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Sector Held on March 15-16, 2024

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Editor-in-chief desk...............

Dear Friends,

In the ever-evolving landscape of lipid science, several key topics are shaping the future of the industry. From innovative surfactants, promising prospects of edible oils in Africa and health benefits of microalgae, the field is brimming with potential and challenges alike.

Sugar-based surfactants are gaining traction as a sustainable alternative to traditional surfactants. Bio-based surfactants, derived from natural sources such as plants and microorganisms, are also emerging as a viable alternative to synthetic surfactants. These eco-friendly surfactants offer reduced environmental impact and improved biodegradability.

Africa's vast agricultural potential positions it as a key player in the global edible oil market. With increasing investments in sustainable farming practices and infrastructure, the continent is poised to become a major producer and exporter of edible oils. This growth not only promises economic benefits but also the potential to improve food security and nutrition across the region.

The blending of different edible oils to enhance nutritional value and health benefits is gaining popularity. By combining oils rich in various fatty acids, such as omega-3 and omega-6, these blends can offer a balanced profile that supports heart health, reduces inflammation, and improves overall well-being.

Perfluoroalkyl substances (PFAS) have long been a staple in industrial applications due to their stability and resistance to heat, water, and oil. However, their persistence in the environment and potential health risks have raised significant concerns. The contamination of edible oils with PFAS, through raw materials, processing, and packaging, underscores the urgent need for stringent regulations and innovative remediation techniques1.

The extraction of soluble dietary fiber from de-oiled meals presents a valuable opportunity to enhance the nutritional profile of various food products. Microalgae are proving to be a remarkable source of omega-3 fatty acids, essential for brain and heart health. These tiny organisms can grow rapidly and produce high levels of omega-3, making them a sustainable alternative to traditional fish oil sources.

Recent studies have sparked renewed interest in the health effects of saturated fats. While traditionally viewed as detrimental to heart health, emerging research suggests that not all saturated fats are created equal. Some types, such as those found in coconut oil and dairy, may have neutral or even beneficial effects on health.

The lipid universe explores on exciting innovations and pressing challenges shaping lipid world's ensuing trajectory. As we navigate this dynamic field, it is crucial to balance sustainability, health and economic considerations. By embracing new technologies and approaches, we can unlock the full potential of lipids to improve our lives and the planet.

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

Editor-in-chief desk...............

Editor's desk..............

Dear Readers,

Now a days scientific research is zeroing in sugar-based bioethanol, renewable diesel fuel, bio- surfactants and genetically modified Camelina seeds. Production of biofuels from renewable feedstocks has also captured considerable scientific attention since they could be used to supply energy and alternative fuels.

Special emphasis was given on the sugarcane crop (a C4 crop), converting the crop into sugar, biofuel and biosurgactants and their applications towards replacement of fossil fuel, and use in home care and personal care products like powder detergent, liquid detergent, hand wash, face wash, shampoo etc. respectively.

Commercially, most of the surfactants are manufactured from petrochemical sources which are non- biodegradable. The harmful effects and increasing stringent regulations of biodegradability have triggered interest and use of bio- based surfactants derived from renewable raw materials like carbohydrates such as sugar or liquid glucose. These surfactants can be used in various homecare, personal care products and detergent.

Blending two or more oils is the effective way to get optimised fatty acid composition but it fails in providing long chain omega-3 fatty acids (EPA - ecosapentaenoic acid and DHA - docosahexaenoic acid) to meet the International Guidelines and ICMR Recommendations. At present, fish oils and algal oils are used to meet the recommendations which have the on-going shortfalls of supply.

Rothamsted Agricultural Research Institute in the UK developed genetically modified Camelina seeds which provides an ideal platform for the sustainable, land-based production of high value omega-3 oil for human nutrition markets. The seeds produce an oil containing approximately 10% EPA and 10% DHA respectively. It's a good news for the vegetarians who dislike fish. Further, incorporation of rice bran oil makes the blends more stable.

