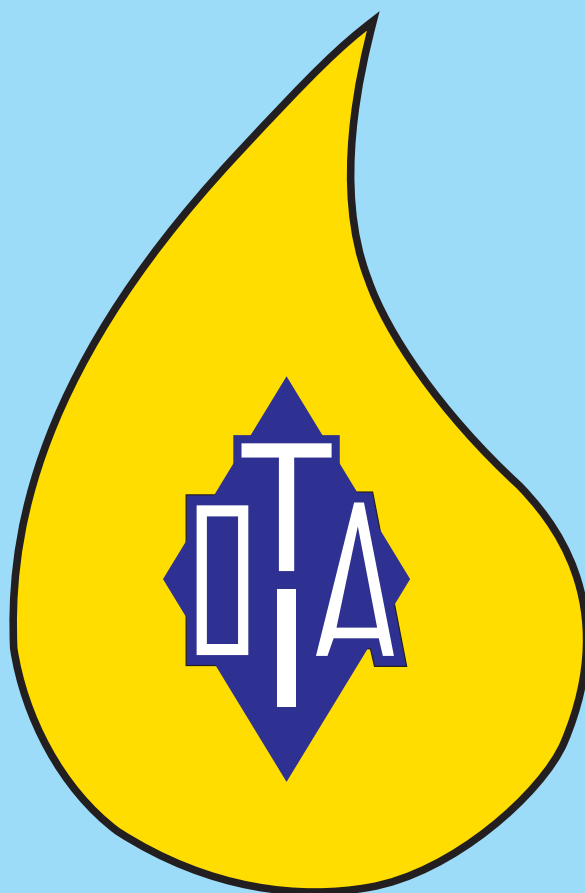


# OIL TECHNOLOGISTS' ASSOCIATION OF INDIA

MAY 2013 - AUGUST 2013

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***

### **MICRONUTRIENTS**

Many nutrients which our bodies need only in small amounts. These are essential for our overall well-being. Not only do these micronutrients keep our physical health in check, they also take care of our emotional well-being. The range of emotions we feel are due to chemical reactions that occur in the nerves. These reactions are governed by mini molecules and hormones in our body, which are, in turn, governed by these micronutrients. Some of these nutrients are :

**Zinc** : It is one of the most essential minerals in our body. In children, lack of zinc can lead to growth retardation, infection susceptibility and diarrhea. In adults, it leads to skin disorders and infertility.

**Sources** : Nuts and whole grains.

**Selenium** : It is required in trace amounts for cellular function in humans. Selenium is a key component of many antioxidant enzymes, which convert one kind of thyroid hormone to another.

**Sources** : Sunflower seeds, fish, shellfish, eggs, mushrooms, wheat, barley, brown rice, oats and onions.

**Fluoride** : This is required in low doses to prevent tooth decay. For this reason, it is used in toothpaste. However, an overdose of fluoride causes health complications and can be toxic.

**Sources** : Tea.

**Molybdenum** : A number of instances of esophageal cancer have been associated with molybdenum deficiency. People severely deficient in molybdenum are also prone to toxic reactions to sulfites in foods. Babies with molybdenum deficiency develop nerve-related disorders.

**Sources** : Green beans, eggs, wheat flour, "dals" and sunflower seeds.

**Iodine** : It's essential for proper functioning of the thyroid gland so it can release the requisite amount of hormones. Iodine is necessary for the maintenance of the stomach



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lining, salivary glands, oral mucosa and blood vessels, it also plays a role in aiding proper lactation.

Iodine deficiency leads to intellectual disabilities in infants and children. Other possible health effects being investigated as a result of iodine deficiency include breast cancer, stomach cancer and autism.

**Sources** : Kelp and certain seafood, as well as plants grown on iodine-rich soil. Salt is fortified with iodine.

**Copper** : The human body cannot produce copper. You must intake foods that are rich in copper instead. Conditions linked to copper deficiency include osteoporosis, osteoarthritis, rheumatoid arthritis, cardiovascular diseases, colon cancer and conditions involving bone, connective tissue, heart and blood vessels.

**Sources** : Shellfish, whole grains, legumes, chocolate, peanuts, raisins, cereals, potatoes, peas, red meat, mushrooms, dark green leafy vegetables such as kale, and fruits like coconuts, papaya and apples.

