LIPID UNIVERSE

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Oil Technologists' Association of India (North Zone)

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Editor-in-chief desk.....

Dear Friends,

Welcome to the latest edition of Lipid Universe, the fascinating world of lipids, oils, fats, and allied products. In this volume, we discussed diverse range of topics that impact our health, culinary choices, and overall well-being.

Ayurveda, the ancient Indian system of medicine, recognizes the therapeutic properties of oils. From sesame oil for abhyanga (self-massage) to ghee for internal consumption, Ayurveda emphasizes the role of oils in promoting balance and vitality. Let us explore the wisdom of Ayurvedic oil therapy and its relevance in modern times.

India, despite being a major consumer of edible oils, imports approximately 65% of its demand. The edible oil import bill rivals that of petroleum. To address this, the government has launched the ambitious National Mission on Edible Oil - Oil Palm, aiming for self-sufficiency. Palm oil, constituting nearly 35% of India's total oil demand, plays a pivotal role. This is a challenge that can be converted into opportunities in edible oil production.

Oils and fats are more than mere cooking ingredients. They provide essential fatty acids, fat-soluble vitamins and micronutrients and energy. We explore the nutritional profiles of various oils such as olive, coconut, sunflower, mustard, soyabean, cottonseed and more. Understanding their unique properties help us to make informed dietary choices. One distinct category of lipids called short-chain fatty acid esters of hydroxy fatty acids (SFAHFAs), detected in tea are essential metabolites for maintaining gut health.

As we embark on this lipid-rich journey, let us celebrate the diversity of oils, honor ancient wisdom, and embrace modern science. Remember, every drop of oil holds a story-a story of nourishment, tradition, and resilience.

Stay curious, stay healthy!

Yours truly
C.S. Joshi
Editor-in-chief

Editor-in-chief desk.....

Editor's desk.....

Plants provide food and also medicines for the disease of human beings. With practical experiences of thousands of years carried forward from generation to generation, human beings started using plants for curing diseases, protecting their lives and sustaining for a longer period as noted in Vedas.In India during ancient period, Rigveda (5000 years B.C) mentioned 67 medicinal plants, Yajurveda 81 and Atharvaveda(4500 years B.C)290 plants.Later,in three major classical texts of Ayurveda, viz.Charaka, Sushruta and Vaagbatta, the use of about 700 plants for medicinal purpose is mentioned.In Charaka Samhita(700 years B.C)and Sushruta Samhita (200 years B.C), properties of 1100 plants & 1270 plants respectively have been described in compounding of drugs, and those are still used in classical formulations in Ayurvedic System of medicine.The World Health Organization (WHO) has compiled a list of about 20,000 medicinal plants used in different parts of the world.

Plant oils are used in herbal systems throughout the world and they have their greatest diversity and importance in Ayurveda. Plant oils have wide spectrum of applications not only in the field of edible oils and oleo-chemicals (cosmetics and personal care products) but also in the field of Ayurveda.Our article written on "Oil Therapy" in this issue of Lipid Universe, being the first time that we introduced, would reflect as why it is so essential for most forms of treatment in balancing the three biological humors (doshas) - vata,pitta and kapha.

Yours truly

Dr. S. Adhikari

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OIL THERAPY AND VATA - PITTA - KAPHA

Dr. S. Adhikari

Introduction :

Ayurvedic diagnosis of disease is based on the three biological humours or three primary life-forces in the body. These are called in Sanskrit “vata”, “pitta” and “ kapha”. They correspond primarily to the element of air, fire and water. As the active and mobile elements, they determine the life processes of growth and decay.

The Ayurvedic term for humor is Dosha, meaning that which darkens, spoils or causes things to decay. When out of balance, the humours are the causative forces in the disease process.

The biological air humor is called **Vata,** sometimes also translated as wind. In terms of etimology it means ‘that which moves things’. It is the motivating force behind the other two humours, which are considered to be lame, incapable of movement without it. It also governs our sensory and mental balance and orientation, and promotes mental adaptability and comprehension.

The biological fire humor is called **Pitta**, sometimes are translated as bile. Its etimological meaning is ‘that which digests things’. It is responsible for all chemical and metabolic transformations in the body. It also governs our mental digestion, our capacity to perceive reality and understand things as they are.

The biological water humor is called **Kapha**, sometimes also translated as phlegm. Etimogically it means ‘that which holds things together’. It provides substance and gives support, and makes up the bulk of our bodily tissues. It also provides our emotional support in life and governs such positive imotional traits as love, compassion, modesty, patience and forgiveness.

Use of Oils and their Types :

Various oils are commonly used in herbal systems throught the world, but they have their greatest diversity and importance in Ayurveda. Oil is specific for Vata (air or wind) disorders. As these constitute the majority of diseases, oil therapy is essential for most forms of treatment.

Oils are usually of two types, which can be combined. First, there are heavy or fatty oils. These are vegetable oils like sesame and animal oils like ghee (clarified butter) or animal fat. With their nutritive properties they combine well with tonic herbs like licorice or ashwagandha. The second essential oils: subtle aromatic oils from fragrant or pungent plants like mint or Jasmine. They are active in small amounts and, when combined with heavier oils, help activate them and give them greater powers of penetration.

Oil Therapy and the different Humors:

VATA (AIR)

For Vata the best general oil is sesame. It is warm, heavy, lubricating, nourishing to the skin, bones and nerves and calms the mind. It is said to be the only oil that has the power to penetrate all seven layers of the skin and to nourish all the organs and tissues. Almond or Olive oil are also good but can not substitute for sesame in severe diseases.

Many tonic herbs are good prepared in sesame oil, such as ashwagandha, shatavari, and Bala. The

nutritive, softening, demulcent action of the oils and tonic herbs works synergistically. This combination is necessary for lowering high Vata.

Special Ayurvedic oils for Vata include Mahanarayan and Narayan. Most Ayurvedic oils are good for Vata.

Essential Oils -
Best for Vata are warm, stimulating essential oils like camphor, wintergreen, cinnamon, musk, galangal or cyperus, combined with calming, nutritive and grounding oils like sandalwood, rose or Jasmine. Both do better added to the heavy oils and tonics mentioned above. In an alcohol base they may be too light to really alleviate Vata, which may be irritated by fragrances that are too strong or perfumy.

PITTA (FIRE)

For Pitta the best general oil for external usage is coconut oil. It is cooling and calming and relieves thirst and burning sensations. Sunflower oil is also helpful and can be used for inflammatory skin conditions. Sometimes sesame oil is used as a base for anti - Pitta oils with the addition of cooling herbs that neutralize its slightly warming energy. Some Pitta types who can not tolerate sesame oil (it causes itching) do well with olive oil.

Ghee (clarified butter) is usually the best oil for Pitta, but mainly for internal usage. However, it can be used externally and was in Vedic times, particularly if aged in a copper or silver vessel.

Cooling and calming tonic herbs should be added to these oil based, including shatavari, gotu kola, bhringaraj. Formulas include Brahmi oil and Bhringaraj oil.

Essential oils -
Pitta types enjoy fragrant flowers as most flowers have cooling and calming propertiies. Good flowery oils for Pitta include gardenia, jasmine, rose, honeysuckle, violet, iris, and lotus. The best essential oil for Pitta is sandalwood, especially when applied regularly to the third eye. Other good cooling oils that can be applied to the head are lemon grass, lavender, mint, henna and vetivert.

KAPHA (WATER)

For Kapha the best general oil is mustard oil. It is warm, light and stimulating and dispels phlegm. Another good drying oil for Kapha is flaxseed (linseed) oil. When Kapha is very high, however, all oils may have to be avoided.

Essential oils -
Kapha does best with essential oils that are warm, light, stimulating and expectorant. Good oils include sage, cedar, pine, myrrh, camphor, musk, patchouli, and cinnamon. Kapha can tolerate and should use strong, sharp and stimulating fragrances, though may prefer those that are sweet. Plasters of these herbs or the oils in rubbing alcohol can be applied when Kapha can not tolerate any heavy oils.

Applications and Uses :

Oil therapy is indicated in diseases of the nervous system, bones and the deeper tissues. Ayurvedic oils are mainly for external use. They include application of oils to the nasal passage, the ears, mouth and other orifices and in medicated enemas, as well as massage. Simple oils can be homemade, or special preparations can be purchased.

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TRADE NEWS

Oil Seeds Scenario

India is the fourth largest oil seeds producer in the world. It has 20.8% of the total area under cultivation globally, accounting for 10% of global production. The country produces Groundnut, Soybean, Sunflower, Sesamum, Niger seed, Mustard, And Safflower oil seeds.

Nearly 72% of the oil seed area is restricted to rainfed farming done by small farmers which leads to poor productivity. However, a breakthrough was realized in oilseed production by introducing the latest crop production technologies. As per the second

advance estimates of production of oil seeds and commercial crops for 2023-24, the production of the total oil seeds was estimated to be 365.99 lakh tonnes.

The production of oil seeds in India has been growing for the last five years. According to the final estimates of production of major crops for the year 2022-23, the total oil seeds production in the country was estimated at record 413.55 lakh tonnes which is higher by 33.92 lakh tonnes than the previous year's oil seeds production. The production of oil seeds during 2022-23 was higher by 73.33 lakh tonnes than the average oil seeds production of 340.22 lakh tonnes over the past five years. From the year 2015-16 to 2022-23, the compound annual growth rate (CAGR) of oil seed production was 7.3%.

This was achieved due to the implementation of various programs like special programmes on mustard & rapeseed during Rabi and cluster demonstrations of improved technology by the Government of India.

The largest oilseed-producing states in India include Rajasthan, Madhya Pradesh, Gujarat, Maharashtra, Haryana, Uttar Pradesh, West Bengal, Karnataka, Tamil Nadu, and Telangana. Out of these states, Rajasthan, Madhya Pradesh, Gujarat, and Maharashtra were the top producers during 2021-22 with a share of about 23%, 21%, 18% and 16% of the total production, respectively.

Courtesy : *Last Updated : April,2024*

SEA asks govt to bring finished products of oleochemical industry under 'restricted' list

Large scale import of finished products such as stearic acid, refined glycerine, soap noodles and oleic acid at nil duty from countries in South-East Asia affecting domestic industry.

Solvent extractors' Association of India (SEA) President, Ajay Jhunjhunwala concerns over the threats being faced by the domestic oleochemical industry due to large scale import of finished products such as stearic acid, refined glycerine, soap noodles and oleic acid at nil duty from countries in South-East Asia, the Solvent Extractors' Association of India (SEA) has asked the Government to place them under the restricted items list.