The field of chemistry whether it is in the subject of triglyceride, carbohydrate or genetic modification, has advanced to such a point that it finds a huge potential and much needed by the society in the coming years. These advancements can be instrumental in manufacturing of new ecofriendly products for benefit of consumers and society both.

Yours truly
Dr. S. Adhikari
Editor

Editor's desk..............

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(North Zone)

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PER- AND POLYFLUOROALKYL SUBSTANCES

Per- and polyfluoroalkyl substances are a group of synthetic organofluorine chemical compounds that have multiple fluorine atoms attached to an alkyl chain; there are 7 million such chemicals according to PubChem. PFAS came into use after the invention of Teflon in 1938 to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water.

Per- and Polyfluoroalkyl Substances (**PFASs**) are **toxic**, **man-made**, **hazardous chemicals** that have dangerous effects on the environment and our health. They are a large family of fluorinated chemicals that have partially or completely fluorinated carbon chains of varied lengths. **PFHxS**, **PFOA** and **PFOS** are the three subgroups of PFASs currently listed under the Stockholm Convention as industrial POPs.

Per- and polyfluoroalkyl substances (PFAS) are a large class of thousands of synthetic chemicals that are used throughout society. However, they are increasingly detected as environmental pollutants and some are linked to negative effects on human health.

They all contain carbon-fluorine bonds, which are one of the strongest chemical bonds in organic chemistry. This means that they resist degradation when used and also in the environment. Most PFAS are also easily transported in the environment covering long distances away from the source of their release.

PFAS have been frequently observed to contaminate groundwater, surface water and soil. Cleaning up polluted sites is technically difficult and costly. If releases continue, they will continue to accumulate in the environment, drinking water and food.

They are now used in products including waterproof fabric such as Nylon, yoga pants, carpets, shampoo, feminine hygiene products, mobile phone screens, wall paint, furniture, adhesives, food packaging, heat-resistant non-stick cooking surfaces such as Teflon, firefighting foam, and the insulation of electrical wire. PFAS are also used by the cosmetic industry in most cosmetics and personal care products, including lipstick, eye liner, mascara, foundation, concealer, lip balm, blush, and nail polish.

Some common per- and polyfluoroalkyl substances include:

Polytetrafluoroethylene (aka PTFE or Teflon), Perfluoroalkyl carboxylic acids (PFCAs), Perfluorosulfonic acids (PFSAs), Fluorotelomers (FTOHs)

Name Abbreviation	Structural formula	Molecular weight (g/mol)	CAS No.
Perfluorobutane	H-FBSA	C4F9SO2NH2	299.1230334-69-1
Perfluoropentanesulfonamide	PFPSA	C5F11SO2NH2	349.12 82765-76-2
Perfluorohexanesulfonamide	PFHxSA	C6F13SO2NH2	399.13 41997-13-1
Perfluoroheptanesulfonamide	PFHpSA	C7F15SO2NH2	449.14 82765-77-3
Perfluorooctanesulfonamide	PFOSA	C8F17SO2NH2	499.14 754-91-6
Perfluorobutanesulfonyl fluoride	PFBSF	C4F9SO2F	302.09 375-72-4
Perfluorooctanesulfonyl fluoride	PFOSF	C8F17SO2F	502.12 307-35-7

FilmsMany PFAS such as PFOS and PFOA pose health and environmental concerns because they are persistent organic pollutants or "forever chemicals"; they have half-lives of up to over 8 years due to a carbon-fluorine bond, one of the strongest in organic chemistry. They move through soils and bioaccumulate in fish and wildlife, which are then eaten by humans. Residues are now commonly found in rain and drinking water. Since PFAS compounds are highly mobile, they are readily absorbed through human skin and through tear ducts, and such products on lips are often unwittingly ingested. Due to the large number of PFAS, it is challenging to study and assess the potential human health and environmental risks; more research is necessary and is ongoing.