While talking about micronutrients special mention may be made about Rice Bran Oil which contains “Oryzanol”, Tocopherol, Tocotrienol, Squalene etc. Nature’s miracle oil – A heart friendly oil.

S. K. ROY  
Editor

*Ack : courtesy H. T. Calcutta, Ms. Shikha Sharma*

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## ***ABOUT OURSELVES***

1. Prof Sunit Mukherjee, was invited as the Chief Guest and Prof D. K. Bhattacharryya, Dr Paramita Bhattacharjee, and S. K. Roy were invited as speakers in AICTE sponsored National Seminar on “Recent Advances in the development of Natural Antioxidants”, Guru Nanak Institute of Technology, March 12-13, 2013.
2. Professor D. C. Sen delivered a lecture on 29.06.2013 at Jadavpur University on "Facts and Fallacies of Some Foods" in the Refresher Course titled "Interdisciplinary Research towards the Development of Modern Food and Bioprocess Technology" organized by the Department of Food Technology & Biochemical Engineering, JU, in collaboration with UGC-Academic Staff College, Jadavpur University, for College and University Teachers during 26th June - 16th July, 2013.
3. Dr. A. S. Khanna was invited as Chief Guest by Indian Resins Manufacturers Association at the Inaugural function of its Eastern Region and was specially honoured with a “Shawl”.

\*(Stop Press)

- \*4. National Nutrition Week was celebrated at N.R.S. Medical College, Calcutta in collaboration with Nutrition Society of India (Calcutta Chapter) and “CINI” on the 7th Sept '13. Prof. Sunit Mukherjee was invited as Guest of Honour. S. K. Roy was invited as Speaker for the Special Lecture. Prof (Dr.) Purkayastha, Principal of N.R.S. Medical College was the Chief Guest. Prof (Dr.) Dasgupta, Head, Endocrinology Division organised the whole event. Prof (Dr.) N. Sengupta proposed vote of thanks.

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# FRYING STABILITY OF SOYBEAN, SESAME AND MUSTARD OILS

Probir Kumar Ghosh and Paramita Bhattacharjee\*

Department of Food Technology and Biochemical Engineering  
Jadavpur University, Kolkata 700 032

## ABSTRACT

Potato wedges were deep, shallow and parfried in soybean, sesame and mustard oils. A citric acid based antioxidant using BHT was formulated and administered to these oils. Physicochemical analyses and assay of DPPH radical scavenging activity were conducted to ascertain the suitability of these frying techniques in these oils. These assays indicated least oxidation in oils administered with the formulated antioxidant in parfrying mode, and the most in deep frying, suggesting parfrying to be the most suitable frying mode. Mustard oil was least oxidized with repeated frying and highest oxidation was reported in soybean oil. The potency of the formulated antioxidant with respect to control was significant ( $p < 0.05$ ) in all oils, until the third fry (8 days). Mustard oil was found to be the best choice for frying, followed by sesame and soybean oil with minimum changes in physicochemical parameters and antioxidant activity, with repeated frying.

