OIL TECHNOLOGISTS' ASSOCIATION OF INDIA

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EASTERN REGION

FOR LIMITED CIRCULATION

CONTENTS

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**Prof. R. K. Trivedy has taken over as National President OTAI for the year 2017-2019.*

Editor
S. K. Roy

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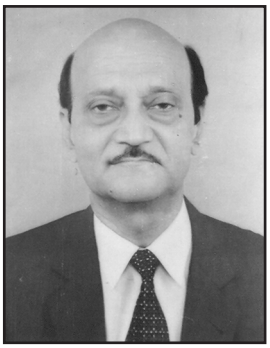
From the Editor's Desk



The winter has set in. The comfortable weather, to start with becomes harsh for some. Cough, cold are very common symptoms of this fluctuating weather condition. The Indian spices play an important role to ward off winter sickness. I take this opportunity to provide our members in particular & readers of the journal in general, the beneficial effects of Indian herbs to ward off winter sickness.

Saffron : Apart from adding a vibrant colour to your dishes, saffron, has several health benefits too. If you're looking for an instant relief from cold, mix a few strands in milk and apply the same on your forehead. This technique is a sure-shot one to treat colds due to seasonal change.

Turmeric : A glass of turmeric milk gulped down every day in the winter months will boost your immunity system and keep you away from various infections. Turmeric has antioxidants, antibacterial, and anti-inflammatory benefits that will help prevent and tackle a number of diseases.

Fenugreek : Do you like laddose? Try putting fenugreek seeds, ginger, fennel seeds and jaggery in it. Fenugreek seeds are packed with antiviral properties and have the ability to kill viruses that cause sniffles and sore throats.

Nutmeg : This is a warm spice and can be added in your sweet and savoury food items to boost their flavours. It has strong antibacterial properties that help boost the immune system. A cup of hot milk with nutmeg powder, a few drop of honey and crushed cardamon is sure to keep your winter blues away.

Black Pepper : With a distinctive taste and pungent aroma, this spice contains various anti-oxidants that accelerate the body's metabolism. Add this incredible spice to any cuisine or use it as a condiment and enjoy the fine flavour along with its myriad health benefits.

Cloves : Rich in antioxidants, cloves have anti-inflammatory, antiseptic and dental-soothing properties. Widely recognised the world over for its medicinal and culinary qualities, these dried flower buds have distinct flavour and intense aroma. Add cloves to your salad dressings, meats and desserts and relish the bursts of flavours.

The medical herbs can plug in very positive role to word sickness and help to enjoy a healthy life.

Wish you all a Very Happy & Prosperous New Year 2018 !!

S. K. ROY
Editor

Ack. / Courtsy IANS

About Ourselves

1. S. K. Roy deliverd a lecture on “Quest for use of Veg. Oils in proper perspective” at the OTAI (ER) Regional Lecture Hall on the 7th August 2017. Prof. Sunit Mukherjee chaired the Session.** A View
2. Prof. Sunit Mukherjee & S. K. Roy of OTAI (E.Z.) were invited to deliver a lecture in Bajbaj College, on the occasion of National Nutrition Week on the 6th September 2017. The lectures were well appriciated.
3. S. K. Roy has been nominated as Member, Science & Technology Advisory Committee, Ministry of Food & Consumer Affairs, Govt. of India.
4. Dr. S. Bandopadhya, former Head, Ceramic Division, CGCRI, has been inducted as an Executive Committee Member OTAI (E.Z.), Kolkata.
5. Mr K. S. Parasuram former President has donated 25 very valuable Books authored by him on Soaps and Detergents with the directive that the sale proceeds from these Books will be donated to OTAI (E.Z.)

   A very humble gesture indeed !!

International Conference of OTAI was held in New Delhi, hosted by the North Zone. The participants from Eatern Zone were S. K. Roy, Former National President and Mr. Manchanda, Secretary of the Eastern Zone. S. K. Roy was one of the Panel Members in the session on the theme “PACKAGING” on the 30th October 2017 in the International Conference. It was well attended.

**A View on

"QUEST FOR USE OF VEGETABLE OILS IN PROPER PERSPECTIVE*"

Presented by S. K. Roy

By

Asst Prof. Ms. Smita Sahu
Food and Nutrition Division
Bajbaj College under Calcutta University

Dear Sir,

I recently got the opportunity to listen to your lecture titled "Quest for use of vegetable oils in proper perspective" which I found very helpful especially in perspective of nutrition education. There is an increasing trend of the low-fat diet despite several important functions of fat in the human body. This presentation deals with the roles of essential fatty acids found in oil to prevent and treat cognitive problems and some degenerative disorders like Alzheimer's disease. In several studies, it has been shown that choosing right quality of fats and oils in right proportion can lower the serum level of cholesterols and triglycerides resulting in the reduction of risk of coronary heart disease (CHD). The quality of the oils is a real concern as the amount of n-6 PUFA in the Indian diet is much on the higher side than n-3 PUFA. Enlightenment of the cheap quality of the adulterated olive oils available in the Indian market clears that choosing olive oil is not the solution in the Indian context we should aim at blended oils.

As this lecture includes all the indigenous types of cooking oils used in Indian cookery this presentation could be used as a useful means to aware common people about the quantity and quality of oil they should incorporate in their healthy diet.

It would be of immense help if you kindly share your valuable thoughts on the butter-margarine-ghee dilemma albeit they are not vegetable oils.

I look forward to your future pivotal lectures.

Asst Prof. Ms. Smita Sahu
Food and Nutrition Division
Bajbaj College under Calcutta University

OBITUARY

Mr. T. K. Mitra, our C.E.C. Member OTAI (EZ), left for hevenly abode on the 19th September 2017.

Mr. K. C. Lahiri, a Life Fellow Member left for hevenly abode on the 28th October 2017.

Ms. Kusum Khanna, wife of Founder Member Dr. A. S. Khanna an enthusiastic supporter of OTAI left for heavenly abode on the 21st December 2017. She had been a life line for the Annual Social Meet of Eastern Region for decades. Her meticulous planning and, all around vigil during Sports and other activities along with her endearing qualities will be remembered by one and all.

All these members have contributed immensely to the cause of OTAI (EZ). We pray for their souls to rest in Peace.