In a memorandum submitted to Piyush Goyal, Union Minister of Commerce and Industry, Consumer Affairs and Food and Public Distribution, the SEA President, Ajay Jhunjhunwala, said oleochemicals

are the chemicals derived from vegetable oils and fats.

Stating that large investments and capacity expansion have happened in this sector in India in the last decade, he said India has high domestic consumption as well as potential to grow further.

Existential threat

Domestic oleochemical industry industry is facing severe existential threat due to increasingly large scale import of finished products such as stearic acid and refined glycerine at 5 per cent duty, and soap noodles and oleic acid at nil duty from countries such as Malaysia, Indonesia and Thailand.

Refined palm stearine, which is the raw material to produce these oleochemicals, is allowed to be imported with a basic duty of 12.5 per cent.

He said finished oleochemicals are getting dumped in India at nil or subsidised duty at the cost of domestic oleochemicals industries. Due to this anomalous situation, India's domestic oleochemicals manufacturers producing the same are getting seriously affected.

Imports up

India's stearic acid imports increased from 756 tonnes in 2015-16 to 25,873 tonnes during 2023-24 (till November-end), and soap noodles from 3,286 tonnes in 2015-16 to 62,483 tonnes till the end of November 2023-24.

Refined glycerine imports to India increased from 10,764 tonnes in 2015-16 to 48,748 tonnes in 2023-24 (till November-end), and import of oleic acid increased from 31,329 tonnes in 2015-16 to 61,555 tonnes till the end of November 2023-24.

Jhunjhunwala said many countries have protected their oleochemical industry by putting restriction or higher duty on finished products from Indonesia and Malaysia. Recently European Union has safeguarded its oleochemical industries by putting anti-dumping duty on Indonesian products, he said.

Jhunjhunwala said imports of stearic acid, soap noodles, oleic acid and refined glycerine should be placed under 'restricted' items list. He said import duty on these products should be with additional duty of 25 per cent over the imported raw material such as refined palm stearin.

He urged the Government to allow duty-free imports of all required raw materials to oleochemical players having splitting, distillation and hydrogenation plants.

These actions will help the domestic oleochemical industries to thrive and grow, and help realise the Prime Minister's vision of Make in India, he added.

Courtesy: *businessline, February 12,2024*

MIRACLES - Multi-product Integrated bio-Refinery of Algae: from Carbon dioxide and Light Energy to high-value Specialties

MIRACLES is an industry driven R&D and innovation project tasked with the development of economically feasible bio -refinery concepts for specialties from microalgae. The project consortium comprises 26 partners with complementary expertise including 11 research organizations, 12 SME's and 3 multinational companies/end users. The project addresses FP7 Work program topic KBBE.2013.3.2-02: The CO2 algae bio- refinery. This 4-year project started in 2013, and ended in 2017.

Microalgae biotechnology has large potential as a production platform for food and non-food products. Successful scale-up requires reduction of production costs and enhancement of the economic output. The project results contribute to this goal by successful development of:

- technological innovations enabling cost reduction in algae production, harvesting and processing;
- multiproduct bio-refinery concepts with a profitable business potential;
- a range of new specialty products for application in food, aquaculture and non-food.

  By combining cost reduction and value creation MIRACLES contributes towards economically viable microalgae production, demonstrating commercial feasibility and potential profitability of a microalgae venture. The main achievements leading to cost reduction and value creation are:

- a supported amine based technology for CO2 capture from air for algae growth at competitive costs;
- a novel liquid foam bed photo bioreactor concept that enables a large reduction of energy use and costs in algae production and harvesting;
- new molecular tools for real-time monitoring and control of TAG and EPA during cultivation of Nano chlorosis for cost reduction and enhancement of revenues;
- a submerged membrane system for combined biomass pre-concentration and medium recycling enabling substantial cost savings;
- new, robust production strains for valuable target products with validated outdoor production performance in the tested locations;
- a processing platform (using green solvents) for sequential extraction and fractionation of high added value components from algae biomass for food, pharma and cosmetics;
- knowhow on algae bio-refinery and improved technologies for cell disruption, extraction and fractionation, integrated into multiple product bio-refinery flowsheets;
- the validation of new high value applications for microalgae in the field of food emulsification and preservation, functional aqua feed, plant growth promotors, cosmetics and bio-based materials;
- a positioning strategy based on identified consumer perception, enabling the added value potential of the new applications.

The project has achieved considerable progress beyond the state of the art and a range of exploitable results incl. technologies, new product applications and business models, supported by a marketing and business plan and extensive dissemination and exploitation activities.

Courtesy *– Co ordinado por:-*
WAGENINGEN UNIVEERSITY – Netherlands.

Nano - droplets of Docosahexaenoic Acid-Enriched Algae Oil Encapsulated within Micro -particles of Hydrocolloids by Emulsion Electro-spraying Assisted by Pressurized Gas

Long chain polyunsaturated omega-3 fatty acids (PUFAs), namely eicospentaenoic acid (EPA) and docosahexaenoic acid (DHA), are important functional ingredients due to their well-documented health benefits, but highly susceptible to oxidation. One of the most promising approaches to preserve bio-actives is their encapsulation within protective matrices. In this paper, an innovative high throughput encapsulation technique termed as emulsion electro-spraying assisted by pressurized gas (EAPG) was used to encapsulate at room temperature nano— droplets of algae oil into two food hydrocolloids, whey protein concentrate and maltodextrin. Spherical encapsulating particles with sizes around 5 μm were obtained, where the oil was homogeneously distributed in nano-metric cavities with sizes below 300 nm. Peroxide values under 5 meq / kg, demonstrated that the oil did not suffer from oxidation during the encapsulation process carried out at room temperature. An accelerated stability assay against oxidation under strong UV light was performed to check the protective capacity of the different encapsulating materials. While particles made from whey protein concentrate showed good oxidative stability, particles made from maltodextrin were more susceptible to secondary oxidation, as determined by a methodology put forward in this study based on ATR-FTIR spectroscopy. Further organoleptic testing performed with the encapsulates in a model food product, i.e., milk powder, suggested that the lowest organoleptic impact was seen for the encapsulates made from whey protein concentrate. The obtained results demonstrate the potential of the EAPG technology using whey protein concentrate as the encapsulating matrix, for the stabilization of sensitive bioactive compounds.

Courtesy: *Novel Materials and Nanotechnology Group, Institute of Agro chemistry and Food Technology (IATA), Spanish Council for Scientific Research (CSIC). Callo Catedrático Agustín Escardino Benlloch 7, 46980 Paterna, Spain*

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Global DHA Algae Oil Market Insights

It contains Omega-3 unsaturated fat, which is an important auxiliary component of the human brain. It is also essential for proper cell function and has numerous health benefits for the body and brain. Its consumption aids in cognitive development as well as heart and eye development. The growing use of this oil in the food and beverage industries is the primary driver of the global market. It has gained popularity in the medical field due to its high concentration of phyco-cyanin, proteins, and cell reinforcements derived from DHA and Omega-3.

Growing consumer awareness about the importance of having a strong immune system to fight COVID-19 is expected to drive demand for nutritional food products containing high levels of protein, such as protein bars and healthy snacks, among other things. The expansion of health products during and after the pandemic, as well as the increasing shift from meat products to plant-based products due to the fear of virus transmission through meat products, are expected to boost the DHA algae oil market revenue. Since algae oil is regarded as a superfood, it is used as a food ingredient. It is high in monounsaturated fatty acids (MUFA) and Omega-3 fatty acids. Algae oil is also used as a feed ingredient in fish and seafood farming. Several novel applications of algae oil are being investigated, including its use in the production of synthetic polymers, soaps and surfactants, and nutraceuticals.

Courtesy: *SKYQUEST,*
Report ID: *SQSG30H2020 and*
Published Date: *February, 2024.*

IMPORTANT FIGURES

Table 1: India Oilseeds and Products Supply and Distribution

Thousand Metric Tons

2019/20		2020/21	2021/22	2022/23	Mar2023/24	Apr 2023/24
Production						
Oilseed, Cottonseed	12,100	11,675	10,316	11,166	10,826	10,826
Oilseed, Peanut	6,255	7,300	8,700	6,300	6,400	6,400
Oilseed, Rapeseed	7,400	8,600	11,100	11,300	12,500	12,500
Oilseed, Soybean	9,300	10,456	11,889	12,411	11,000	11,000
Oilseed, Sunflowerseed	140	150	140	215	112	112
Other	998	1,003	1,021	1,022	1,021	1,021
Total	36,193	39,184	43,166	42,414	41,859	41,859
Domestic Consumption						
Meal, Cottonseed	4,523	4,584	4,238	4,443	4,311	4,311
Meal, Rapeseed	3,100	3,650	4,375	4,350	4,700	4,700
Meal, Soybean	5,780	5,850	6,273	6,625	7,050	7,050
Other	2,541	2,445	2,348	2,176	2,157	2,157
Total	15,944	16,529	17,234	17,594	18,218	18,218
SME						
Meal, Cottonseed	3,665	3,714	3,434	3,600	3,493	3,493
Meal, Rapeseed	2,206	2,597	3,113	3,095	3,344	3,344
Meal, Soybean	5,500	5,500	5,873	6,225	6,600	6,600
Other	2,239	2,191	2,177	2,021	1,970	1,970
Total	13,610	14,003	14,597	14,941	15,407	15,407
Food Use Dom. Cons.						
Oil, Cottonseed	1,350	1,360	1,250	1,315	1,250	1,270
Oil, Palm	8,050	8,850	7,800	8,300	8,900	8,700
Oil, Peanut	1,150	1,160	1,185	1,050	1,050	1,050
Oil, Rapeseed	2,700	2,700	3,700	3,600	4,000	4,000
Oil, Soybean	5,125	4,950	5,825	5,400	5,150	5,150
Oil, Sunflowerseed	2,560	2,250	1,900	2,700	2,700	2,900
Other	380	400	375	400	416	416
Total	21,315	21,670	22,035	22,765	23,466	23,486