Production and uses of PFASs

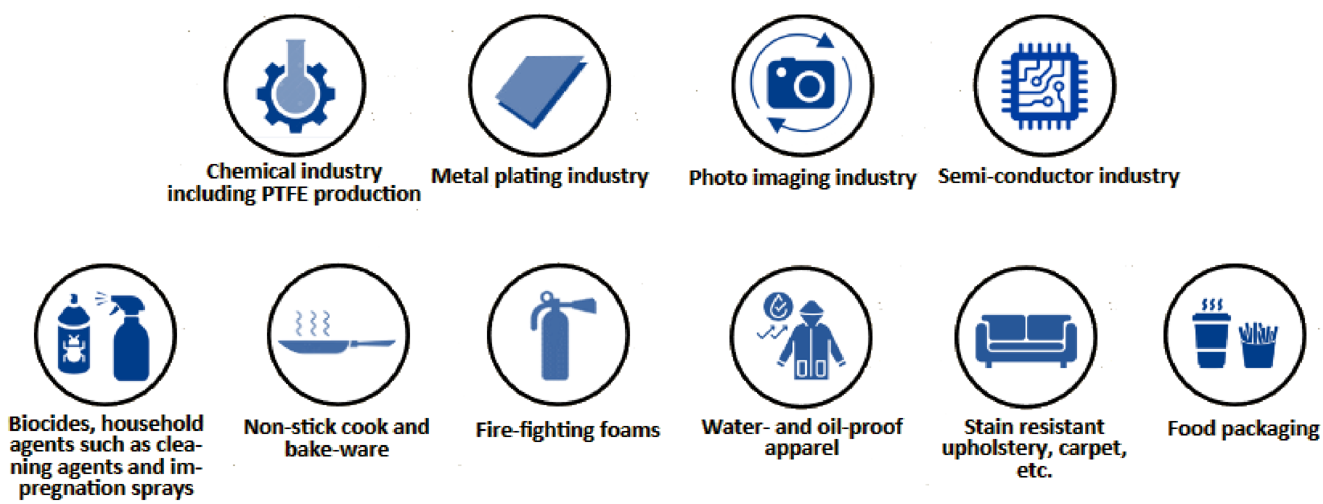
The PFAS family is composed of thousands of synthetic organic chemicals. PFASs were developed from the 1940s by the chemical industry. To date, more than 4,700 Chemical Abstracts Service (CAS) numbers have been identified which can be associated with a large variety of PFASs that may have been on the global market and in the environment (OECD 2018). Their common point is they are composed of a very stable structure which gives them **properties highly sought after in industry**: they resist very high heat, protect surfaces from water, grease or friction, and have fire-retardant and stain-resistant properties.

PFASs are used in the **chemical industry** including in Polytetrafluoroethylene (PTFE) production, in the **metal plating industry**, in the **photo imaging industry**, and in the **semi-conductor industry**.

A wide variety of **everyday consumer goods** are produced with PFASs: **stain resistant carpets** and upholstery, **water-repellent clothing**, **fire-fighting foam**, **papermaking**, printing **inks**, **sealants**, the interior coating of **non-stick cookware**, greaseproof **food packaging**, biocides household agents such as **cleaning agents** and impregnation sprays. Recent studies have found PFAS in personal hygiene and care products such as **cosmetics**, **dental floss**, **toilet paper**. Plastics may contain PFAS.

Among the thousands of PFASs being produced and used, there are many overlooked ones that are structurally similar to PFOS, PFOA, or their precursors, and are produced in high volumes (Wang et al. 2017).

Exposure to PFAS, some of which have been classified as carcinogenic, has been linked to cancers such as kidney, prostate and testicular cancer, ulcerative colitis, thyroid disease, suboptimal antibody response / decreased immunity, decreased fertility, reduced infant and fetal growth and developmental issues in children, obesity,



dyslipidemia (abnormally high cholesterol), and higher rates of hormone interference.

The use of PFAS has been regulated internationally by the Stockholm Convention on Persistent Organic Pollutants since 2009, with some jurisdictions, such as China and the European Union planning further reductions and phase-outs. However, major producers and users such as the United States, Israel, and Malaysia have not ratified the agreement and the chemical industry has lobbied governments to reduce regulations or has moved production to countries such as Thailand, where there is less regulation. In the United States, the Republican Party has filibustered bills regulating the chemicals. Cover-ups and the suppression of studies in 2018 by the Trump administration led to bipartisan outrage.