BLENDS OF RICE BRAN OIL

By

Dr. Surjit Kumar Saha

Chartered Engineer & Oil Technologist

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It is an accepted fact that controlled blending of fatty oils improves the nutritional quality of dietary fats. Vegetable oils contain three types of fatty acids, namely: viz. Saturated (SAFA), Monounsaturated (MUFA) and Polyunsaturated (PUFA). The saturated and polyunsaturated fatty acids respectively are implicated for heart disease and cancer. The monounsaturated fatty acids have a somewhat cushioning effect on the adverse effects of saturated and polyunsaturated fatty acids. The saturated fatty acids are the precursors of bile acid and certain hormones while the polyunsaturated fatty acids include the essential fatty acids. Therefore it can be postulated that an ideal edible oil should contain equal amounts of saturated, monounsaturated and polyunsaturated fatty acids i.e. S:M:P = 1:1:1.

Rice bran oil is extracted from the bran of rice obtained as a byproduct during the process of milling and polishing of rice. As per the Solvent Extractors Association of India (SEA), India has the ability to produce 1.5 million tons of bran oil each year, but demand is negligible, and huge quantity of export of edible oils is not permitted here. According to present scenario near to 900,000 tons of rice bran edible oil is produced and only 300,000 tons is used directly and rest is used by the vanaspati industry or is blended with other oils.

Rice bran oil contains 17% saturated fatty acids, 43% monounsaturated fatty acids and 40% polyunsaturated fatty acids. The ratio of saturated to monounsaturated to polyunsaturated fatty acids (S:M:P) therefore works out to 1.0:2.5:2.4. In addition to this Rice Bran Oil contains tocotrienols and oryzanol. Tocotrienols are the precursors of Vitamin E, which is potent antioxidant. Oryzanol has hypocholesterolemic activity and it is used in the treatment of autonomic asynergia of the nervous system. Rice Bran Oil also contains an enzyme lipase which is responsible for the high free fatty acid (F.F.A.) content of the oil. However alkali refining of Rice Bran Oil significantly reduces the oryzanol content. To conserve the oryzanol content, physical refining has to be resorted to.

Rice Bran Oil has a typical rice taste and odour which restricts its consumption and it is here that the phenomenon of blending Rice Bran Oil with other conventional oils comes into the picture. Blending of Rice Bran Oil with other conventional oils will not only increase the consumption of indigenous Rice Bran Oil but also tend to bridge the gap between

demand and supply of Edible Oils resulting in lower imports and conservation of foreign exchange.

Rice Bran Oil can be blended with conventional edible oils such as groundnut, soybean, safflower, sesame and mustard oil. The approximate contents of saturated, monounsaturated and polyunsaturated fatty acids of different oils and their S:M:P ratios are presented as under :-

Saturated, Monounsaturated and Polyunsaturated Fatty Acid Content of Rice Bran Oil and Some Conventional Oils

OIL	SAFA	MUFA	PUFA	S : M : P
Ricebran Oil	17	43	40	1.0:2.5:2.4
Groundnut Oil	21	43	36	1.0:2.0:1.7
Soybean Oil	17	25	58	1.0:1.5:3.4
Safflower Oil	07	15	78	1.0:2.1:11.1
Sesame Oil	20	40	40	1.0:2.0:2.0
Mustard Oil	07	63	30	1.0:9.0:4.3

The Prevention of Adulteration Act, 1954 and the rules made thereunder advocate blending of not more than two oils and that too the content of each oil in the blend should not be less than 20 percent. Under this guidelines, the oils may be blended as follows to give S:M:P ratio closest to 1:1:1.

Saturated, Monounsaturated and Polyunsaturated Fatty Acid Content of Blends of Rice Bran Oil with some Conventional Oils

Blend No.	Oils in Blend	Content in Blend	S:M:P of Blend
1.	Rice Bran Oil Groundnut Oil	50% 50%	1.0:2.3:2.0
2.	Rice Bran Oil Soybean Oil	50% 50%	1.0:2.0:2.9
3.	Rice Bran Oil Safflower Oil	50% 50%	1.0:2.4:4.9
4.	Rice Bran Oil Sesame Oil	50% 50%	1.0:2.2:2.1
5.	Rice Bran Oil Mustard Oil	50% 50%	1.0:4.4:2.9

Blending of Rice Bran Oil with other conventional oils would not only improve the S:M:P ratio of the blends but also improve the tocotrienol and oryzanol content of the blends. The S:M:P ratio may also be further improved if more than two oils are allowed to be blended and the statutory restrictions pertaining to the content of each oil in the blend is removed. Apart from this, blending of Rice Bran Oil with conventional oils according to regional preferences would also tend to improve the organoleptic properties of rice bran oil as per regional preferences. The Consumer need to be educated about the advantages of blends of Rice Bran Oil. It can also be seen that in all the blends half the amount consists of Rice Bran Oil which would increase the dietary utilisation of Rice Bran Oil and tend to reduce the gap between demand and supply of edible oils. Also since Rice Bran Oil is cheaper than other oils the cost of the blends would be cheaper and that too with better nutritional quality. Thus for the present, the scope of utilisation of Rice bran oil in blends for edible use seems to be unlimited.

FOOD SAFETY

By

Dr. M. K. Kundu

Member (SP), FSSAI, former Edible Oil Commissioner GOI

Food safety is an important global issue with international trade and public health implications. Governments all over the world are intensifying their efforts to improve food quality and consumer safety through compliance with legisiative measures, certification schemes and public participation and involvement in the Programme.

In India, coming into operation effective from 5th August 2011, the Food Safety and Standards Act (FSSA) has been instrumental in bringing about paradigm shift in the approach of the Industry towards quality and consumer safety and security. FSSA recognises that safety can be compromised not only at the manufacturing stage but also at any link in the whole food chain, starting from farm to fork. Each link the whole food chain has to be held accountable for following safety practices which involve risk assessment based on scientific evidences, identification of critical points where possibility is of contamination and parameters to be checked need to be specified. Unlike in the past, the concept is to hold the manufacturer responsible for the safety through documented safety measures rather than simply taking samples from the market and by prosecuting. Further the contamination is defined so as to distinguish between deliberate and unintentional acts or as part of the normal process of manufacture of migration from ingredients so that responsibility can be fixed accordingly. Towards the end, the Act incorporates a graded penalty (financial), depending upon the nature of offences, except in extreme cases.

In the age of globalisation and technological advances, the essential requirements are the modernisation of the Food Industry and assurance of quality and safety of the products, if the Industry has to remain relevant, both domestically and internationally. The objective should be to build products safety as an integral part of how the product raw materials are sourced, the product is manufactured, processed, handled and sold as also reaches the fork level.