2019/20		2020/21	2021/22	2022/23	Mar2023/24	Apr 2023/24
Domestic Consumption						
Oil, Cottonseed	1,395	1,408	1,295	1,361	1,296	1,320
Oil, Palm	8,450	9,225	8,150	8,900	9,550	9,350
Oil, Peanut	1,160	1,170	1,195	1,060	1,060	1,060
Oil, Rapeseed	2,780	2,780	3,780	3,680	4,080	4,080
Oil, Soybean	5,125	4,950	5,825	5,400	5,150	5,150
Oil, Sunflowerseed	2,560	2,250	1,900	2,700	2,700	2,900
Other	704	747	674	710	736	736
Total	22,174	22,530	22,819	23,811	24,572	24,596
Imports						
Oil, Cottonseed	3	8	4	1	3	3
Oil, Palm	7,398	8,411	8,004	10,045	9,200	9,000
Oil, Peanut	0	0	0	0	0	0
Oil, Rapeseed	78	25	34	6	5	5
Oil, Soybean	3,626	3,251	4,231	3,968	3,300	3,300
Oil, Sunflowerseed	2,514	1,958	1,956	2,988	2,700	2,900
Other	113	157	80	111	135	135
Total	13,732	13,810	14,309	17,119	15,343	15,343

Table 2 : World Oilseeds and Products Supply
Metric Tons

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Food Use Dom.	Domestic Consumpti	Ending Stocks
Major Oilseeds									
2010/11	245.61	77.57	459.59	105.02	642.18	108.11	35.90	445.03	89.04
2011/12	249.06	89.04	447.11	113.33	649.47	111.07	36.10	466.12	72.28
2012/13	257.80	72.28	475.41	114.72	662.42	118.26	36.48	472.01	72.16
2013/14	261.65	72.16	503.83	133.89	709.87	133.97	37.36	494.77	81.13
2014/15	268.08	81.13	540.07	143.67	764.86	147.52	38.85	521.40	95.94
2015/16	265.77	95.94	524.89	154.46	775.29	153.93	40.15	527.86	93.50
2016/17	270.63	93.58	577.27	167.65	838.50	171.61	41.58	556.30	110.60
2017/18	281.94	110.60	583.82	176.53	870.95	177.49	43.03	574.93	118.53
2018/19	282.94	118.53	601.50	168.04	888.06	172.08	43.77	582.03	133.96
2019/20	281.34	133.96	582.13	189.86	905.95	191.67	45.23	601.99	112.29
2020/21	287.96	112.29	610.09	190.95	913.33	192.33	46.96	607.09	113.90
2021/22	296.71	113.90	611.55	177.50	902.95	179.56	47.95	611.37	112.01
2022/23	304.08	112.01	637.47	197.55	947.04	202.02	49.14	625.13	119.88
2023/24	307.46	119.88	658.50	194.96	973.35	199.41	50.48	643.34	130.60
Major Protein Meals									
2010/11	nr	10.56	256.89	75.11	342.55	77.92	0.33	251.56	13.07
2011/12	nr	13.07	267.54	79.41	360.02	81.13	0.40	263.95	14.94
2012/13	nr	14.94	269.48	75.26	359.68	79.48	0.43	266.61	13.59
2013/14	nr	13.59	282.65	80.97	377.21	83.54	0.44	278.47	15.20
2014/15	nr	15.20	300.85	82.94	398.98	86.61	0.45	294.03	18.35
2015/16	nr	18.35	306.00	84.15	408.50	87.39	0.47	302.80	18.30
2016/17	nr	18.65	320.80	85.55	425.00	89.73	0.52	316.10	19.18
2017/18	nr	19.18	331.41	87.35	437.94	90.99	0.54	326.14	20.81
2018/19	nr	20.81	333.43	90.29	444.52	95.29	0.61	329.57	19.66
2019/20	nr	19.66	346.77	91.75	458.18	96.06	0.70	341.42	20.70
2020/21	nr	20.70	351.33	92.79	464.82	97.45	0.77	347.89	19.47
2021/22	nr	19.47	350.98	94.17	464.63	96.54	0.81	348.08	20.01
2022/23	nr	20.01	357.27	92.85	470.13	97.72	0.81	355.39	17.02
2023/24	nr	17.02	369.60	99.03	485.65	102.84	0.87	364.50	18.31

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Food Use Dom.	Domestic Consumpti	Ending Stocks
Major Vegetable Oils									
2010/11	17.51	17.10	149.16	56.68	222.93	60.62	109.82	142.20	20.11
2011/12	18.52	20.11	157.87	61.32	239.30	64.73	115.39	151.10	23.47
2012/13	19.23	23.47	161.25	64.77	249.48	68.27	120.26	157.68	23.53
2013/14	20.12	23.53	171.59	66.65	261.77	70.12	125.17	165.93	25.71
2014/15	20.96	25.71	177.51	70.17	273.39	76.55	130.32	169.81	27.03
2015/16	22.06	27.03	176.38	70.43	273.84	73.84	134.69	176.96	23.03
2016/17	23.18	23.03	189.16	76.19	288.38	82.01	138.45	182.43	23.94
2017/18	24.14	23.94	198.77	76.13	298.83	80.99	142.33	190.95	26.89
2018/19	24.60	26.89	204.08	82.09	313.07	86.88	145.47	197.66	28.53
2019/20	25.04	28.53	207.63	82.80	318.96	87.17	148.58	201.32	30.46
2020/21	25.36	30.46	207.59	81.20	319.25	85.79	151.08	204.32	29.14
2021/22	25.96	29.14	208.13	74.24	311.51	79.56	149.45	202.60	29.34
2022/23	27.09	29.34	217.88	83.64	330.86	88.77	152.96	210.74	31.34
2023/24	27.70	31.34	223.17	83.81	338.32	89.09	157.08	218.15	31.08

Table 3: World Soybeans and Products Supply
Million Metric Tons

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Crush	Domestic Consumpti	Ending Stocks
Oilseed, Soybean									
2010/11	103.82	62.81	265.07	89.74	417.62	91.35	222.40	252.76	73.51
2011/12	103.04	73.51	241.19	94.66	409.36	91.83	229.39	259.47	58.06
2012/13	110.39	58.06	268.97	97.13	424.16	100.41	232.12	265.43	58.33
2013/14	113.22	58.33	283.38	113.28	454.98	112.80	243.28	278.33	63.86
2014/15	119.20	63.86	321.51	124.36	509.73	126.44	265.35	303.98	79.31
2015/16	120.91	79.31	316.14	134.04	529.49	132.84	275.83	316.96	79.69
2016/17	120.59	79.71	350.88	145.00	575.59	147.74	288.46	332.23	95.63
2017/18	125.27	95.63	343.82	154.17	593.62	153.40	295.76	340.39	99.83
2018/19	126.08	99.83	363.51	145.92	609.26	149.22	299.30	345.78	114.27
2019/20	123.57	114.27	341.43	165.30	621.00	165.82	312.51	359.92	95.25
2020/21	129.73	95.25	369.22	166.20	630.67	165.18	318.07	366.86	98.64
2021/22	131.46	98.64	360.45	154.47	613.55	154.43	316.51	366.03	93.09
2022/23	136.86	93.09	378.20	167.87	639.16	172.09	315.03	365.76	101.31
2023/24	139.47	101.31	396.73	170.33	668.37	173.06	328.03	381.08	114.22
Meal, Soybean									
2010/11	nr	7.34	175.10	56.85	239.29	58.92	222.40	170.94	9.43
2011/12	nr	9.43	181.01	57.21	247.65	58.73	229.39	177.90	11.03
2012/13	nr	11.03	182.38	54.57	247.98	58.50	232.22	178.81	10.67
2013/14	nr	10.67	190.66	58.49	259.83	60.86	243.38	187.24	11.73
2014/15	nr	11.73	208.74	61.40	281.87	64.64	265.36	202.59	14.65
2015/16	nr	14.65	216.43	63.35	294.42	65.85	275.84	213.84	14.73
2016/17	nr	14.90	226.38	61.72	303.00	65.41	288.47	222.40	15.19
2017/18	nr	15.19	232.93	62.89	311.02	65.80	295.76	229.03	16.19
2018/19	nr	16.19	234.42	63.55	314.16	68.06	299.30	230.86	15.25
2019/20	nr	15.25	245.52	63.98	324.74	67.94	312.51	240.74	16.05
2020/21	nr	16.05	250.00	65.29	331.35	69.44	318.07	246.16	15.76
2021/22	nr	15.76	248.40	67.13	331.29	68.80	316.51	246.05	16.43
2022/23	nr	16.43	247.77	62.97	327.17	67.27	315.03	246.61	13.28

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Crush	Domestic Consumpti	Ending Stocks
2023/24	nr	13.28	257.68	67.41	338.37	70.49	328.04	253.59	14.30
Oil, Soybean									
2010/11	nr	3.84	41.51	9.42	54.76	9.68	222.40	40.52	4.56
2011/12	nr	4.56	42.87	8.02	55.44	8.55	229.39	42.43	4.47
2012/13	nr	4.47	43.41	8.53	56.40	9.36	232.21	42.59	4.45
2013/14	nr	4.45	45.32	9.35	59.13	9.43	243.38	45.47	4.23
2014/15	nr	4.23	49.38	10.18	63.79	11.19	265.35	47.83	4.77
2015/16	nr	4.77	51.65	11.74	68.16	11.83	275.83	52.13	4.19
2016/17	nr	4.21	53.95	11.22	69.38	11.45	288.46	53.55	4.38
2017/18	nr	4.38	55.31	10.05	69.74	10.78	295.76	54.41	4.55
2018/19	nr	4.55	56.16	10.93	71.64	11.48	299.30	55.32	4.85
2019/20	nr	4.85	58.52	11.61	74.98	12.38	312.51	57.17	5.42
2020/21	nr	5.42	59.67	11.70	76.79	12.61	318.07	58.69	5.50
2021/22	nr	5.50	59.62	11.35	76.47	12.32	316.51	59.52	4.63
2022/23	nr	4.63	59.24	10.93	74.81	11.65	315.03	58.28	4.89
2023/24	nr	4.89	61.63	10.72	77.24	11.41	328.03	60.67	5.16

Ba Based on the aggregate of different marketing years, primarily October through September