**Keywords :** soybean oil, sesame oil, mustard oil, antioxidant, frying, physicochemical properties.

## INTRODUCTION

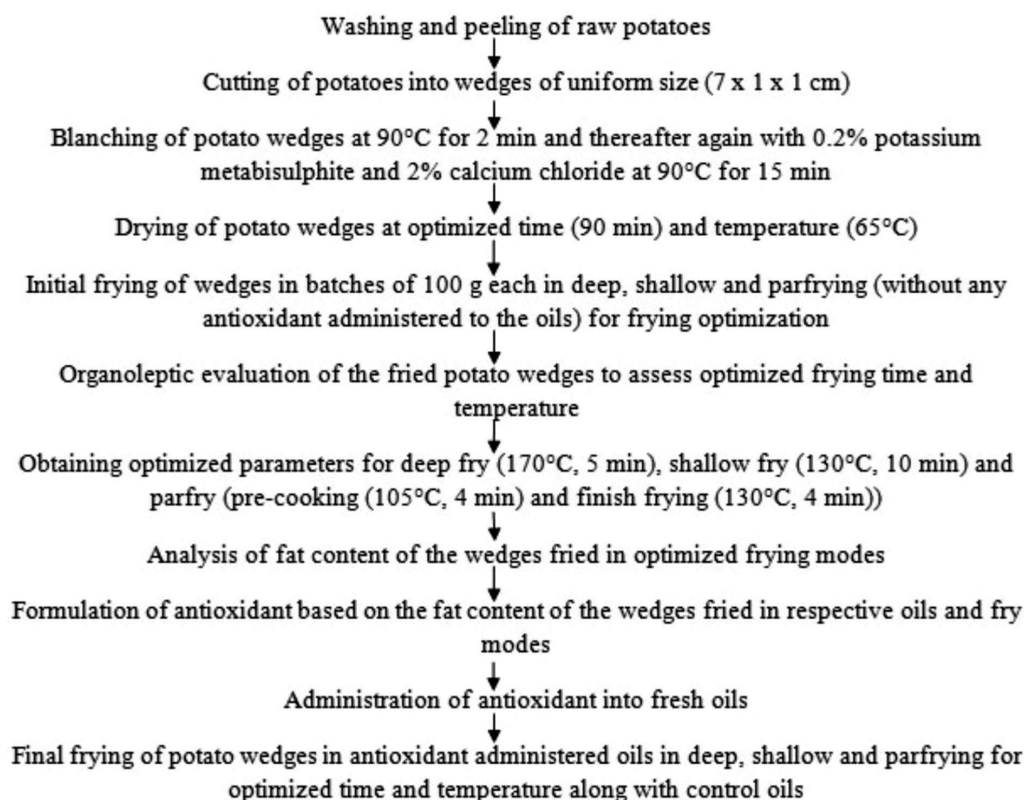
India is the world's largest importer and the third largest consumer of edible oils (Ramesh and Murugan, 2008). The most common application of edible oils is in frying. Commonly, immersion frying is employed for frying, and the most common type of the same is deep frying (Hubbard and Farkas, 1999). However, deep frying degrades the oil quicker than shallow and parfrying, which are better alternative frying techniques. We have worked on deep, shallow and parfrying techniques using soybean, sesame and mustard oils and studied the physicochemical properties as well as antioxidant activity of these oils with repeated frying (Ghosh et al., 2012; Ghosh and Bhattacharjee, 2012).

The process of frying: Frying is not a single step process but depends on pre-frying procedures, chiefly blanching and drying, which influence the quality of fried foods. In order to obtain the best fried foods, optimization of frying procedure is necessary to best utilize the resources employed in frying- the food/agro commodity to be fried (vegetables, meat, fish and poultry) and the frying oils. Sensory evaluation plays a pivotal role in the process of optimization and allows determination of best conditions (such as time, temperature, additives (administered during processing, if any) of pre-frying and frying operations.

The oils used for frying are generally reused as long as they are not rancid. In order to evaluate the effects of repeated frying, research has been conducted on soybean, sesame and mustard oils for four frying cycles without replacement or replenishment with fresh oils, at an interval of four days between consecutive fryings (Ghosh et al., 2012; Ghosh and Bhattacharjee, 2012). These authors have optimized deep, shallow and parfrying

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processes, using sensory evaluation as the basis of assessment (Fig.1) and have reported optimized blanching (90°C, 17 min) and drying (65°C, 90 min) conditions, for pre-drying operation. The optimized frying conditions were established as: deep frying (170°C, 5 min), shallow frying (130°C, 10 min) and parfrying [(pre-cooking (105°C, 4 min), followed by finish frying (130°C, 4 min)].



**Physicochemical analyses of oils with frying :** Frying of oils produces physicochemical changes (due to oxidation) in the oils which depend on choice of oil, mode of frying and number of fryings. Physicochemical properties such as viscosity, free fatty acids, peroxide value, p-anisidine value, TOTOX value, iodine value, amount of conjugated dienes and trienes and antioxidant activity (% DPPH radical scavenging activity) are assayed to evaluate these changes in oils.