There are a no of areas where the Industry faces challenges. It has to address the challenges adequately in order to be able to be globally competitive and recognised. Some of the challenges are :

1) Upgradation of Laboratories

There is a need for review of the existing facilities, Laboratories which could be upgraded so as to enable proper testing and to what extent the existing laboratories need to be upgraded and new facilities to be created.

2) Strengthining Infrastructure of Laboratories

There have been concerns over microbiological contaminants, namely, food and water brone diseases, diarrhoeal diseases, mycotoxins, natural toxins, pesticides residues etc.

Compliance with international standards and export inspection requirements have become mandatory prequisites to achieving global competitiveness in terms of quality and acceptability to the products. Unfortunately, for a country of around 1.3 billion population the current level of infrastructure for referral services, development of standards and equipments are mostly inadequate. Most of the labs lack world class facilities and infrastructure. Many labs are not quipped with basic facilities such as testing for heavy metal contamination and other toxic contaminants. Further testing manuals do not properly prescribe parameters and procedures. The lack of clarity on specific requirements often results in rejection and the point of export/import.

3) Development of Simple Kits

It is a bitter fact that despite a no of measures taken by the Government, there is no evidence that the incidence of marketing of substandard products has come down to any significant extent.

Adulteration of Food, per set, is not a static phenomenon. It is a dynamic one which changes continuously, depending on the cost of the material and may other factors. The consumer like to get maximum quantity for a price as low as possible. The sellers must meet the needs of the buyers to be able to exist, in addition, at times, to illegitimate profit motives. It is a vicious cycle. There is a need to improve the existing methods, innovate newer once for reliability, ease of operation and cost of analysis.

It is necessary to promote consumer awareness so as to ensure availability of safe and wholesome product at reasonable prices. For the purpose, simple test Kits which are indicative and reliable, quick, easy and cost-effective are essential. Test Kits are valuable in such situations.

4) Need to Regular Training Programme

There is a need for regular training programme to be conducted for all those involved in associated with implementation of food safety meassures so as to keep them aware of the changes/developments in the area. In addition to normal training, training on GMP, GHP, HACCP is considered necessary so as to keep the concerned personnel informed of the latest developments in the area.

Small and medium scale industries do not have the resources/technical experties to track the regulatory changes. It is important to design special training programme for them to be able to update the products and processed and thus be able to comply with the quality/hygiene standards.

5) Need for spread of technology

Indian industry is general range from modern, state-of-the-art factories mostly in the organised sector to small units virtually dependent on obsolete technologies/traditional practices. The size and scalability of the manufacturing units also vary widely. Then there is excessive presence of middle men both in terms of sourcing of commodities as also distribution of finished products. Thus there is attendant increase in the risk of exposure to unhygienic environment, contamination and adulteration. There is a need to have a proper mechanism to enable spread of technology among the various sectors of the industry to the extent possible.

6) Organic Food

An organic food is that which is raised, grown, stored and processed without the use of synthetically produced chemicals or fertilisers, insecticides, fungicides or any other pesticides or growth hormones as growth regulators or even irradiation. By organic farming, organic food is produced. The principles of organic framing are natural way of farming based on i) intimate understanding of nature's way, ii) soil considered as a living system and not an inert bowl for unloading chemicals, iii) fertility of the soil due to microbes and other organisms, iv) small quantities of water used.

While organic farming has a multitude of benefits like protecting future generations. preventing soil erosion, protecting water quality, protecting environment etc, it has certain limitations, e.g. i) productivity of food approx 1/3rd of those produced by conventional framing, ii) uncertainties in ensuring farming, iii) farm profits react very sensitively to changes, say, in products prices.

7) Genetically Modified (GM) Foods

GM crops can benefit the consumers primarily in 3 important ways. It provides new tools to very significantly improve crop productivity, both by making conventional breeding faster and more efficient through insertion of novel genes in a crop species, secondly pesticides application may be reduced. Further transgenic methods may be used to improve the micronutrients content and/or bioavailability of commonly eaten foods.

Genetic modifications of oilseeds resulted in products yielding high oleic (18:1) acid, low linolenic (18'3) acid, increased lauric acid and larger yields of many edible Oils. Canola with high lauric acid content, soybean with high oleic acid, b-carotene and iron-rich variety are some examples.

In fact the biotechnology could revolutionse agriculture, very significantly augment the Income of the farmers and could address the pressing problems food, nutrition and water scarcity in the coming years.

While benefit are immense, there are concerns that genetic modifications may result in harm althought there is no documented evidence to this effect. Introduction of GM foods in the food chain is regulated and controlled at various stages both by governmental and international regulatory systems.

USA, Argentina and Canada are the major countries adopting GM crops in a big way. However resistance continues in Europe.

8) Processed and Convenience Foods

Increasing urbanisation, stress of work and high disposable income are having impact on the lifestyle of a large segment of population. This has resulted in increased demand for prepackaged and pre-cooked ready-to-eat foods. There has been tremendous progress in the development of new covenience foods suitable for Indian palate and in their commercial marketing. As per available information, armed forces are the largest users of convenience foods (around 40%).

9) Food Fortification

As defined by WHO 'food fortification is the process whereby nutriebts (in small quantities) are added to foods to maintain of improve the quality of the diet of a group, a community or a population'. Food Fortification has been recognised as the most efficient and most cost-effective strategy of combat hidden hunger (micronutrients malnutrition) and has been successfully used as a tool to fight these deficiencies in many developed and developing countries world over.

The main criteria for selection of suitable vehicles for fortification are i) availability, ii) acceptability, iii) affordability, iv) unrelated to socio-economic status.

Rice, wheat flour, sugar (for iron and vitamin A), edible Oils, vanaspati (for vitamin A), common salt (for iodine) are some of the vehicles which meed these criteria. There are certain issues which are debatable, like cost of Fortification, stability etc. Public Distribution

System (PSD) through its nationwide network could ensure easy reach of the fortified foods among the masses at affordable prices.

Government has been funding many of the above programmes. For a vast country like ours, funds requirements are much higher. All stakeholders should join hands in contributing to the efforts of the Government.

Some of the areas of challenges would need technological cooperation with countries who have relevant technologies. It makes no sense in wasting public money and valuable time in trying to reinvent what are already available elsewhere.