The market for PFAS was estimated to be $28 billion in 2023 and the majority are produced by 12 companies: 3M, AGC Inc., Archroma, Arkema, BASF, Bayer, Chemours, Daikin, Honeywell, Merck Group, Shandong Dongyue Chemical, and Solvay. Sales of PFAS, which cost approximately $20 per kilogram, generate a total industry profit of $4 billion per year on 16% profit margins. Due to health concerns, several companies have ended or plan to end the sale of PFAS or products that contain them; these include W. L. Gore & Associates (the maker of Gore-Tex), H&M, Patagonia, REI, and 3M. PFAS producers have paid billions of dollars to settle litigation claims, the largest being a $10.3 billion settlement paid by 3M for water contamination in 2023. Studies have shown that companies have known of the health dangers – DuPont and 3M were aware that PFAS was "highly toxic when inhaled and moderately toxic when ingested" since the 1970s. Externality, including remediation of PFAS from soil and water contamination, the cost of treating related diseases, and monitoring of PFAS pollution may cost as much as US$17.5 trillion annually, according to ChemSec. The Nordic Council of Ministers estimated health costs to be at least •52–84 billion in the European Economic Area. In the United States, PFAS-attributable disease costs are estimated to be US$6–62 billion.

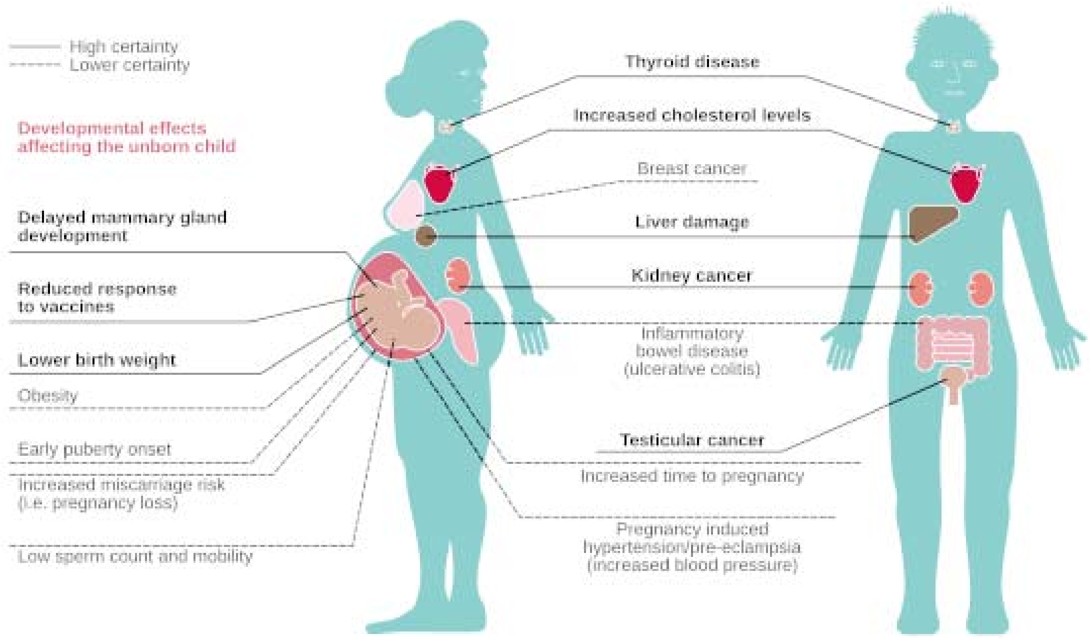
- PFAS are widely used, long lasting chemicals, components of which break down very slowly over time.
- Because of their widespread use and their persistence in the environment, many PFAS are found in the blood of people and animals all over the world and are present at low levels in a variety of food products and in the environment.
- PFAS are found in water, air, fish, and soil at locations across the nation and the globe.
- Scientific studies have shown that exposure to some PFAS in the environment may be linked to harmful health effects in humans and animals.
- There are thousands of PFAS chemicals, and they are found in many different consumer, commercial, and industrial products. This makes it challenging to study and assess the potential human health and environmental risks.