Table 4: World Rapeseed and Products Supply and Distribution

Million Metric Tons

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Food Use Dom.	Domestic Consumpti	Ending Stocks
Oilseed, Rapeseed									
2010/11	33.84	8.70	60.85	10.18	79.73	10.93	0.46	60.09	8.71
2011/12	33.55	8.71	61.55	13.24	83.51	12.99	0.46	63.73	6.79
2012/13	36.07	6.79	63.67	12.83	83.29	12.57	0.48	65.20	5.52
2013/14	36.07	5.52	71.11	15.55	92.18	15.10	0.50	69.28	7.80
2014/15	35.43	7.80	70.99	14.32	93.11	15.11	0.56	70.63	7.37
2015/16	33.75	7.37	69.40	14.13	90.90	14.40	0.66	70.14	6.37
2016/17	33.80	6.42	70.17	15.80	92.38	16.15	0.66	70.93	5.31
2017/18	36.17	5.31	75.80	15.73	96.83	16.60	0.66	72.10	8.14
2018/19	36.23	8.14	73.48	14.64	96.26	14.70	0.17	71.87	9.69
2019/20	35.15	9.69	70.32	15.82	95.83	16.00	0.27	72.27	7.56
2020/21	35.34	7.56	74.74	16.67	98.96	18.03	0.67	74.90	6.03
2021/22	38.45	6.03	75.82	13.92	95.78	15.35	0.67	76.03	4.41
2022/23	41.95	4.41	88.83	20.04	113.28	19.78	0.72	85.07	8.43
2023/24	42.50	8.43	88.39	16.36	113.17	17.32	0.75	88.03	7.82
Meal, Rapeseed									
2010/11	nr	1.23	33.52	5.32	40.07	5.28	0.00	33.74	1.05
2011/12	nr	1.05	35.11	5.57	41.73	5.56	0.00	35.05	1.11
2012/13	nr	1.11	36.10	5.63	42.84	5.70	0.00	36.24	0.90
2013/14	nr	0.90	38.54	6.51	45.95	6.36	0.00	38.69	0.90
2014/15	nr	0.90	38.99	6.01	45.90	6.07	0.00	38.86	0.97
2015/16	nr	0.97	38.84	5.71	45.52	5.70	0.00	38.67	1.15
2016/17	nr	1.33	39.10	6.19	46.62	6.26	0.00	38.96	1.40
2017/18	nr	1.40	39.66	6.51	47.57	6.68	0.00	39.43	1.46
2018/19	nr	1.46	39.58	7.17	48.21	7.22	0.00	39.74	1.26
2019/20	nr	1.26	39.83	8.01	49.10	7.72	0.00	39.96	1.42
2020/21	nr	1.42	41.59	8.37	51.38	8.23	0.00	41.86	1.30
2021/22	nr	1.30	41.93	7.67	50.89	7.78	0.00	41.62	1.50
2022/23	nr	1.50	47.01	9.29	57.80	9.60	0.00	46.92	1.28
2023/24	nr	1.28	48.68	9.97	59.92	10.19	0.00	48.15	1.58

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Food Use Dom.	Domestic Consumpti	Ending Stocks
Oil, Rapeseed									
2010/11	nr	2.13	23.52	3.39	29.04	3.43	15.78	23.32	2.28
2011/12	nr	2.28	24.87	4.08	31.23	3.98	16.55	23.92	3.34
2012/13	nr	3.34	25.50	3.94	32.78	3.95	16.61	23.87	4.95
2013/14	nr	4.95	27.20	3.82	35.97	3.83	17.95	25.86	6.28
2014/15	nr	6.28	27.62	3.95	37.85	4.07	18.94	27.11	6.68
2015/16	nr	6.68	27.56	4.13	38.37	4.17	20.13	28.49	5.71
2016/17	nr	5.66	27.81	4.56	38.02	4.64	20.56	29.13	4.25
2017/18	nr	4.25	28.32	4.84	37.41	4.83	20.58	29.18	3.40
2018/19	nr	3.40	28.03	5.18	36.61	5.26	20.30	28.38	2.97
2019/20	nr	2.97	28.35	5.80	37.13	5.87	20.23	28.34	2.92
2020/21	nr	2.92	29.44	6.33	38.68	6.42	20.46	28.59	3.67
2021/22	nr	3.67	29.17	5.13	37.97	5.20	22.01	30.15	2.62
2022/23	nr	2.62	32.72	6.89	42.23	6.52	23.45	32.65	3.07
2023/24	nr	3.07	34.01	7.51	44.58	7.69	23.80	33.58	3.32

Table 5: World Sunflower and Products Supply and Distribution

Million Metric Tons

	Area Harvested	Beginning Stocks	Production	Imports	Exports	Food Use Dom.	Domestic Consumpti	Ending Stocks
Oilseed, Sunflowerseed								
2010/11	23.11	2.61	32.82	1.64	1.78	1.86	33.02	2.26
2011/12	24.65	2.26	38.74	1.74	1.93	1.77	38.28	2.54
2012/13	23.58	2.54	34.93	1.36	1.47	1.76	34.59	2.77
2013/14	24.01	2.77	41.57	1.73	2.01	1.91	40.76	3.31
2014/15	23.09	3.31	39.25	1.63	1.68	2.01	39.55	2.95
2015/16	23.46	2.95	40.70	2.11	2.13	2.05	40.70	2.93
2016/17	25.95	2.93	48.35	2.46	2.68	2.06	47.39	3.66
2017/18	25.93	3.66	47.92	2.38	2.75	2.09	48.11	3.10
2018/19	25.65	3.10	50.31	2.89	3.19	2.07	50.33	2.79
2019/20	25.83	2.79	53.90	3.35	3.60	2.09	53.44	2.99
2020/21	26.77	2.99	48.87	2.72	2.95	2.08	49.23	2.41
2021/22	28.54	2.41	56.85	3.83	3.95	2.08	51.31	7.84
2022/23	28.29	7.84	52.77	3.78	4.02	2.12	56.22	4.15
2023/24	27.60	4.15	54.80	2.72	2.81	2.10	56.13	2.74
Meal, Sunflowerseed								
2010/11	nr	0.99	13.34	4.11	4.58	0.00	12.78	1.08
2011/12	nr	1.08	15.62	6.44	6.81	0.00	14.67	1.67
2012/13	nr	1.67	14.14	4.96	5.14	0.00	14.88	0.75
2013/14	nr	0.75	16.84	5.81	6.23	0.00	15.78	1.39
2014/15	nr	1.39	16.17	5.56	5.87	0.00	15.73	1.52
2015/16	nr	1.52	16.54	5.99	6.24	0.00	16.39	1.42
2016/17	nr	1.42	19.50	7.12	7.61	0.00	18.96	1.47
2017/18	nr	1.47	20.00	6.81	7.16	0.00	19.34	1.78
2018/19	nr	1.78	20.93	8.11	8.18	0.00	20.66	1.98
2019/20	nr	1.98	21.79	8.56	8.85	0.00	21.43	2.05
2020/21	nr	2.05	20.24	7.58	8.16	0.00	20.48	1.23
2021/22	nr	1.23	21.18	7.35	7.84	0.00	20.95	0.97
2022/23	nr	0.97	22.98	8.57	9.12	0.00	21.87	1.53
2023/24	nr	1.53	22.98	9.55	9.92	0.00	22.65	1.48

	Area Harvested	Beginning Stocks	Production	Imports	Exports	Food Use Dom.	Domestic Consumpti	Ending Stocks
Oil, Sunflowerseed								
2010/11	nr	2.00	12.11	3.73	4.57	10.65	11.33	1.94
2011/12	nr	1.94	14.37	5.89	6.52	11.89	12.62	3.05
2012/13	nr	3.05	12.85	5.09	5.55	12.40	13.20	2.24
2013/14	nr	2.24	15.65	7.05	7.78	13.41	14.22	2.94
2014/15	nr	2.94	14.97	6.33	7.41	13.43	14.24	2.59
2015/16	nr	2.59	15.40	7.32	8.21	14.16	15.07	2.04
2016/17	nr	2.12	18.30	9.31	10.75	15.41	16.37	2.62
2017/18	nr	2.62	18.57	9.15	10.32	16.41	17.40	2.61
2018/19	nr	2.61	19.59	9.73	11.51	16.98	18.00	2.42
2019/20	nr	2.42	21.17	11.75	13.49	17.88	18.89	2.96
2020/21	nr	2.96	19.00	9.67	11.34	17.26	18.30	2.00
2021/22	nr	2.00	19.65	9.68	11.22	16.43	17.53	2.58
2022/23	nr	2.58	21.66	12.62	14.27	18.47	19.63	2.96
2023/24	nr	2.96	21.80	12.74	14.46	19.48	20.65	2.38

Table 6: World Palm Oil, Coconut Oil, and Fish Meal Supply and Distribution

Million Metric Tons

	Beginning Stocks	Production	Imports	Total Supply	Exports	Industrial Dom.	Food Use Dom.	Domestic Consumpti	Ending Stocks
Oil, Palm									
2010/11	6.51	49.38	34.91	90.80	37.12	10.64	33.99	45.19	8.49
2011/12	8.49	52.31	37.84	98.65	39.73	12.46	36.24	49.35	9.57
2012/13	9.57	56.34	41.39	107.30	43.00	14.67	39.51	54.82	9.48
2013/14	9.48	59.20	41.16	109.84	43.09	16.21	40.27	57.11	9.63
2014/15	9.63	62.09	43.86	115.58	47.33	14.35	42.42	57.40	10.85
2015/16	10.85	58.75	41.79	111.38	43.79	16.41	41.85	58.95	8.63
2016/17	8.58	65.57	45.63	119.79	48.94	16.72	43.06	60.44	10.41
2017/18	10.41	70.51	46.02	126.94	48.66	19.85	44.74	65.28	13.00
2018/19	13.00	74.17	49.89	137.05	51.49	22.72	47.15	70.56	15.00
2019/20	15.00	73.11	47.04	135.15	48.36	23.10	47.04	70.85	15.94
2020/21	15.94	73.28	46.86	136.08	48.56	23.51	48.22	72.43	15.09
2021/22	15.09	73.01	41.60	129.70	43.90	22.88	45.85	69.39	16.42
2022/23	16.42	78.08	46.93	141.42	49.51	25.41	48.21	74.29	17.62
2023/24	17.62	79.48	46.90	144.01	49.07	26.57	50.14	77.36	17.58
Oil, Coconut									
2010/11	0.75	3.52	1.78	6.06	1.80	1.60	1.87	3.50	0.75
2011/12	0.75	3.27	1.83	5.85	1.86	1.48	1.86	3.37	0.62
2012/13	0.62	3.48	1.89	5.99	1.93	1.62	1.90	3.56	0.50
2013/14	0.50	3.37	1.74	5.61	1.91	1.51	1.72	3.27	0.43
2014/15	0.43	3.31	1.82	5.56	1.94	1.44	1.70	3.18	0.44
2015/16	0.44	3.20	1.61	5.25	1.58	1.47	1.60	3.10	0.58
2016/17	0.57	3.38	1.54	5.49	1.79	1.55	1.63	3.21	0.50
2017/18	0.50	3.69	1.75	5.94	1.76	1.65	1.74	3.42	0.76
2018/19	0.76	3.79	1.86	6.40	2.14	1.70	1.80	3.54	0.73
2019/20	0.73	3.61	1.84	6.18	1.88	1.75	1.87	3.65	0.64
2020/21	0.64	3.58	1.95	6.17	1.73	1.70	1.92	3.65	0.79
2021/22	0.79	3.73	2.24	6.76	2.24	1.63	1.93	3.59	0.92
2022/23	0.92	3.72	1.95	6.60	2.18	1.63	1.89	3.55	0.86