Finally food quality and consumer safety being priority, compliance be the industry with the regulatory measures has become of utmost importance. To ensure compliance, traditional inspector raj must not be allowed to let loose and come in the way of innovation and development. A better approach would be to encourage self-compliance which is an accepted practice in most of the developed countries as also joint regulation with the industry. Approach should be positive, based on trust. It could be reasonably expected to go a long way in reducing iltigation, faster approvals as also better compliance by the Industry. Self-compliance will also incentivise industry to go for innovation.

QUALITY IMPROVEMENT OF BISCUITS BY PEA PROTEIN CONCENTRATE FORTIFICATION

By

***Vishal R. Parate[1], Vanashree B. Shinde[1], Mohammed I. Talib[1]**

[1](Department of Food Technology, UICT, North Maharashtra University, Jalgaon, India)

ABSTRACT :

Safe, quality, nutritious biscuits are always in high demand. The biscuits presently available in market is nutritionally inferior because of low protein content and low protein quality. Peas are a rich source of superior quality proteins and can be used as a dietary protein fortifier. The present study was carried out with the aim to develop protein enriched biscuits by fortifying with pea protein concentrate. Protein enriched sweet variety biscuits were prepared by substituting refined flour with pea protein concentrate (PPC) at various levels (0%, 10%, 15%, 20%, 25%, 30%, 35%). The prepared biscuits were evaluated for their physico-chemical and sensory characteristics. The result revealed that thickness and weight increased where as diameter spread ratio and spread factor for biscuits decreased with increase in the level of PPC fortification. Protein content found to increase linearly with increasing level of PPC fortification without affecting much in other chemical parameters. The statistical alalysis of sensory evaluation data of biscuits suggested that biscuits fortified with 25% and above level of PPC differ significantly with control biscuits at $p<0.05$ as assessed by t-test. The investigation conclude the maximum level of pea protein concentrate which can be incorporated in the formulation of the control biscuits without affecting overall quality is 20%.

Keywords : Protein, Pea protein concentrate, Biscuits, Fortification, Nutrition

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1.0 Introduction

Proteins are nitrogen-containing compounds made up of amino acids unit. They are the major structural component of muscles and other tissues in the body. They are also component of hemoglobin, enzymes and hormones (Hoffman et al. 2004; Gaba and Kaur 2013). As we are getting proteins from diet, out diet should be balanced in terms of proteins. Protein malnutrition is a serious problem in developing country like India's the diet in India is mainly on the basis of cereal dietary pattern. The particular diseases like Marasmus and kwashiorkor are common in the children due to protein deficiency, whereas

in adults, results in poor health and reduced work capacity (Black et al. 2008; But and Batool 2010). Therefore various preparations based on cereal pulsed combinations are of dominant importance to improve the protein quality of Indian diet (Awasthi 2012). Pea proteins, which are quite new industrial proteins, show a well balanced profile of amino acids, particularly a high contentin lysine (Schneider & Lacampagne 2000; Nunesa 2006).

Pea seeds comprise on average about 24% to 25% protein (Owusu-Ansah 1991). Pea protein in an excellent source of protein which have high bioavailability, excellent digestibility, and different animal proteins, offers useful long-term effects on human health (Tomoskozi 2001; Swiatecka 2010; Linder 1985). The potential use of pea proteins is associated to their functional properties such assolubility, emulsifying, foaming and other functional properties (Barac Miroljub 2011; Garbar and Kaur 2013). These functional properties can be improved by enzymatic hydrolysis, yielding products which are better suited to compete with soy protein or other, relatively expensive, proteins such as egg-white protein. Pea protein also has the additional benefit of being hypoallergenic due to the absence of common allergens and intolerance ingredients such as lactose, gluten and wheat. Biscuits are ready-to-eat, economical and such suitable food product that is consumed among all age groups in many countries (Hussein et al. 2006; Iwegbue 2012; Adebowale et al. 2012). Biscuits is a rich in fat and carbohydrate; therefore they can be referred to as energy giving food (Kure et al. 1998; Banureka and Mahendran 2009). The biscuits are however less in proteins and its protein quality considered inferror due to lacking of essential amino acids lysine (Parate et al. 2011). Development of protein fortified biscuits is now a day's therefore the latest trend in bakery industry is also due to their possibility of use in feeding programs and in catastrophic situations such as starvation or earthquakes (Pratima and Yadava 2000; Baljeet et al. 2010; Stark et al. 1975; Hoover 1979).

2.0 Materials and Methods

The raw materials like Maida (Refined flour), fat, sugar, salt, skimmed milk powder (SMP), condensed milk, invert syrup, liquid glucose, lecithin, flavor, ammonium bicarbonate, sodium bicarbonate, and tertiary butyl hydroquinone and other chemicals were purchased from local market of Jalgaon (MS). The protein source pea portein concentrate (PPC) was obtained from Roquette India Pvt Ltd, Pawai, Mumbai (MS). The major ingredients for biscuits making like Maida and PPC was analyzed using methods as mentioned by Raganna (1995). The functional properties of PPC was evaluated by methods given by Malomo (2012).

2.1 Preparation of control biscuits :

The controlled biscuits were prepared in “Good Food Products, MIDC, Jalgaon (MS)” by trial and error method and is given in Table 1. Different parameters of biscuits making process were also set by trial and error method given in Table 2.

2.2 Preparation of pea protein concentrate fortified biscuits :

In present study pea protein concentrate fortified biscuits were prepared by incorporating pea protein concentrate in the formulation of controlled biscuits at level of 10, 15, 20, 25, 30 and 35% by replacing Maida. The water required by the PPC fortified biscuits was more than the control biscuits because PPC was slightly dry than Maida, and PPC had higher quantity of proteins. The processing conditions, procedure and quantity of other ingredients were kept same as that for control biscuits.

2.3 Evaluation of biscuits :

The control and PPC fortified biscuits were analyzed for physical, chemicals, and sensory parameters as per standard methods. Physical parameters like diameter, thickness were measured by using a vernier callipers (ICI) and spread ratio and % spread factor of biscuits was calculated as per the method describes by Adebowale et al. (2012). The biscuits were weighed by using a digital weighing balance (AND HR-200). Chemical analysis of biscuits such as Moisture, Fat, Protein content, Acid insoluble ash, Percent acidity of extrated fat, Crude fiber of biscuits were determined as per standard methods by Raganna (1995). Sensory properties of biscuits were determined by ten semi-trained panelist. A 9 point Hedonic scale was sued for the sensory evaluation of biscuits. Statistical analysis t-test was carried out by using a computer software Microsoft Office Excel 2007.