From physicochemical analyses of soybean, sesame and mustard oils, mustard oil has been found to be the most stable (minimum changes in fried oil with respect to native oil) followed by sesame and soybean oils with repeated frying (Ghosh et al., 2012; Ghosh and Bhattacharjee, 2012). These authors have also reported highest oxidation in deep frying, followed by shallow frying and parfrying. Their work also revealed that physicochemical parameters increase sharply after third frying (8 days), indicating increased oxidation in oils after the third frying. Therefore, it is advocated to replace or replenish the oils after the third frying (8 days). From this study, the authors established parfrying to be the most suitable frying technique in these oils (owing to minimum oxidation of oils).

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**Role of antioxidants in frying operations :** Antioxidants are administered to oils to protect them from oxidation and enhance their shelf life. Antioxidants such as Butylated hydroxyanisole (BHA), Butylated hydroxytoluene (BHT) and Tertiary Butyl hydroquinone (TBHQ) are used commercially as antioxidants in edible oils. These antioxidants are phenolic compounds, and it is mandatory to administer them within the approved limits, to circumvent toxic effects.

Citric acid is a metal ion chelator and acts synergistically with antioxidants in inhibiting oxidation. The effects of citric acid based antioxidant administered to soybean oil in limiting oxidation with frying has been studied by authors (Warner and Gehring, 2009), affirming the potency of the same as a synergist. Ghosh et al. (2012) and Ghosh and Bhattacharjee (2012) have formulated a citric acid based antioxidant (ATX) using citric acid, BHT and adjuvant doses of potassium sulfate and aluminum silicate; within the approved limits. The formulation of the antioxidant was based on the fat content of the fried potato wedges. The authors have subsequently administered ATX into soybean, sesame and mustard oils.

The authors have found significantly higher stability of oils with repeated frying, administered with ATX, with respect to control. The percent DPPH radical scavenging activity of parfried soybean, sesame and mustard oils have been conducted, since in this frying technique, the oils have been found to be least oxidized with repeated frying. In agreement with physicochemical results, DPPH radical scavenging activity indicated least changes in antioxidant activity of mustard oil followed by sesame and soybean oils (with administered ATX). Furthermore, there was a sharp decrease in antioxidant activities in all oils after third frying (8 days), as was observed by physicochemical analyses.

**Conclusions:** From this study, shallow and parfrying have been found to be suitable alternatives to conventional deep frying, owing to lower oxidation of oils. For repeated frying, it is advisable to replace or replenish the oils after third frying (8 days). It is further recommended to use mustard oil, followed by sesame and soybean oil, using parfrying as the frying mode. Future studies on stability of mustard oil with repeated frying and its effect on its antioxidant potential are suggested.

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- Warner, K. and Gehring M. M. 2009. High temperature natural antioxidant improves soy oil for frying. *J. Food Sci.*, 74 (6): 500-505.

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Probir Kumar Ghosh, Research Scholar, Dept. FTBE, JU.

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**68th Annual Convention and International Seminar of Oil Technologists' Association of India was held at IICT, Hyderabad During August 08-10, 2013 [Oleo 2013]**

Following members of EZ attended the conference - Dr. Ranjit Chakraborty, President, EZ; Dr. Mahua Ghosh, Hon Sec, EZ; Prof. D. K. Bhattacharyya, Sri S. K. Roy, Dr. Avery Sengupta, Smt. Isita Nandi & Sri T. K. Mitra.

1. Dr. Avery Sengupta from EZ received the O.P. Narula - OTAI (SZ) young scientist award.
2. Dr. Siddhartha Sankar Saha from EZ received Dr. Santinath Ghosh Memorial research award.
3. Dr. Rupali Dhara, Dr. Avery Sengupta, Dr. Pubali Dhar, Dr. Santinath Ghosh and Dr. Mahua Ghosh received Sri R.K. Khanna memorial best research paper award for their article : "The Role of DAG - rich Oils in Controlling Plasma Leptin Level a potent Regulator of Obesity" published in JLST: January-March 2012, Vol 44, No-1.
4. posters were presented by the research scholars from EZ. One oral presentation on 'Preparation of Polymeric Film for Food Packaging Utilising Oil Cake Starch' was made by Dr. Mahua Ghosh. Prof. D. K. Bhattacharyya acted as a session chairman in the session on 'Microbial production of oleochemicals'.

Smt. Tanim Bhattacharyya received consolation prize in best poster category.