	Beginning Stocks	Production	Imports	Total Supply	Exports	Industrial Dom.	Food Use Dom.	Domestic Consumpti	Ending Stocks
2023/24	0.86	3.77	1.87	6.51	2.01	1.76	1.87	3.66	0.84
Meal, Fish									
2010/11	0.28	5.55	2.77	8.60	2.69	0.05	0.00	5.22	0.69
2011/12	0.69	4.71	3.05	8.44	2.80	0.05	0.00	5.36	0.28
2012/13	0.28	4.84	2.47	7.59	2.32	0.05	0.00	4.81	0.46
2013/14	0.46	4.45	2.73	7.64	2.47	0.05	0.00	4.94	0.23
2014/15	0.23	4.69	2.51	7.42	2.28	0.05	0.00	4.87	0.27
2015/16	0.27	4.51	2.44	7.21	2.21	0.05	0.00	4.73	0.27
2016/17	0.27	4.88	3.06	8.21	2.59	0.05	0.00	5.37	0.25
2017/18	0.25	4.80	3.05	8.10	2.69	0.05	0.00	5.17	0.25
2018/19	0.25	4.77	3.08	8.10	2.65	0.05	0.00	5.20	0.24
2019/20	0.24	4.65	3.09	7.98	2.67	0.08	0.00	5.05	0.26
2020/21	0.26	4.86	3.41	8.52	2.95	0.06	0.00	5.38	0.19
2021/22	0.19	4.97	3.59	8.75	2.84	0.07	0.00	5.64	0.27
2022/23	0.27	4.51	3.35	8.12	2.50	0.07	0.00	5.39	0.23
2023/24	0.23	4.91	3.41	8.55	2.85	0.08	0.00	5.50	0.21

Table 7: Brazil Soybeans and Products Supply and Distribution Local Marketing Years (Feb-Jan)Thousand Metric Tons

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Crush	Domestic Consump-ti	Ending Stocks
Oilseed, Soybean (Local)									
2010/11	24,200	7,739	75,300	40	83,079	33,789	37,264	39,664	9,626
2011/12	25,000	9,626	66,500	298	76,424	31,905	36,230	38,630	5,889
2012/13	27,700	5,889	82,000	240	88,129	42,826	36,432	38,807	6,496
2013/14	30,100	6,496	86,200	579	93,275	45,747	38,195	40,745	6,783
2014/15	32,100	6,783	97,100	329	104,212	54,635	40,339	42,989	6,588
2015/16	33,300	6,588	95,700	362	102,650	52,099	39,967	42,642	7,909
2016/17	33,900	7,909	114,900	267	123,076	68,806	42,161	44,936	9,334
2017/18	35,150	9,334	123,400	190	132,924	83,728	43,389	46,224	2,972
2018/19	35,900	2,972	120,500	145	123,617	73,436	43,495	46,410	3,771
2019/20	36,900	3,771	128,500	884	133,155	81,626	46,461	49,556	1,973
2020/21	39,500	1,973	139,500	791	142,264	88,512	48,121	51,326	2,426
2021/22	41,500	2,426	130,500	416	133,342	77,118	51,196	54,441	1,783
2022/23	44,600	1,783	162,000	298	164,081	103,885	54,200	58,000	2,196
2023/24	45,900	2,196	155,000	450	157,646	99,000	52,500	56,250	2,396
Meal, Soybean (Local)									
2010/11	nr	1,528	28,880	51	30,459	14,452	37,264	13,400	2,607
2011/12	nr	2,607	28,080	15	30,702	13,854	36,230	14,000	2,848
2012/13	nr	2,848	28,230	30	31,108	13,619	36,432	14,800	2,689
2013/14	nr	2,689	29,560	27	32,276	13,721	38,195	15,300	3,255
2014/15	nr	3,255	31,220	16	34,491	15,106	40,339	15,900	3,485
2015/16	nr	3,485	30,930	27	34,442	14,651	39,967	16,700	3,091
2016/17	nr	3,091	32,680	38	35,809	13,915	42,161	17,100	4,794
2017/18	nr	4,794	33,620	12	38,426	16,782	43,389	17,500	4,144
2018/19	nr	4,144	33,640	22	37,806	16,462	43,495	17,864	3,480
2019/20	nr	3,480	36,007	12	39,499	16,947	46,461	18,700	3,852
2020/21	nr	3,852	37,294	19	41,165	17,579	48,121	19,400	4,186
2021/22	nr	4,186	39,682	5	43,873	20,297	51,196	19,800	3,776
2022/23	nr	3,776	42,005	9	45,790	23,016	54,200	20,200	2,574
2023/24	nr	2,574	40,688	10	43,272	19,800	52,500	20,700	2,772

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Crush	Domestic Consumption	Ending Stocks
Oil, Soybean (Local)									
2010/11	nr	504	7,150	0	7,654	1,758	37,264	5,305	591
2011/12	nr	591	6,950	2	7,543	1,688	36,230	5,395	460
2012/13	nr	460	6,990	4	7,454	1,410	36,432	5,528	516
2013/14	nr	516	7,330	0	7,846	1,326	38,195	5,955	565
2014/15	nr	565	7,740	32	8,337	1,650	40,339	6,220	467
2015/16	nr	467	7,670	74	8,211	1,250	39,967	6,490	471
2016/17	nr	471	8,090	51	8,612	1,323	42,161	6,887	402
2017/18	nr	402	8,325	41	8,768	1,409	43,389	6,990	369
2018/19	nr	369	8,355	35	8,759	1,014	43,495	7,351	394
2019/20	nr	394	8,944	241	9,579	1,097	46,461	7,880	602
2020/21	nr	602	9,268	67	9,937	1,794	48,121	7,675	468
2021/22	nr	468	9,855	33	10,356	2,645	51,196	7,350	361
2022/23	nr	361	10,434	21	10,816	2,199	54,200	8,175	442
2023/24	nr	442	10,106	25	10,573	1,700	52,500	8,525	348

Table 8: Argentina Soybeans and Products Supply and Distribution Local Marketing Years (Apr-Mar)

Thousand Metric Tons

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Crush	Domestic Consumpti	Ending Stocks
Oilseed, Soybean (Local)									
2010/11	18,300	3,383	49,000	13	52,396	10,389	37,521	39,901	2,106
2011/12	17,577	2,106	40,100	2	42,208	6,098	30,681	33,431	2,679
2012/13	19,750	2,679	49,300	2	51,981	7,817	35,009	40,009	4,155
2013/14	19,250	4,155	53,400	2	57,557	7,434	38,503	43,503	6,620
2014/15	19,350	6,620	61,450	141	68,211	11,670	45,110	50,360	6,181
2015/16	19,350	6,181	58,800	1,304	66,285	9,046	43,042	49,242	7,997
2016/17	17,335	7,997	55,000	2,600	65,597	7,247	40,940	47,440	10,910
2017/18	16,300	10,910	37,800	7,256	55,966	3,842	36,359	43,055	9,069
2018/19	16,600	9,069	55,300	3,789	68,158	10,256	41,188	48,083	9,819
2019/20	16,700	9,819	48,800	4,939	63,558	6,662	37,870	45,108	11,788
2020/21	16,470	11,788	46,200	4,438	62,426	5,377	41,043	48,362	8,687
2021/22	15,900	8,687	43,900	4,571	57,158	5,552	35,900	43,100	8,506
2022/23	15,000	8,506	25,000	10,500	44,006	1,900	28,500	35,500	6,606
2023/24	16,500	6,606	50,000	5,100	61,706	5,100	39,000	46,250	10,356
Meal, Soybean (Local)									
2010/11	nr	2,264	29,181	0	31,445	27,485	37,521	1,085	2,875
2011/12	nr	2,875	23,946	0	26,821	21,973	30,681	1,550	3,298
2012/13	nr	3,298	27,150	0	30,448	23,937	35,009	1,950	4,561
2013/14	nr	4,561	29,528	0	34,089	27,473	38,503	2,200	4,416
2014/15	nr	4,416	34,737	1	39,154	31,873	45,110	2,524	4,757
2015/16	nr	4,757	33,350	0	38,107	30,981	43,042	2,759	4,367
2016/17	nr	4,367	31,750	0	36,117	29,255	40,940	2,930	3,932
2017/18	nr	3,932	28,270	1	32,203	25,849	36,359	3,084	3,270
2018/19	nr	3,270	32,000	27	35,297	29,285	41,188	3,175	2,837
2019/20	nr	2,837	29,539	1	32,377	26,584	37,870	3,217	2,576
2020/21	nr	2,576	32,050	1	34,627	28,652	41,043	3,300	2,675
2021/22	nr	2,675	28,002	194	30,871	24,849	35,900	3,325	2,697
2022/23	nr	2,697	22,230	10	24,937	18,600	28,500	3,400	2,937
2023/24	nr	2,937	30,420	1	33,358	26,800	39,000	3,550	3,008

	Area Harvested	Beginning Stocks	Production	Imports	Total Supply	Exports	Crush	Domestic Consumpti	Ending Stocks
Oil, Soybean (Local)									
2010/11	nr	225	7,148	0	7,373	4,227	37,521	2,755	391
2011/12	nr	391	5,840	35	6,266	3,433	30,681	2,550	283
2012/13	nr	283	6,616	59	6,958	4,281	35,009	2,375	302
2013/14	nr	302	7,191	26	7,519	4,296	38,503	2,843	380
2014/15	nr	380	8,753	5	9,138	6,312	45,110	2,308	518
2015/16	nr	518	8,382	0	8,900	5,386	43,042	3,055	459
2016/17	nr	459	7,925	0	8,384	4,721	40,940	3,290	373
2017/18	nr	373	7,150	1	7,524	4,566	36,359	2,610	348
2018/19	nr	348	8,042	0	8,390	5,113	41,188	2,625	652
2019/20	nr	652	7,460	0	8,112	6,150	37,870	1,792	170
2020/21	nr	170	8,100	15	8,285	5,480	41,043	2,194	611
2021/22	nr	611	7,079	78	7,768	4,575	35,900	2,770	423
2022/23	nr	423	5,629	10	6,062	4,000	28,500	1,750	312
2023/24	nr	312	7,703	10	8,025	5,150	39,000	2,525	350

LECTURE SERIES : INTERNATIONAL CONFERENCE ON APPLICATION OF OILS AND FATS IN FMCG SECTOR HELD ON MARCH 15-16, 2024

NUTRITIONAL PROPERTIES OF DIFFERENT FATS: IMPLICATIONS FOR PRODUCT DEVELOPMENT

Prof Pulkit Mathur, *Head, Department of Food & Nutrition and Food Technology, Lady Irwin College, University of Delhi.*

ABSTRACT:

Consumer health and product functionality are both of paramount importance while formulating food products. Fats are not only a major energy source but also influence the texture, flavor, and shelf life of food products. However, their health implications vary significantly depending on their chemical structure and source. This paper explores the nutritional properties of different fats which can guide product development decisions.