3.0 Results and Discussion

The raw materials for biscuits making like Maida was analyzed for various chemical parameters. It had moisture, ash, alcoholic acidity, water absorption power, gluten, crude fibre, fat and protein 12.03%, 0.48%, 0.068%, 61.2%, 9.02%, 0.97%, 0.0.88, 9.72% respectively. PPC was found to contain moisture-8.69%, ash-4.01%, fat-1.91%, crude fiber-0.09% and protein 79.90%. The PPC was also evaluated for functional properties which are given in Table 3. The low protein content in Maida indicates its suitability for biscuits making in present work. Also the high protein content (79.9%) in PPC confirms the choice of PPC as fortificant was appropriate for the present work.

The chemical assessment of control and PPC fortified biscuits is given in Table 4. The moisture of control biscuits was found to slightly greater than all the PPC fortified biscuits. The reason behind the same was PPC fortified dough required exess water than the control dough. AS the level of PPC increased in the formulation, the moisture content of biscuits increased because of increase in water content of dough with increasing level of pea portein concentrate in the formulation. The results agreed with other research workers Kar et al. (2012) who reported moisture content of biscuits increased linearly with increase in concentration of protein rich flour. As protein rich flour had higher water holding capacity which was responsible for higher moisture content in biscuits.

All the PPC fortified biscuits were found to contain slightly greater fat that control as PPC had slightly more fat than maida. The ash content slightly increased with the increase in the level of PPC, as PPC had slightly more ash than wheat flour. All the PPC incorporated biscuits had protein content greater than control biscuits (7.5% protein) i.e. from 13.64% to 22.69%. It shows that PPC fortified biscuits contain more protein than the control biscuits. Also it was observed that the protein content increased as increasing he level of PPC. There was no significant effect found on the parameters like acid insoluble ash, acidity of extracted fat and crude fiber of control biscuits owing to incorporation of PPC.

The change in physical parameters of control biscuits due to incorporation of various levels of PPC is shown in Table 5. It was observed that the PPC fortified biscuits had less diameter than the control biscuits for all the level incorporation (10 to 35 percent). The diameter of PPC fortified biscuits was decreasing with increasing level of PPC incorporated. The less reduction in diameter was observed for incorporation 10 and 15 percent as compared to control biscuits. The reduction in diameter was greater for biscuits at the PPC level of 20, 25, 30 and 35%. The thickness of PPC fortified biscuits was greater than that of control biscuits for all the level of PPC incorporated. As the level of PPC incorporation was increased the corresponding increase in thickness was observed. Parate et al. (2011) reported that as the whey proteins were incorporated in biscuits, biscuits shrunk (diameter decreased) and it compensated reduction indiameter by expanding in thickness. Vasantharuba et al. (2012) also reported decrease in diameter and spread ratio of biscuits due to the higher water holding capacity of flour. The spread ratio and spread factor of all PPC incorporated biscuits decreased as the level of pea protein increased. Reduction in spread ratio as well as in spread factor was due to increase in thickness and decrease in diameter of biscuits as a consequence of PPC fortification. Baljeet et al. (2010) also found change in spread ratio and percent spread factor due to change in diameter and thickness of biscuits. All the PPC fortified biscuits had slightly high weight than that of controlled biscuits. It was due to high water holding capacity of

PPC fortified dough. Pea protein concentrate fortified dough was slightly dru as compared to control biscuits dough and required excess water than the control biscuits dough. The result found in the same trend as that by Adebowale et al. (2012).

Date about the sensory evaluation for appearance, colour, flavor, texture and overall acceptability of biscuits are summarized in Table 6. The score of colour reduced significantly for incorporation level 25% and above. It was due to PPC as PPC had slight creamy dark colour than the maida which gave a slight dark colour to biscuit and was not liked much by the panelist. All PPC fortified biscuits was observed in range from 7.36 to 5.97. The significant difference in favour was found at the level of 25 and above. The said deviation in flavor was again due to PPC as PPC carried very slight pea characteristics flavor. The texture of PPC fortified biscuits was slightly harder than control which resulted less score for texture as compare to control for incorporation level 25% and above. Development of roughness was observed on the surface of fortified biscuits for incorporation level of 25% and above and was the cause of poor appearance. The sensory score of control and all the PPC fortified biscuits for overall acceptability is expressed. The sensory score of all the PPC incorporated biscuits for overall acceptability was less than he control biscuits and was decreasing with increasing the level of PPC. On the basis of sensory evaluation (overall acceptability) the maximum level of PPC to be incorporated was found to be 20%.

The Chemical analysis of PPC fortified biscuits signifying the incorporation of all the level of PPC i.e. from 10 to 35 percent as all the incorporation level was increasing protein % in fortified biscuits with minor changes in other chemical characteristics. As per physical analysis significant difference ($p<0.05$) at 1% level of control biscuits observed in spread ratio for all the level of incorporation of PPC. However diameter of biscuits for incorporation level 10, 15 and 20 percent was closer to control biscuits. Therefore on the basis of physical, chemical and sensory evaluation, the maximum level of PPC to be incorporated in the given formulation of control biscuits without affecting overall quality was optimized at incorporation level 20%.

4.0 Conclusion

Substitutions of wheal flour by pea protein concentrate in the formulation of sweet variety biscuits improve the nutritional quality of biscuits by increasing protein content. However such incorporation brings changes in physical as well as sensory characteristics of biscuits depending upon level of incorporation. The pea protein concentrate fortified sweet variety biscuits of acceptable quality can be prepared by incorporating maximum 20 percent level pea protein concentrate.