Exposure to PFAS: People can be exposed to PFAS by:

- Working in firefighting or in chemicals manufacturing and processing
- Drinking or eating liquids or food contaminated with PFAS
- Swallowing dust contaminated with PFAS
- Breathing air containing PFAS
- Using products made with or packaged in materials containing PFAS

Health and environmental effects

PFASs were originally considered to be chemically inert. Early occupational studies revealed elevated levels of fluorochemicals, including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA, C8), in the blood of exposed industrial workers, but cited no ill health effects. These results were consistent with the



measured serum concentrations of PFOS and PFOA in 3M plant workers ranging from 0.04 to 10.06 ppm and 0.01 to 12.70 ppm, respectively, well below toxic and carcinogenic levels cited in animal studies. Given, however, the serum elimination half-life of 4–5 years and widespread environmental contamination, molecules have been shown to accumulate in humans to such a degree that adverse health outcomes have resulted.

Effects of exposure to PFASs on human health

Short-chain PFASs, such as perfluorohexanoic acid (PFHxA) and perfluorobutanesulfonic acid (PFBS), have been found to be highly toxic despite claims to the contrary by the chemical industry. In many cases where long-chain PFAS were phased out, they were replaced with toxic short-chain PFAS

Prevalence in rain, soil, water bodies, and air

In 2022, levels of at least four perfluoroalkyl acids (PFAAs) in rain water worldwide greatly exceeded the EPA's lifetime drinking water health advisories as well as comparable Danish, Dutch, and European Union safety standards, leading to the conclusion that "the global spread of these four PFAAs in the atmosphere has led to the planetary boundary for chemical pollution being exceeded"

It had been thought that PFAAs would eventually end up in the oceans, where they would be diluted over decades, but a field study published in 2021 by researchers at Stockholm University found that they are often transferred from water to air when waves reach land, are a significant source of air pollution, and eventually get into rain. The researchers concluded that pollution may impact large areas.

In 2024, a worldwide study of 45,000 ground water samples found that 31% of samples contained levels of PFAS that were harmful to human health; these samples were taken from areas not near any obvious source of contamination.

Soil is also contaminated and the chemicals have been found in remote areas such as Antarctica. Soil contamination can result in higher levels of PFAs found in foods such as white rice, coffee, and animals reared on contaminated ground.

Adverse health outcomes

From 2005 to 2013, three epidemiologists known as the C8 Science Panel conducted health studies in the Mid-Ohio Valley as part of a contingency to a class action lawsuit brought by communities in the Ohio River Valley against DuPont in response to landfill and wastewater dumping of PFAS-laden material from DuPont's West Virginia Washington Works plant. The panel measured PFOA (also known as C8) serum concentrations in 69,000 individuals from around DuPont's Washington Works Plant and found a mean concentration of 83 ng/mL, compared to 4 ng/mL in a standard population of Americans. This panel reported probable links between elevated PFOA blood concentration and hypercholesterolemia, ulcerative colitis, thyroid disease, testicular cancer, kidney cancer as well as pregnancy-induced hypertension and preeclampsia.

Pregnancy issues

Exposure to PFAS is a risk factor for various hypertensive disorders in pregnancy, including preeclampsia and high blood pressure. It is not clear whether PFAS exposure is associated with wider cardiovascular disorders during pregnancy. Human breast milk has the capability to harbor PFASs, which can be transferred from mother to infant via breastfeeding.

Fertility issues

Endocrine disruptors, including PFASs, are linked with the male infertility crisis

A report in 2023 by the Icahn School of Medicine at Mount Sinai linked high exposure to PFAS with a 40% decrease in the ability for a woman to have a successful pregnancy as well as hormone disruption and delayed puberty onset.

Liver issues

A meta-analysis for associations between PFASs and human clinical biomarkers for liver injury, analyzing PFAS effects on liver biomarkers and histological data from rodent experimental studies, concluded that evidence exists that PFOA, perfluorohexanesulfonic acid (PFHxS), and perfluorononanoic acid (PFNA) caused hepatotoxicity in humans.