The seminar was well organised and well attended.

AGM of OTAI was held simultaneously on the 9th Aug., 2013. S.K. Roy, Vice President, OTAI and Ex-President of EZ took over the charges of All India president of OTAI from Dr. R.B.N. Prasad and Sri Sanjay Tandon took over the charges of Hon. Secretary of OTAI from Prof. R.K. Trivedi. Mr. Rajesh Srivastaba took over the charges of Hon. Treasurer from Sri. P.K. Tewari.



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## PARLIAMENT NEWS

Lok Sabha Unstarred Question No. 5685 - Answered on 30th April 2013

### PULSE AND OIL SEED VILLAGES

Shri Baijayant Jay Panda

Will the Minister of Agriculture be pleased to state

- (a) whether the Government has created 60,000 pulse and oil seed villages to encourage the cultivation of the said crops;
- (b) if so, the details thereof; and
- (c) the achievement made so far in this regard ?

**Answer**

Minister of State in the Ministry of Agriculture and Food Processing Industries.

Shri Tariq Anwar.

(a) to (c) Government of India had implemented “Integrated Development of 60,000 Pulses and Oilseeds Villages in Rainfed Areas” programme in 2010-11 with an allocation of Rs. 300 crores to focus on integrated intervention of water harvesting, watershed management and soil health for enhancing the productivity of pulses and oilseeds in the dry land farming areas in the states of Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. Subsequently, the programme was renamed “Integrated Development of 60,000 Pulses Villages in Rainfed Areas” in 2011-12 and implemented with an outlay of Rs. 300.00 crores in 11 states of Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and Uttar Pradesh constituting nearly 96 percent of pulses area in the country. For enhancing production and productivity of pulses, the interventions included in the programme like in situ moisture conservation (a) New farm ponds including polythene lining or dug wells (b) plastic lining of developed farm ponds, accelerated Pulses production program with inclusion of minikits and pest surveillance and market linked extension support through Small Farmers Agri-business Consortium (SFAC). The programme was subsumed under NFSM-Pulses from 2012-13.

Under the above programme 3016 custom hiring units of farm implements (Tractor, Rotavator & Ridge furrow planter) was established during 2010-11. During 2011-12, construction of 10614 new farm ponds with lining, 1263 lining of old farm ponds, 345 units of block demonstrations of pulses (1000 ha per unit) were conducted by the states. In addition to this, Small Farmers Agri-business Consortium (SFAC) formed 7551 Farmers Interest Groups (FIGs) & 127 Farmers Producer Organisations (FPOs) to develop market chain of pulses.

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The implementation of NFSM Pulses, A3P and “Integrated Development of 60,000 Pulses and Oilseeds Villages in Rainfed Areas” resulted into increase in the production of pulses from 14.20 million tones from 2006-07 to 17.09 million tones during 2011-12 with an increase of 2.89 million tones against the envisaged target of 2.0 million tones.

Lok Sabha Unstarred Question No. 5658 - Answered on 30th April 2013

### **ADVERSE IMPACT OF CULTIVATION OIL PALM**

Shri Varun Gandhi

Will the Minister of Agriculture be pleased to state :

- (a) whether a study by the World Wildlife Fund (WWF) indicates that the cultivation of oil palm leads to deforestation, loss of habitat for endangered species and increase in green-house gases emissions.
- (b) if so, the details thereof and the reaction of the Government thereto :
- (c) whether the Government is taking any steps to find a suitable replacement for this crop;
- (d) if so, the details thereof; and
- (e) if not, the reasons therefor ?

*Answer*

Minister of State in the Ministry of Agriculture and Food Processing Industries.

Shri Tariq Anwar

(a) & (b) As per WWF's estimates, the expansion of oil palm plantations is likely to cause 4 m ha of forest loss by 2020 in global level especially in Indonesia and Malaysia. As per the Forest (Conservation) Act 1980 of India, the cultivation of oil palm/oil bearing plants is a non-forestry activity. Therefore, plantation of oil palm in forest areas is not being encouraged.

(c) & (d) : Oil Palm is being cultivated in India as an alternate crop for edible oils, Government of India is implementing a Centrally sponsored “Integrated Scheme on Oilseeds, Pulses, Oil Palm and Maize” for increasing the production and productivity of Oilseed crops in the country to meet the demand of edible oil. As a result, the production of total oilseeds has increased from 248.82 tonnes in 2009-10 to 297.99 lakh tonnes in 2011-12.