Table 1 : Receipe of control biscuits

Sl. No.	Ingredients	Quantity
1	Maida	300 g
2	Sugar	116.53 g
3	Fat	220 g
4	Salt	3.46 g
5	Sodium Bicarbonate	1.38 g
6	Ammonium bicarbonate	2.76 g
7	Water	40 ml
8	Licithin	0.9 g
9	Flavor	0.6 ml
10	Invert syrup	13.26 g
11	Liquid Glucose	0.57 g
12	TBHQ	5.76 mg
13	SMP	6 g
14	Condensed milk	6 g

Table 2 : Process parameters for biscuits making

Sl. No.	Parameter	Value
1	Premixing Time	10 min
2	Mixing Time	10 min
3	Standing Time	5 min
4	Forming Dough Thickness	5 mm
5	Forming Dough Diameter	53.4 mm
6	Baking Temperature	180°C
7	Baking Time	12 min
8	Cooling Time	15 min

Table 3 : Functional properties of pea protein concentrate

Parameters	Results
Dispersability%	29+5.29
Water Solubility Index	1.97+1.16
Swelling Power	5.87+1.15

Values are means (+ SD) of 3 determinations

Table 4 : Chemical analysis of control and pea protein concentrate fortified biscuits

Parameters	Level of pea protein concentrate						
	0%	10%	15%	20%	25%	30%	35%
Moisture%	1.52±0.08	1.85±0.51	2.62±0.02	2.67±0.02	2.71±0.06	2.75±0.07	2.77±0.05
Ash%	1.34±0.02	1.92±0.24	2.05±0.07	2.06±0.07	2.21±0.06	2.40±0.20	2.45±0.02
Acid Insoluble Ash	0.051±0.04	0.048±0.03	0.049±0.02	0.050±0.04	0.032±0.03	0.057±0.01	0.048±0.03
Fat%	27.95±0.02	28.13±0.03	28.21±0.19	28.24±0.02	28.51±0.06	29.04±0.04	30.27±0.07
Acidity of Ext. Fat	0.79±0.01	0.80±0.02	0.79±0.03	0.76±0.06	0.82±0.02	0.84±0.01	0.81±0.04
Protein	7.50±0.03	13.64±0.07	14.82±0.02	16.88±0.10	19.18±1.00	20.71±0.99	22.69±0.38
Crude Fibre	0.15±0.03	0.14±0.08	0.13±0.03	0.15±0.01	0.13±0.02	0.13±0.04	0.14±0.05

Values are means (+ SD) of 3 determinations

Table 5 : Effect of different level of pea protein cocentrate on physical characteristics of control biscuits

Parameter	PPC level%						
	0%	10%	15%	20%	25%	30%	35%
Diameter, mm	54.95 ± 0.05^{a}	54.73 ± 0.04^{b}	54.53 ± 0.05^{c}	54.10 ± 0.06^{d}	53.66 ± 0.05^{e}	53.58 ± 0.05^{f}	53.47 ± 0.04^{g}
Thickness, mm	5.96 ± 0.05^{a}	6.11 ± 0.11^{a}	6.36 ± 0.07^{b}	6.61 ± 0.08^{c}	6.87 ± 0.06^{d}	7 ± 0.04^{c}	7.12 ± 0.04^{f}
Spread ratio	9.21 ± 0.07^{a}	8.95 ± 0.09^{a}	8.57 ± 0.06^{b}	8.17 ± 0.09^{c}	7.80 ± 0.07^{d}	7.64 ± 0.05^{c}	7.54 ± 0.04^{f}
Spread factor (%)	100 ± 0.77^{a}	97.17 ± 0.94^{a}	93.05 ± 0.65^{b}	88.70 ± 0.09^{c}	84.69 ± 0.75^{d}	82.95 ± 0.50^{c}	81.86 ± 0.43^{f}
Weight, gm	9.99 ± 0.13^{a}	10.02 ± 0.10^{a}	10.67 ± 0.05^{b}	10.77 ± 0.05^{c}	10.88 ± 0.04^{d}	11.05 ± 0.05^{c}	11.38 ± 0.05^{f}

Values are means (+ SD) of 50 determinations, Means not sharing a common superscript letter in a row are significantly different $p<0.05$ as assessed by t-Test.

Table 6 : Effect of different level of pea protein cocentrate on sensory characteristics of control biscuits

Parameter	PPC level%						
	0%	10%	15%	20%	25%	30%	35%
Colour	7.36 ± 0.38^{a}	$7.32\pm0.41^{a,b}$	$7.2\pm0.38^{a,b,c}$	$7.22\pm0.40^{a,b,c}$	$6.77\pm0.38^{b,c}$	6.49 ± 0.25^{c}	6.16 ± 0.21^{d}
Flavour	7.4 ± 0.20^{a}	$7.36\pm0.22^{a,b}$	$7.31\pm0.21^{a,b,c}$	$7.25\pm0.21^{a,b,c}$	$6.75\pm0.26^{b,c}$	6.4 ± 0.21^{c}	5.97 ± 0.20^{d}
Texture	8.14 ± 0.19^{a}	$8.1\pm0.19^{a,b}$	$8.05\pm0.19^{a,b,c}$	$7.95\pm0.26^{a,b,c}$	7.09 ± 0.09^{b}	6.83 ± 0.14^{c}	6.65 ± 0.10^{d}
Appearance	8.15 ± 0.17^{a}	$8.11\pm0.18^{a,b}$	$8.07\pm0.16^{a,b,c}$	$8.03\pm0.17^{a,b,c}$	$7.4\pm0.27^{b,c}$	7.32 ± 0.28^{c}	7 ± 0.16^{d}
Overall acceptability	7.91 ± 0.07^{a}	$7.87\pm0.08^{a,b}$	$7.82\pm0.12^{a,b}$	$7.82\pm0.12^{a,b}$	6.75 ± 0.15^{b}	6.53 ± 0.18^{c}	6.23 ± 0.23^{b}

Values are means (+ SD) of 10 values, Means not sharing a common superscript letter in a row are significantly different $p<0.05$ as assessed by t-Test.

SKIPPING BREAKFAST

Irregular eating habits such as skipping breakfast are often associated with obesity, type 2 diabetes, hypertension and cardiovascular diseases

Skipping breakfast can disrupt the body's internal clock and cause weight gain, even if one does not overeat for the rest of the day, a study has found.

Irregular eating habits such as skipping breakfast are often associated with obesity, type 2 diabetes, hypertension and cardiovascular disease, but the precise impact of meal times on the body's internal clock has been less clear.

Researchers from Tel Aviv University (TAU) and Hebrew University in Israel found that the effect of breakfast on the expression of "clock genes" that regulate the post-meal glucose and insulin responses of both healthy individuals and diabetics.

The importance of the body's internal clock and the impact of meal times on the body were the subject of this year's Nobel Prize for Medicine, awarded for discovery of molecular mechanisms controlling our circadina rhythm.

"Our study shows that breakfast consumption triggers the proper cyclic clock gene expression leading to improved glycaemic control," said Daniels Jakubowicz of TAU.

"The circadian clock not only regulates the circudian changes of glucose metabolism, but also regulates our body weight, blood pressure, endothelial function and atherosclerosis," said Jakubowicz.