Lowering total fat in high fat foods is the first step in innovation which can be done by replacing processing methods (viz. roasting vs. frying) and use of fat replacers. By replacing fat in food products with fat replacers, the overall fat and calorie content can be reduced without compromising the quality and acceptance of the food.

Different types of fat replacers, such as dietary fibers, whey protein concentrate, and starch-based replacers, have been investigated and shown promise in reducing fat content and mimicking the physio chemical properties of fat. These fat replacers have the potential to improve the health outcomes of individuals by reducing calorie intake and lowering the risk of obesity and cardiovascular disease.

Saturated fats are associated with increased risk of heart disease and hence reducing or balancing the amount of saturated fat, possibly by blending with unsaturated fats, will appeal to health conscious consumers. Omega-3 fortified products or products with high level of polyunsaturated fatty acids can be marketed for their added health benefits, though stability and taste must be carefully managed due to sensitivity to oxidation.

Using natural antioxidants like Vitamin E will nutritionally enhance the product in comparison to chemical antioxidants like BHA, BHT or TBHQ. Trans fats are associated with an increased risk of heart disease, as they raise LDL cholesterol levels and lower HDL cholesterol which is considered as the 'good cholesterol'. There is a call for reduction in the use of hydrogenated fats across the world to reduce trans-fat intake.

It is necessary to innovate with alternatives that provide similar functionality in terms of texture and shelf life without the health risks, such as interesterified fats or blends of saturated and unsaturated fats.

However, the successful development of these products is still a challenge because fat plays multiple roles in determining the desirable physio-chemical and sensory attributes, and because the consumers who want or need to replace these ingredients, seek products with similar characteristics to those of the original product. Important attributes such as smooth, creamy, and rich texture; milky and creamy appearance; desirable flavor; and satiating effects are influenced by the droplets of fat, and these characteristics are paramount to the consumer and consequently crucial to the success of the product in the market.

Therefore, it is important to identify commercially viable strategies that can remove or reduce fat content of food products without altering their sensory and nutritional characteristics. Innovations in fat replacement and modification technologies continue to offer new opportunities for developing healthier and more desirable food products.

Balancing health, functionality, and sensory attributes, while staying informed about regulatory and consumer trends, is key to successful product development in the fats category.

EXPLORATION OF SYNTHETIC STRATEGIES AND BIOLOGICAL ASSESSMENT: UNVEILING THE POTENTIAL OF SOME NATURAL AND MARINE NATURAL COMPOUNDS OF MEDICINAL INTEREST

Sunita Bhagat, *Professor, Department of Chemistry ARSD College Fellow, DSPH , Institute of Eminence, University of Delhi.*

ABSTRACT:

"The need for efficient and practical synthesis of biologically active molecules remains one of the greatest intellectual challenges with which chemists are faced in the 21st Century ".

Throughout the ages humans have relied on Nature to cater for their basic needs, not the least of which are medicines for the treatment of a wide spectrum of diseases [1]. The synthesis of complex natural products continues to occupy an important position in organic chemistry research, not only because nature provides us with some of the most synthetically challenging molecules that we can ever aspire to synthesize, but also because research in this area frequently drives important breakthroughs in methodology. Structurally complex, biologically active naturally occurring substances of marine origin continue to spur the interest of both chemists and biologists as they demonstrate antiviral, antimicrobial, anti-oxidant, and many more biological activities [2,3].

This is an important area to work on as the major challenge with the biologically active isolated natural products is their limited availability through natural resources and their isolation is very tedious and time consuming process [4]. Further, they are usually isolated in very small quantities, hindering further studies to establish their biological activities as well as structural modifications and their constant supply from natural sources is problematic or virtually impossible. In addition, chemo-selective derivation of marine natural products themselves is usually quite difficult because of their sensitive and elaborate molecular structures, and access to their structural analogs is severely restricted in many cases.

Therefore, chemical synthesis of natural and marine compounds in larger quantities and by sufficient means is necessary to investigate their biological implications and this strategic synthetic methodology is focused in our lab [5,6].

Further, considering significance of fluorine incorporation in heterocycles and taking an overview on their biological activities, synthesis of fluorinated analogues of some natural products is planned. An understanding of mechanism, coupled with knowledge of physicochemical properties affected by fluorine substitution has aided in rational drug design of many pharmaceutical agents. Design , strategic synthesis and significance of target molecules will be presented.

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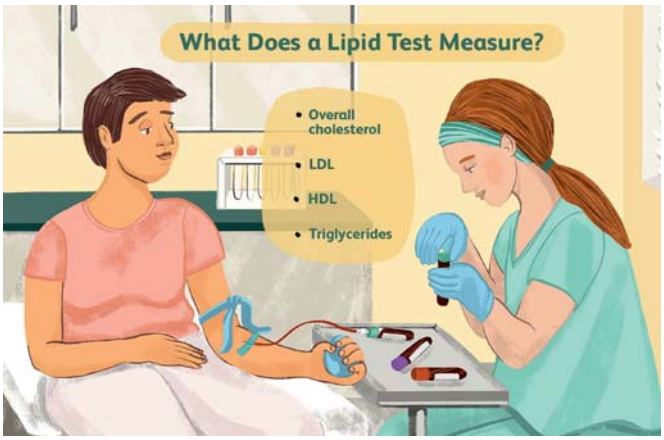
What can lipids tell us about our health and how we age?

- Lipids are fatty compounds that are one of the building blocks needed to make living cells, as well as helping with many important functions.
- While a lot of research in recent years has focused on the genome and its influence on the different molecules found in each cell, such as RNA and proteins, lipids are not influenced by the genome.
- Researchers from Stanford University say lipids can also be used as indicators for health, disease, and aging.

Alongside other important moleculesTrusted Source in the body like protein, carbohydrates, enzymes, and amino acids, lipidsTrusted Source are crucial for normal functioning.

Lipids — such as cholesterol and triglycerides — are fatty compounds that play an essential role in a number of body functions. Additionally, they are part of the building blocksTrusted Source needed to make living cells.

Now, researchers from Stanford University say certain lipids could be used as indicators for health, disease, and aging.



Their study was recently published in the journal Nature MetabolismTrusted Source.

Courtesy: *Medical News Today,Corrie Pelc, September 20,2023*

Novel lipids in traditional herbal teas unlock potential health gains

The lipids in some herbal teas have been identified in detail for the first time, preparing the ground for investigating their contribution to the health benefits of the teas.

Herbal teas are enjoyed worldwide, not only for their taste and refreshment but also for a wide range of reputed health benefits. But the potential significance of a category of compounds called lipids in the teas has been relatively unexplored. Researchers at Hokkaido University, led by Associate Professor Siddabasave Gowda and Professor Shu-Ping Hui of the Faculty of Health Sciences, have now identified 341 different molecular species from five categories of lipids in samples of four types of herbal tea. They published their results in the journal Food Chemistry.

Lipids are a diverse collection of natural substances that share the property of being insoluble in water. They include all of the fats and oils that are common constituents of many foods, but they have generally not been examined as significant components of teas.

The Hokkaido team selected four teas for their initial analysis: dokudami (Houttuynia cordata, fish mint), kumazasa (Sasa veitchii), sugina (Equisetum arvense, common horsetail) and yomogi (Artemisia princeps, Japanese mugwort).

"These herbs are native to Japan and have been widely consumed as tea from ancient times due to their medicinal properties," says Gowda. The medicinal benefits attributed to these and other herbal teas include antioxidant, antiglycation, anti-inflammatory, antibacterial, antiviral, anti-allergic, anticarcinogenic, antithrombotic, vasodilatory, antimutagenic, and anti-aging effects.

The lipids in the teas were separated and identified by combining two modern analytical techniques called high-performance liquid chromatography and linear ion trap-Orbitrap mass spectrometry.

The analysis revealed significant variations in the lipids in the four types of tea, with each type containing some known bioactive lipids. These included a distinct category of lipids called short-chain fatty acid esters of hydroxy fatty acids (SFAHFAs), some of which had never previously been found in plants. SFAHFAs detected in tea could be a novel source of short-chain fatty acids, which are essential metabolites for maintaining gut health.

"The discovery of these novel SFAHFAs opens new avenues for research," says Hui, adding that the lipid concentrations found in the teas are at levels that could be expected to have significant nutritional and medical effects in consumers.

The lipids discovered also included á-linolenic acid, already known for its anti-inflammatory properties, and arachidonic acid which has been associated with a variety of health benefits. These two compounds are examples of a range of poly-unsaturated fatty acids found in the teas, a category of lipids that are well-known for their nutritional benefit

Courtesy: *Nath, L. R., Food Chemistry. doi.org/10.1016/j.foodchem.2024.138941*

Study finds high microplastic levels in Mediterranean fish despite low chemical contaminants

In a recent study published in the journal Foods, researchers from Italy, Albania, and Montenegro conducted bio-monitoring campaigns on fish and cephalopod species in the Mediterranean Sea to assess contamination levels of cadmium, microplastics, and antibiotics. They found negligible contamination by cadmium and antibiotics but high levels of microplastics in the stomach and gut of *Sparus aurata* (Gilt-head bream) and *Dicentrarchus labrax* (European seabass).

Based on the study's findings, it is imperative to conduct monitoring and cleanup initiatives to identify the sources of pollution and evaluate potential risks to public health. Further, leveraging the framework established by the ADRINET project across the three sub-regions examined in the present study could serve as a model for regional or national adoption, enabling monitoring seawater pollution and ensuring seafood safety.

Courtesy: *Dr.S.R. Chaphalkar, News Medical Life Sciences, April 19,2024.*

An avocado a day may improve overall diet quality, researchers report

Eating one avocado per day may improve overall diet quality, according to a team led by researchers in Penn State's Department of Nutritional Sciences. Poor diet quality is a risk factor for many diseases,

including heart disease, and many American adults have poor diet quality and do not meet key dietary recommendations provided by the Dietary Guidelines for Americans.