(e) Does not arise.



**PRODUCTION OF EDIBLE OIL**

Shri Jayant Chaudhury; Shri M. K. Raghavan; Shri A.K.S. Vijayan; Shri Pralhad Joshi.

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

- (a) the total quantum of edible oil including palm oil and coconut oil produced and consumed in the country during each of the last three years and the current year, oil wise;
- (b) whether the Government proposes to promote consumption and export of coconut oil; and
- (c) if so, the details thereof and the steps taken thereon ?

*Answer*

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

(a) The details of estimated domestic production and consumption of edible oils, oil wise including palm oil and coconut oil during the last three years and the current year is annexed.

(b) & (c) Yes, Madam. The steps taken to promote consumption and export of coconut oil is as follow :

- (i) Coconut Development Board is promoting production of Coconut Oil and value added products from coconut under the scheme "Technology Mission on Coconut". Under this Scheme financial and technical assistance is extended to entrepreneurs for establishing processing units in Coconut sector.
- (ii) In order to encourage domestic growers of coconut and producers of coconut oil, the import duty on crude edible oils has been raised from zero to 2.5%.
- (iii) The port restriction for export of coconut oil has been lifted and at present export of coconut oil is permitted through 13 Electronic Data Interchange (EDI) ports and also through Land Customs Stations (LCS).
- (iv) Quantitative restriction on export of edible oils including coconut oil in branded consumer packs of upto 5 kg has been removed.

*Annexure*

Annexure Referred to in reply to part (a) of the Unstarred Question No. 5633 -  
Answered on 30.4.2013 in Lok Sabha

**Details of Estimated Domestic Production and Consumption of Edible Oils**

*(Quantity in lakh tons)*

Name of Oil	2008-09	(Nov-Oct)	2009-10	(Nov-Oct)	2010-11	(Nov-Oct)	2011-12	(Nov-Oct)
	Produ- ction	Consum- ption	Produ- ction	Consum- ption	Produ- ction	Consum- ption	Produ- ction	Consum- ption
Rapeseed/ Mustard	22.32	22.32	20.48	20.48	25.35	25.35	20.47	20.47
Soyabean	15.85	25.74	15.94	29.61	20.38	29.08	19.54	30.35
Groundnut	16.48	16.48	12.48	12.48	19.01	19.01	16.02	16.02
Sunflower	3.82	9.82	2.81	8.14	2.15	9.10	1.70	13.01
Cotton seed	7.60	7.60	8.00	8.00	10.89	10.89	11.62	11.62
Coconut	4.71	4.83	4.79	4.74	4.84	4.85	5.02	4.84
Rice Bran	7.70	7.70	7.20	7.20	7.20	7.20	7.50	7.50
Palm Oils	0.53	64.80	0.66	54.90	0.73	54.76	1.1	76.51
Others	6.00	7.75	8.00	9.43	7.94	11.68	7.74	9.64
<b>Total</b>	<b>85.09</b>	<b>167.04</b>	<b>80.36</b>	<b>155.01</b>	<b>98.49</b>	<b>170.92</b>	<b>90.71</b>	<b>189.96</b>

\* Consumption includes edible oils imported.

**Progress of Sowing of Kharif (2012) Oilseed Crop as on 20th June, 2013**

The Agriculture Ministry report of Kharif oilseeds sowing data for week ending 20th June, 2013 vis a vis same period of the last year (2012) as under :

Area in lakh ha

Item	Normal Area	As on 20.6.2013	Coverage Area 2012	Coverage Area 2011	Changed Compared to 2012
Groundnut	49.02	5.56	2.21	2.03	(+) 3.35
Soybean	95.70	1.32	0.16	0.48	(+) 1.16
Sunflower	5.13	0.41	0.22	0.21	(+) 0.18
Sesamum	16.50	0.65	0.55	0.69	(+) 0.09
Niger	3.45	0.01	--	--	(+) 0.01
Castor	9.39	0.19	0.04	0.06	(+) 0.15
<b>Total</b>	<b>179.19</b>	<b>8.13</b>	<b>3.19</b>	<b>3.47</b>	<b>(+) 4.95</b>

**STATEWISE AREA COVERED UNDER KHARIF OIL SEEDS A FOR WEEK ENDING AS ON 20TH JUNE, 2013**

Area in Lakh Ha.