"Proper meal timing - such as consuming breakfast before 9.30 am - could lead to an improvement of the entire metabolism of the body, facilitate weight loss, and delay complications associated with type 2 diabetes and other agerelated disorders," she said.

For the study, 18 healthy volunteers and 18 obese volunteers with diabetes took part in a test day featuring breakfast and lunch, and in a test day featuring only lunch.

On both days, the researchers conducted blood tests on the participants to measure their postprandial clock gene expression, plasma glucose, insulin and intact glucagon-like peptide-I (iGLP-I) and dipeptidyl peptidase IV (DPP-IV) plasma activity.

"Our study showed that breakfast consumption triggers the proper cyclic clock gene expression leading to improved glycaemic control," said Jakubowicz.

“In both healthy individuals and in diabetics, breakfast consumption acutely improved the expression of specific clock genes linked to more efficient weight loss, and was associated with improved glucose and insulin levels after lunch,” she said.

In contrast, in test days featuring only lunch - when participants skipped breakfast - the clock genes related to weight loss were downregulated, leading to blood sugar spikes and poor insulin responses for the rest of the day, suggesting also that skipping breakfast leads to weight gain even without the incidence of overeating the rest of the day.

“The fact that we can change the gene’s expression in just four hours is very impressive,” said Jakubowicz.

PTI

THE GMO IN YOUR MUSTARD IS GOOD

By

Dr. Prof. Deepak Pental*

Former Vice-Chancellor, University of Delhi

Personalities that aspire to be cult figures often resort to hyperbole and lies and Vandana Shiva has done exactly this in her piece, GMO in my mustard, which appeared in this newspaper on August 12, 2005. Before misinformations are nailed, it is important to look at the issue both from scientific and developmental perspective.

Plant breeding since 1900, after Mendelian laws of inheritance were rediscovered, it a science-based technological intervention which has been used to increase productivity of major crops grown around the world. Global population was around 1.6 billion in 1900, today it is 7.2 billion. Average life span at birth in India in 1900 was 23 years, today it is around 65 years.

Just imaging a world in which medical revolution would have occurred, but agriculture would have stayed frozen at 1900 levels — no mechanisation, no chemical fertilisers, no agrochemicals for crop protection and no systematic plant breeding. A health revolution would have caused massive starvations, untold human misery and rise of extreme ideologies.

Two major technologies — dwarfing genes (in wheat, rice and barley) and hybrids (to begin with in maize, later millets and rice and many other crops) — increased crop yields in a big way and saved the work from severe food shortages and famines in the 20th century. In the 1970s and ’80s, backed by some brilliant discoveries on the molecular basis of life, technologies were developed for transferring genes from any organism to plants. The challenge is to use these breakthroughs in an imaginative and safe way to develop low-input, high-output agriculture—low-input both in terms of natural resources and monetary resources.

In 1993, our group (at the Tata Energy Research Institute) made a seminal observation — Indian mustard types produce hybrids that are more productive than the best Indian gene pool lines. Mustard flower has both male and female parts and it predominantly self-pollinates. To develop hybrid seed — we require one of the two parental lines to be made male sterile so that it is forced to cross with the other line to produce hybrid seed. Farmers can grow the hybrid seed and achieve higher production. Our group tested many conventional breeding methods of hybrid seed production, and to date the best results are with the GM method.

The GM technology used in mustard has been used extensively for hybrid seed production in rapeseed — a sister crop of mustard — since it was deregulated in 1995 in Canada, in 2002 in US and in 2003 in Australia. In 2013, Canada grew rapeseed in 7.7 million hectares of land — 100 per cent of Canada's rapeseed in transgenic (GM), 50 per cent under hybrids developed with GM technology and 50 per cent containing resistance to herbicide Glyphosate.

In 2014 alone, Canada exported 9.6 million tonnes of seed, 2.3 million tonnes of oil and 3.4 tonnes of seed meal to all parts of the world. Japan, a country that does not grow any GM crops, was the biggest importer. Canadian rapeseed oil, high in quality, is also bring sold in the Indian market as a premium health oil under the brand name Canola.

In spite of 18 years of safe consumption of millions of tonnes of GM rapeseed oil and meal, GM mustard containing the same three genes that were used in rapeseed has been rigorously tested for all the biolsafty parameters in India. Final reports of all the tests and a request for deregulation will now be submitted to the Genetic Engineering Appraisal Committee (GEAC).

The first generation hybrid developed using GM methodology for pollination control yields 20-30 per cent more than the leading non-GM varieties currently in the field without any additional inputs of water of fertiliser. Better hybrids wil follow as has happened with other crops around the world. As the research on mustard has been funded entirely by the department of biotechnology and National Dairy Development Board (NDDB), hybrid seed should reach the farmers at a very reasonable price.

While the GEAC takes a decision, except massive lies, gross misrepresentations, law suits, innuendoes and demagogy from GM technology bashers. Ms Shiva's article is one such attempt. Let me point out the fallacies and half-truths in her piece. Coconut, safflower and sesams in all probability had Indian origin, but groundnut is from South America, mustard is of Central Asian origin, rapeseed has never been grown in India except very recently. Soybean, contrary to Ms Shiva's rilling against it, is a good oil for health — in 2014, around 48 million tonnes of soy oil was consumed worldwide without any ill effects. Ms Shiva either does not know on in deliberately misinforming — the solvent used to extract soybean oil is "hexane" and not "benzene". India's poor are mostly consuming palm oil and hydrogenated oils — both not very healthy.

Ms Shiva is deliberately confusing a "GM-based pollination control mechanism" for producing hybrids with ill-conceived "Terminator technology". If rapeseed hybrids are based on "Terminator technology" and there is a UN resolution against it, how come

Canada, US and Australia are using if so extensively? Use of a common gene does not transform a “pollination control technology” into a “Terminator technology”.

Yes, GM mustard used a gene conferring resistance to herbicide Glufosinate. It is also correct that all herbicides kill plants, especially weeds. But the truth ends there, rest is mischief. Worldwide agriculture is supported by herbicides. Germany, a country at the forefront of enunciating and following green policies, used around 20,000 tonnes of hernicides of 16 million bectare of land in 2013, three times more than India used for 170 million hectares of land. Why not run a campaign in Germany to ban herbicides? Ms Shiva known nobody will listen. Moreover, in GM technology-based mustard hybrids, Glufosinate will be used only for hybrid seed production and not in the farmers’ field as mustard has no serious weed issues.