Cancer

PFOA is classfied as carcinogenic to humans (Group 1) by the International Agency for Research on Cancer (IARC) based on "sufficient" evidence for cancer in animals and "strong" mechanistic evidence in exposed humans. IARC also classified PFOS as possibly carcinogenic to humans (Group 2b) based on "strong" mechanistic evidence There is a lack of high-quality epidemiological data on the associations between many specific PFAS chemicals and specific cancer types, and research is ongoing.

Hypercholesterolemia

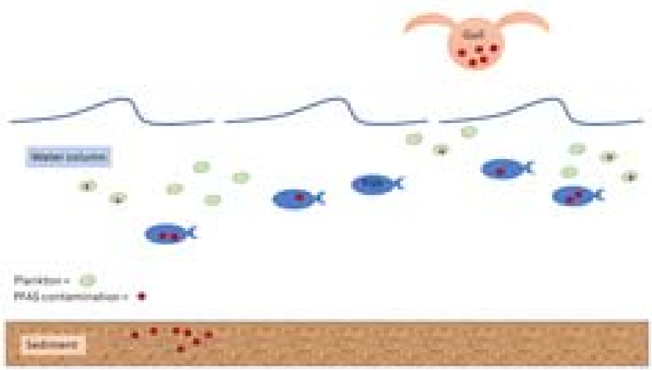
A response is observed in humans where elevated PFOS levels were significantly associated with elevated total cholesterol and LDL cholesterol, highlighting significantly reduced PPAR expression and alluding to PPAR independent pathways predominating over lipid metabolism in humans compared to rodents.

Ulcerative colitis

PFOA and PFOS have been shown to significantly alter immune and inflammatory responses in human and animal species. In particular, IgA, IgE (in females only) and C-reactive protein have been shown to decrease whereas antinuclear antibodies increase as PFOA serum concentrations increase. These cytokine variations allude to immune response aberrations resulting in autoimmunity. One proposed mechanism is a shift towards anti-inflammatory M2 macrophages and/or T-helper (TH2) response in intestinal epithelial tissue which allows sulfate-reducing bacteria to flourish. Elevated levels of hydrogen sulfide result, which reduce beta-oxidation and nutrient production, leading to a breakdown of the colonic epithelial barrier.

Thyroid disease

Hypothyroidism is the most common thyroid abnormality associated with PFAS exposure. PFASs have been shown to decrease thyroid peroxidase, resulting in decreased production and activation of thyroid hormones in vivo. Other proposed mechanisms include alterations in thyroid hormone signaling, metabolism and excretion as well as function of nuclear hormone receptor.



Bioaccumulation and Biomagnification

Bioaccumulation of PFAS: PFASs from sediments and water can accumulate in marine organisms. Animals higher up the food chain accumulate more PFAS because they absorb PFAS in prey they consume.

In marine species of the food web

Bioaccumulation controls internal concentrations of pollutants, including PFAS, in individual organisms. When bioaccumulation is looked at in the perspective of the entire food web, it is called biomagnification, which is important to track because lower concentrations of pollutants in environmental matrices such as seawater or sediments, can very quickly grow to harmful concentrations in organisms at higher trophic levels, including humans. Notably, concentrations in biota can even by >5000 times those present in water for PFOS and C_{10}–C_{14} PFCAs.] PFAS can enter an organism by ingestion of sediment, through the water, or directly via their diet. It accumulates namely in areas with high protein content, in the blood and liver, but its also found to a lesser extent in tissues.

Biomagnification can be described using the estimation of the trophic magnification factor (TMF), this describes the relationship between the contamination levels in a species and their trophic level in the food web. TMFs are determined by graphing the log transformed concentrations of PFAS against the assigned trophic level, and taking the antilog of the regression slope (10^{slope}).