Sr. No.	State	Groundnut		Soybean		Sunflower		Sesamum		Nigar		Cestor		Total	
		2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012
1.	Andhra Pradesh	0.90	0.50	0.34	--	--	0.01	0.06	0.07	--	--	0.15	0.01	1.45	0.59
2.	Arunachal Pradesh	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3.	Assam	--	--	--	--	--	--	0.04	--	--	--	--	--	0.04	--
4.	Bihar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5.	Chhatisgarh	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6.	Gujarat	3.99	1.25	0.03	0.02	--	--	0.06	0.01	--	--	--	--	4.08	1.28
7.	Haryana	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8.	Himachal Pradesh	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9.	Jammu & Kashmir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10.	Jharkhand	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11.	Karnataka	0.58	0.17	0.94	0.03	0.40	0.19	0.31	0.26	0.01	--	0.04	0.03	2.28	0.68
12.	Kerala	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.	Madhya Pradesh	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14.	Maharashtra	--	0.04	0.01	0.11	--	--	--	--	--	--	--	--	0.01	0.15
15.	Odisha	--	0.01	--	--	--	--	0.10	0.08	--	--	--	--	0.10	0.08
16.	Punjab	--	0.01	--	--	--	--	--	0.04	--	--	--	--	--	0.05
17.	Rajasthan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18.	Tamil Nadu	0.06	0.23	--	--	0.01	0.02	0.07	0.08	--	--	--	--	0.13	0.34
19.	Uttar Pradesh	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20.	Uttarakhand	0.03	--	--	--	--	--	--	--	--	--	--	--	0.03	--
21.	West Bengal	--	--	--	--	--	--	0.01	0.01	--	--	--	--	0.01	0.01
22.	Others	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Total – All India</b>		<b>5.56</b>	<b>2.21</b>	<b>1.32</b>	<b>0.16</b>	<b>0.41</b>	<b>0.22</b>	<b>0.65</b>	<b>0.55</b>	<b>0.01</b>	<b>--</b>	<b>0.19</b>	<b>0.04</b>	<b>8.13</b>	<b>3.19</b>

Source : Ministry of Agriculture, GOI

File : Kharif Crop Wise Summary

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***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 industrial circles throughout India because of the highly relevant and beneficial 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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5C, Tarak Mitra Lane, Kolkata - 700 026  
Phone : 24666243 / 24639721  
E-mail : esskay\_roy81@rediffmail.com  
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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 ascertain 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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## BOOK REVIEW

A book entitled “Advances in Fish Processing Technology” has been authored by Dr. D. P. Sen, an executive committee member of the OTAI (EZ), Calcutta. He is highly qualified with National and International recognition.

The contents of the book are • Resources, Their Utilisation - Emerging Trends • Chemical Composition and Their Technological Significance • Fish Odours and Flavours • Fresh Fish Handling and Chill Storage • Modified Atmosphere Packaging of Seafoods • Assessment of Freshness Quality • Traditional Salted and Dried Fish Products • Proteolysed Fish Products • Minced Fish Technology • Retort Pouch Processing Technology • Surimi and Surimi-Based Products • Irradiation in Fish Processing • Antarctic Krill and its Processing • Microwave in Fish Handling and Processing • Fish Food Products • Advance in Freezing Technology • Shrimp Culture, Shrimp Feed, Melanosis and Moulting • Selected By-products from sea • W-3 Fatty Acids, Fish Oil and Fish in Health and Nutrition • Fishborne Pathogens and Depuration • Toxins, Pollutants and Contaminants • Quality Management.

The book should be useful to a wide range of readers including ichthyologists and researchers involved with the fish industry. The book has already been well appreciated among the scientific community.

**Publisher : Allied Publisher Pvt. Ltd.  
New Delhi ; Price : Rs. 1800/-**

Offer by the Author on Book entitled

**Advances in Fish Processing Technology**  
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**S. K. Roy**  
Editor

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