This study was led by Kristina Petersen, associate professor of nutritional sciences, and Penny Kris-Etherton, retired Evan Pugh University Professor of Nutritional Sciences, and recently published in the journal Current Developments in Nutrition. The researchers examined how a food-based intervention — one avocado per day — impacts overall diet quality.

Avocados are a nutrient-dense food, containing a lot of fiber and other important nutrients. We wanted to see if regular intake of this food would lead to an increase in diet quality," Petersen said. "Previous observational research suggests avocado consumers have higher diet quality than non-consumers. So, we developed this study to determine if there is a causational link between avocado consumption and overall diet quality."

Petersen stated that because only 2% of American adults are regular avocado consumers, the researchers wanted to determine if including avocados in an individual's daily diet could significantly increase their diet quality.

Researchers conducted phone interviews with participants before the study began and at a few points throughout to determine what their dietary intake was like in the previous 24 hours and evaluated their diets using the Healthy Eating Index to determine how well they adhered to the Dietary Guidelines for Americans. Adherence to the guidelines was used as a measure of overall diet quality.

The study consisted of 1,008 participants who were split into two groups. One group continued their usual diet and limited their avocado intake during the 26-week study, while the other group incorporated one avocado per day into their diet.

"We found that the participants who had an avocado per day significantly increased their adherence to dietary guidelines," Petersen said. "This suggests that strategies, like eating one avocado per day, can help people follow dietary guidelines and improve the quality of their diets."

Although researchers said they were not surprised to see that eating avocados daily improved diet quality, they had not predicted how participants were able to achieve it.

"We determined that participants were using avocados as a substitute for some foods higher in refined grains and sodium," Petersen said. "In our study, we classified avocados as a vegetable and did see an increase in vegetable consumption attributed to the avocado intake, but also participants used the avocados to replace some unhealthier options."

According to Petersen, having poor diet quality substantially increases the risk for conditions like heart disease, type 2 diabetes, kidney disease and many other preventable diseases.

"By improving people's adherence to dietary guidelines, we can help to reduce their risk of developing these chronic conditions and prolong healthy life expectancy," Petersen said.

Petersen has also conducted similar studies investigating the impact of food-based interventions, including the relationship between pistachios and diet quality, but said that more research is needed to determine what other food-based strategies can be

used to improve people's adherence to dietary guidelines.

"In studies like this one, we are able to determine food-based ways to improve diet quality, but behavioral strategies are also needed to help people adhere to dietary guidelines and reduce their risk of chronic disease," Petersen said.

Courtesy: *Kristina S Petersen et. al., Current Developments in Nutrition, 2024; 8 (2): 102079 DOI: 10.1016/j.cdnut.2024.102079*

WHO updates guidelines on fats and carbohydrates

WHO has updated its guidance on total fat, saturated and trans-fat and carbohydrates, based on the latest scientific evidence.

The three new guidelines, Saturated fatty acid and trans-fatty acid intake for adults and children, Total fat intake for the prevention of unhealthy weight gain in adults and children, and Carbohydrate intake for adults and children, contain recommendations that aim to reduce the risk of unhealthy weight gain and diet-related noncommunicable diseases, such as type 2 diabetes, cardiovascular disease and certain types of cancer.

With its guidance on dietary fat, WHO notes that both quantity and quality are important for good health. WHO reaffirms that adults should limit total fat intake to 30% of total energy intake or less. Fat consumed by everyone 2 years of age and older should be primarily unsaturated fatty acids, with no more than 10% of total energy intake coming from saturated fatty acids and no more than 1% of total energy intake from trans-fatty acids from both industrially produced and ruminant animal sources.

Saturated and trans-fatty acids in the diet can be replaced with other nutrients such as polyunsaturated fatty acids, monounsaturated fatty acids from plant sources, or carbohydrates from foods containing naturally occurring dietary fibre, such as whole grains, vegetables, fruits and pulses.

Saturated fatty acids can be found in fatty meat, dairy foods, and hard fats and oils such as butter, ghee, lard, palm oil and coconut oil and trans-fatty acids in baked and fried foods, pre-packaged snacks, and meat and dairy foods from ruminant animals, such as cows or sheep.

Together with WHO's existing guidance to limit free sugars intake, the new guidance on carbohydrate intake highlights the importance of carbohydrate quality for good health. WHO provides a new recommendation that carbohydrate intake for everyone 2 years of age and older should come primarily from whole grains, vegetables, fruits and pulses. WHO recommends that adults consume at least 400 grams of vegetables and fruits and 25 grams of naturally occurring dietary fibre per day. In first time guidance for children and adolescents WHO suggests the following intakes of vegetables and fruits:

- 2–5 years old, at least 250 g per day
- 6–9 years old, at least 350 g per day
- 10 years or older, at least 400 g per day

And the following intakes of naturally occurring dietary fibre:

- 2–5 years old, at least 15 g per day
- 6–9 years old, at least 21 g per day
- 10 years or older, at least 25 g per day.

These new guidelines, together with existing WHO guidelines on free sugars, non-sugar sweeteners and sodium, as well as forthcoming guidelines on polyunsaturated fatty acids and low-sodium salt substitutes, underpin the concept of healthy diets.

Courtesy: *World Health Organization, News, 17 July 2023*

WINTER GREEN ESSENTIAL OIL

About

Wintergreen is a woody, evergreen ground cover grown in different regions of the world and commonly used as a flavouring for chewing gum, candies, and toothpaste. Young Living Wintergreen essential oil has a cool, minty aroma and contains the naturally occurring constituent methyl salicylate, which is beneficial for use during soothing massage to cool fatigued muscles and joints when applied topically.

Wintergreen's fragrance may appeal to children, so always keep the child-resistant cap in place.

Common and Scientific Name: The common names of Wintergreen, Checkerberry, and Teaberry are for the plant known as *Gaultheria procumbens.* This plant is an aromatic plant of the heath family called Ericaceae.

Countries of Origin of the Plant and oil: Essential oil of Wintergreen (*G. procumbens* or *G. fragrantissima*) is available in Nepal and China. *G. procumbens* is in the forest of Canada and the north of the United States.

ENDANGERED: Wintergreen is native to Ontario Canada. It was first discovered and used by Native Americans; the leaves and berries produce the oil of wintergreen (methyl salicylate). And it is not endangered.

GENERAL DESCRIPTION OF WINTERGREEN HABITAT and GROWTH: *Gaultheria procumbens has many short erect branches with short-stalked, thick, shining tooth-edged leaves in the upper part. Flowers hang singly from the leaf axils and have a pale pink, waxy-looking, urn-shaped corolla. The bright red*

berrylike fruits, sometimes called deer-berries, consist of the much-enlarged fleshy calyx, which surrounds the small many-seeded capsule. The plant is a native of shady wood on sandy soil, particularly in the mountainous areas of the northern United States and southern Canada.

It is evergreen, a ground cover, and seems to be tolerant of most soil, sandy, dry, slightly alkaline, and drought tolerant. It seems to prefer well-drained soil.

LEAVES OF WINTERGREEN ARE USED IN EXTRACTION: The composition of wintergreen essential oil is very simple; its distillation is a bit more complex. First, the methyl salicylate is not free in the plant but bound to some sugar. This non-volatile glucidic complex named *gaultherin* must be hydrolyzed prior to distillation so that the methyl salicylate can be distilled. The leaves must be macerated in hot water prior to the distillation so that the plant enzymes can free the methyl salicylate. This macerate water is used in the hydrodistillation.

Wintergreen essential oil is one of the rare oils that are denser than water and it doesn't decant easily. The distillation of eastern teaberry requires a still with a special design (a separator for heavy oils and for better yields, the possibility to distill with cohobation).

Wintergreen leaf tea is harvested in Nepal and the oil is made by steam processing of warmed, water-soaked wintergreen leaves. and then steam-distilled.

ORGANOLEPTICS of Wintergreen: The scent of the essential oil is bright and fresh and should be used in dilution – never neat.

Organoleptics	Wintergreen – Red	Wintergreen – No Color
Color	reddish	colorless
Clarity	clear	clear
Viscosity	Non-viscous	Non-viscous
Intensity	8	6
Taste	Strong & bitter	Strong & bitter
Odor	Eponymous Wintergreen gum odor. green, fruity, herbaceous	Fruity, green, and Herbaceous

CHEMISTRY AND COMPONENTS-WINTERGREEN: oil has a relatively simple composition. Methyl salicylate is the main compound found in this EO at a concentration higher than 98%. The remaining part of the oil generally contains low amounts of ethyl salicylate, linalool, á-pinene, and limonene.

Application and Uses

Wintergreen is an herb. It has a good taste and is used in teas for headaches and other types of pain, fever, gas, pain of arthritis, and other conditions. In foods, wintergreen fruit is consumed raw or cooked in jellies, syrups, and wine and is very tasty.

The leaves and oil are used to make medicine. In manufacturing, Wintergreen is used as a flavouring agent in food, candies, teas, root beer, and in pharmaceutical products. The E.O. is used for painful conditions including headache, arthritis, and menstrual cramps. It is also used for digestion problems including stomachache and gas (flatulence) and lung conditions including asthma.

Compiled By –

Sneha Shukla,
M.Tech –Food Technology, HBTI – KANPUR.

LAUGH AND LOUD

Q. What's a chemistry teacher's favorite thing to teach about?

A. Ammonia, because it's pretty basic stuff.

****

Q. What do the other elements say about hydrogen?

A. He's such a loner!

****

Q. What's the difference between chemistry jokes and physics jokes?

A. Chemistry jokes can be funny periodically, but physics jokes have more potential.

****

Q. What's Iron Man's favorite amusement park ride?

A. The ferrous wheel.

****

Q. What was Avogadro's favorite sport?

A. Golf, because he always got a mole-in-one.

****

Q. What is the chemical formula for "banana"?

A. BaNa2

****

Q. A proton and a neutron are walking down the street.

A. The proton says, "Wait, I dropped an electron help me look for it."

****

The neutron says "Are you sure?"

The proton replies "I'm positive."