Plant breeding, conventional and GM, will be foundational is meeting the challenge of bringing about low-input, high-output agriculture in the 21st century. Use of GM technology in developing productive hybrids in mustard is a step in that direction.

The writer teaches genetics, works on mustard breeding and is former vice-chancellor of University of Delhi.

*Views Expressed are those of the Author.

A RAPID ANALYTICAL METHOD FOR DETECTING FRAUD IN PEANUT OIL

By

Wang Xin and Zhu Wen-ran

Owing to its pleasant flavor and the presence of compounds such as resveratrol, peanut oil is one of the major edible oils in China, along with soybean oil and rapeseed oil. However, peanut oil is more expensive than the other two oils, making it prone to adulteration by unscrupulous dealers. Such dealers may mix varying proportions of cheaper oils, such as soybean oil, sunflower oil, canola oil, or palm oil into peanut oil or, worse, use cheaper oils to make fake peanut oil by adding peanut oil flavor.

- Peanut oil is one of the major edible oils in China, but it is prone to adulteration. Consequently, establishing a simple and rapid method to detect adulteration in peanut oil is important.
- A new method using low-field nuclear magnetic resonance (LF-NMR) and chemometrics was recently developed to enable the rapid authentication of peanut oil.
- The method eliminates the sample pretreatment step, and can reliably detect adulteration of peanut oil with other vegetable oils in a single 5-minute analysis.

The adulteration of oils not only violates the rights and interests of consumers, food processors, and other industries, but can also lead to potential health risks and the resale of “recycled oil” in China. Consequently, the authentication of vegetable oils and detection of adulteration are important to human health and safety, and many studies have focused on detecting oil adulteration. To the best of our knowledge, techniques available for the rapid authentication and detection of adulteration in peanut oil in particular are still limited. Therefore, establishing a simple and rapid method to detect adulteration in peanut oil is important.

^{1}H Low-field nuclear magnetic resonance (LF-NMR) has been proposed as a rapid, simple, and effective tool for wide use in food quality control and material property measurements. Spin-spin relaxation (T_2) is one of the LF-NMR parameters that represent

two features of proton relaxation, and can provide more information about the relaxation time. It has been used to study water mobility in acidified milk drinks, hake muscle after different freezing and storage conditions, and the drying degree and quality of chicken jerky. Moreover, LF-NMR provides a powerful tool to evaluate the quality of deep-frying oil, and there is good correlation between total polar compounds (TPCs), viscosity, and LF-NMR parameters. Nevertheless, there have been very few reports on the measurement of edible oil adulteration by using LF-NMR relaxation measurements.

ANALYTICAL METHODS

Our research group recently reported the development of a new method to enable the rapid authentication of peanut oil using low-field nuclear magnetic resonance (LF-NMR) and chemometrics. The method eliminates the sample pretreatment step, and can reliably detect the adulteration of peanut oil with less expensive vegetable oils and fake peanut oils.

An LF-NMR analyzer NMI20-Analyst (Niumag Electric Corporation, Shanghai, China) combined with a Windows analysis platform, and an inversion of a multiexponential fitting analysis (T-invfit) program were used for the NMR measurements. The strength of the magnetic field was 0.53 T, which corresponded to a proton resonance frequency of 22 MHz.

A comparison of the continuously distributed relaxation spectral curves revealed visible differences between the different oil samples. The hydrogen protons in the oil samples could be categorized into two groups according to their relaxation response in the magnetic field, and the two peaks may be attributed to two distinct mobility populations of the protons on the alkyl chain, or inhomogeneous structural organizations with two different packing densities and intermolecular interaction intensities or types. Thus, the difference of the fatty acid composition may have some influence on their T_2 spectra.

Significant differences in the LF-NMR parameters, single component relaxation time (T2W), and peak area proportion (S21 and S22), were detected between pure and adulterated peanut oil samples.

Both the established principal component analysis (PCA) and discriminant analysis (DA) models based on the LF-NMR relaxation results could correctly distinguish authentic peanut oil (PEO) from fake PEO and the adulterated PEO samples when the adulteration ratio is at least 10% of soybean oil (SO), rapeseed oil (RO), or palm oil (PAO), respectively. It is more difficult to separate the binary oil mixtures groups. The results show that different types of the samples are clustered in different regions of the DA score plot, and higher

correct classification rate of 91.7% and 87.5% could be achieved when the adulterant is PAO or SO, respectively, while a low of 79.2% for RO, provided the adulteration ratio is above 30%. Therefore, the proposed LF-NMR and chemometrics method can reliably distinguish authentic PEO from counterfeit PEO and the PEO samples adulterated with SO, RO, or PAO. A key feature of this new method is that 1H LF-NMR technique can be used to rapidly and simply detect the adulteration of peanut oils, showing advantages over other time-consuming extraction and purification procedures. Furthermore, it offers great potential for screening the oil species in peanut oil blends "in situ."

Wang Xin is an associate professor at University of Shanghai for Science and Technology (USST), Shanghai, China, where her research typically involves the application of different analytical techniques to solve food safety problems of significance to the rural region in which the university is located, such as establishment of method for evaluating oil quality, the quality prediction of frying oil, rapid determination of physicochemical indicators of oil by Near-Infrared Spectroscopy, relationship between physico-chemical indexes of oil, and LF-NMR characteristics during storage or frying. She can be contacted at 18918629281@126.com.

Zhu Wen-ran is a master's degree student at USST, Shanghai, China, where she concentrates on the detection of peanut oil adulterated with lard, vegetable oil, and waste oil using LF-NMR and chemometrics. Her research project is funded by the National Natural Science Foundation of China, as well as the Key Scientific and Technological Projects of Science and Technology Commission of Shanghai Municipality. So far, the research has resulted in two publications, and has been presented at two national conferences. She can be contacted at zhuwenran2014@126.com.

Suggested Reading

Zhu, W., X. Wang, and L. Chen, Rapid detection of peanut oil adulteration using low-field nuclear magnetic resonance and chemometrics, Food Chem. 216: 268–274, 2017, http://dx.doi.org/10.1016/j.foodchem.2016.08.051.

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A REVIEW

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

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

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

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

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

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

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

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Glimpses of Inauguration OTAI, EZ Office 7th Sept. 2005

(From Left to Right) S. K. Roy, President & Mr H Hahiri, Secretary

(From Left to Right) Dr. A. S. Khanna, S. K. Roy

(Facing seated) Dr. B. R. Roy, Mr. K. S. Parasuram, Dr. J. Chakraborty

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

If "health is wealth"
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