****

Q. A small piece of sodium that lived in a test tube fell in love with a Bunsen burner. "Oh Bunsen, my flame," the sodium pined. "I melt whenever I see you,"

A. The Bunsen burner replied, "It's just a phase you're going through."

****

Q. What did the Mass Spectrometer say to the Gas Chromatograph?

A. Breaking up is hard to do.

****

Q. What did one titration say to the other?

A. "Let's meet at the endpoint."

****

Q. What do you call an acid with an attitude?

A. mean-o Acid.

YOUNG MINDS

FOOD AND MOOD: HOW DIET AFFECTS TEENAGER'S MENTAL HEALTH

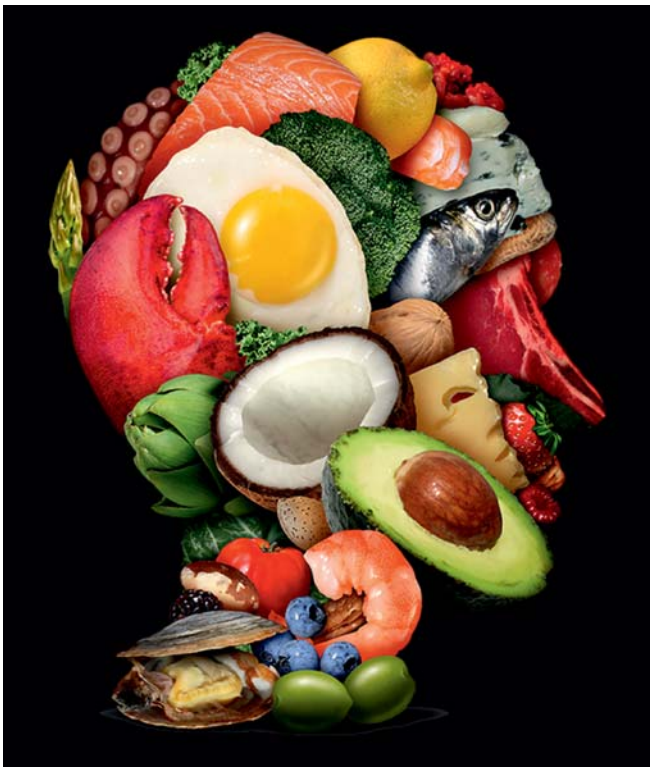
by Divishi Rai and Samaira Rajpal, Class 10,
Shikshantar Senior Secondary School Gurgugram

There is a strong connection between what you eat and how you feel, and that is especially true for teens. Just like a car needs the right fuel to run smoothly, your brain needs the right nutrients to function at its best. Teens are going through a lot of developmental changes, both physically and mentally, and good nutrition is essential to support their well-being.

Here is how diet can affect teen mental health:

Brain Power:

The brain is a complex organ that uses up a lot of energy. Eating a healthy diet that includes plenty of fruits, vegetables, whole grains, and lean protein can help teens feel more focused, energized, and improve their memory and concentration.



Mood Swings:

Teens are notorious for their mood swings, but what they eat can actually play a role in how they feel emotionally. Studies have shown that a diet high in processed foods, sugary drinks, and unhealthy fats can be linked to an increased risk of depression and anxiety.

Disordered Eating:

Teens who are struggling with body image issues or disordered eating may be at a higher risk for developing mental health problems. Not getting enough nutrients can lead to fatigue, low mood, and difficulty concentrating.

Some of the specific nutrients that are important for teen mental health:

Omega-3 fatty acids:

These are found in fatty fish, such as salmon and tuna, as well as nuts and seeds. Omega-3s are essential for brain development and function, and they have been shown to reduce symptoms of depression and anxiety.

B Vitamins:

These vitamins are important for energy production and can help improve mood and cognitive function. B vitamins are found in whole grains, legumes, and leafy green vegetables.

Vitamin D:

This vitamin is essential for bone health, but it also plays a role in mood regulation. Vitamin D can be obtained from sunlight exposure and from foods such as fatty fish and eggs.

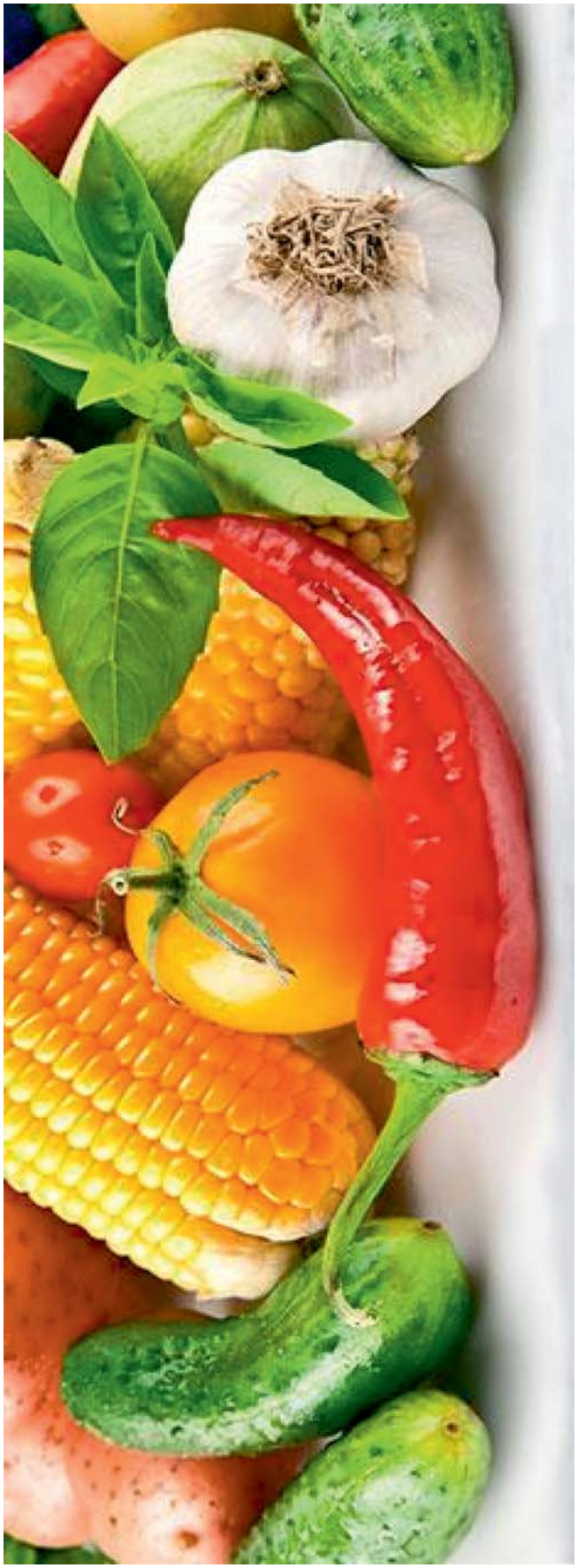
Iron:

Iron deficiency can lead to fatigue and can worsen symptoms ofdepression and anxiety. Iron is found in red meat, poultry, beans, and lentils. Healthy foods provide the nutrients that the brain needs to produce neurotransmitters, which are chemicals that help regulate mood, sleep, and concentration.

Tips for Healthy Eating

If you are a teen looking to improve your mood through diet, here are a few tips:

- **Eat plenty of fruits and vegetables.** Aim for at least five servings per day.
- **Choose whole grains over refined grains.** Whole grains are a good source of fiber, which can help regulate blood sugar levels and improve mood.
- **Include lean protein in your diet.** Protein is essential for building and repairing tissues, and it can also help you feel full and satisfied.
- **Limit processed foods, sugary drinks, and unhealthy fats.** These foods can contribute to mood swings and other mental health problems.
- **Don't skip meals.** Eating regular meals throughout the day will help keep your blood sugar levels stable and improve your energy levels.
- **Stay hydrated.** Drinking plenty of water is essential for overall health, including mental health.



MEMBERS' PAGE

SATVIK FOOD AND AYURVEDIC RECOMMENDATIONS FOR PURITY OF LIFE

by R.C. ARORA (Ex. Manager Q.C. - S.F.F.I., New Delhi)

A Satvik (Sattivic) diet includes foods that are light and healthy. In Ayurvedic practice, satvik foods are thought to increase energy, happiness, calmness, and mental clarity. In practice, that means eating things that are vegetarian, nutritious, fresh, and testy.

Each festival in India holds a unique significance, reflecting the diversity and richness of the country's heritage. Be it -

* Baishakhi in Punjab,
* Pohela Boishakhi in West Bengal,
* Ram Navami, Navratri during the Hindu month of Chaitra,
* Vishu Kani in Kerala,
* Pathandu in Tamil Nadu,
* Cheti Chand in Sindh Community,
* Ramzan in Muslim Community,
* Gudi Padwa in Maharashtra,
* Ugadi in Karnataka and Andhra Pradesh;

during these auspicious occasions / period, devotees observe fasting and engage in prayers to seek blessings and spiritual enlightenment.

One integral aspect of the festivals along with fasting is the consumption of Satvik food, which not only adheres to dietary restrictions but also nourishes the body and mind. It represents purity, harmony, and balance. Satvik food aligns with the principles of Ayurveda and emphasises consuming fresh, seasonal, and easily digestible ingredients.

By promoting a balanced and harmonious state of mind, Satvik food enhances mental clarity, focus, and emotional stability. It calms the nervous system, reduces stress and anxiety, fosters a sense of inner peace and tranquility.

What makes a festival delightful is a perfect meal. Along with the celebration, it is crucial to have proper meals to our immunity strong.

Fresh Fruits :

Incorporate an assortment of seasonal fruits such as bananas, apples, oranges, pomegranates, and grapes into your diets. Enjoy them as whole fruits or consider a glass of banana walnut lassi. Blend ripe bananas with yogurt, walnuts, honey and a dash of cardamom to make a nutritious and filling lassi.

Wholesome Grains:

Opt for whole grains like amaranth (raigira), buckwheat (kuttu), and water chestnut flour (singhare ka atta) to prepare nutritious dishes such rotis, puris, and pancakes. These grains are gluten - free and rich in fibre, vitamins, and minerals, making them ideal for festivals.

Nutritious Legumes :

Include legumes such as mung beans, chickpeas, and peanuts in your meals.

Dairy Delights :

Indulge in dairy products like milk, yogurt, paneer (cottage chees), and buttermilk to nourish your body with calcium, protein, and probiotics. Prepare creamy yogurt smoothies, paneer star- fries, and lassi (a yogurt based drink) to keep your energy levels up during fasting.

Nutty Treats :

Snack on an assortment of nuts and seeds such as almonds, walnuts, pumpkin seeds and sunflower seeds to boost your intake intake of healthy fats, vitamins and minerals.

Hydrating Beverages:

Stay hydrated with refreshing drinks such as coconut water, herbal teas, and fruit - in - fused water during festival fasting. Avoid sugary sodas and caffeinated Beverages, and opt for natural, hydrating options to replenish your body fluids.

Thus, Satvik food is considered pure, wholesome, and beneficial for physical, mental, and spiritual health ; hence the great source of energy and mental well - being during our festivals and fasting days.

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