In a study done on a macrotidal estuary in Gironde, SW France, TMFs were >1 for nearly all 19 PFAS compounds considered in the study and were particularly high for PFOA and PFNA (6.0 and 3.1 respectively).. A TMF> 1 means that accumulation in the organism is greater than that of the medium, in this case the medium being sea water.

PFOS, a long chain sulfonic acid, was found at the highest concentrations relative to other PFASs measured in fish and birds in Northern seas such as the Barents Sea and the Canadian Arctic.

A study published in 2023 analyzing 500 composite samples of fish fillets collected across the United States from 2013 to 2015 under the EPA's monitoring programs showed freshwater fish ubiquitously contain high levels of harmful PFAS, with a single serving typically significantly increasing the blood PFOS level.

Bioaccumulation and biomagnification of PFASs in marine species throughout the food web, particularly frequently consumed fish and shellfish, can have important impacts on human populations. PFASs have been frequently documented in both fish and shellfish that are commonly consumed by human populations, which poses health risks to humans and studies on the bioaccumulation in certain species are important to determine daily tolerable limits for human consumption, and where those limits may be exceeded causing potential health risks This has particular implications for populations that consume larger numbers of wild fish and shellfish species. PFAS contamination has also resulted in disruptions to the food supply, such as closures and limits on fishing.

Shorter fluorosurfactants may be less prone to accumulating in mammals; there is still some concern that they may be harmful to both humans and the environment,

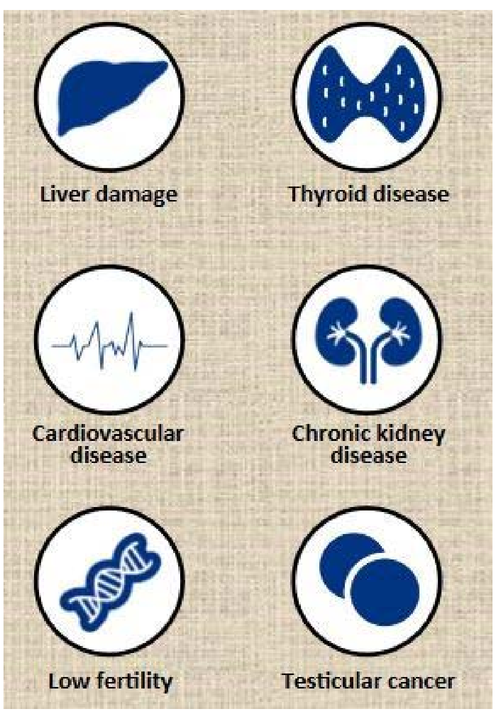
Suppression of information on health effects

Since the 1970s, DuPont and 3M were aware that PFAS was "highly toxic when inhaled and moderately toxic when ingested" Producers used several strategies to influence science and regulation – most notably, suppressing unfavorable research and distorting public discourse.

In 2018, under the Presidency of Donald Trump, White House staff and the United States Environmental Protection Agency pressured the U.S. Agency for Toxic Substances and Disease Registry to suppress a study that showed PFASs to be even more dangerous than previously thought.

Hazardous effects of PFASs

Due to PFASs long-term persistent accumulation, humans, wildlife and the environment continues to be exposed long after these compounds are released into the air, water and soil. PFAS are highly mobile in air, water and soil and are mostly persistent. They do not degrade - or only partially. Their lifespan is up to several thousand years, hence their nickname "forever pollutants". The health risks from PFAS have been known since the 1990s, long-chain PFASs have been widely recognized as contaminants of high global concern by the OECD in 2013. They have been linked to **cancer**, **reproductive harm**, **immune system damage** and other serious health problems, **even at low levels**.



PFOS affects the liver, kidney, thyroid, fecundity, leading to cancer formation.

Major health issues such as kidney cancer, testicular cancer, thyroid disease, pregnancy-induced hypertension, high cholesterol have been linked to **PFOA**.

Effects of **PFHxS** in humans are found to influence on the nervous system, brain development, endocrine system, and thyroid hormone.

PFOS, **PFOA** and **PFHxS** are transferred to foetus through cord blood and to infant through breast milk (UNEP 2016b, 2018). Exposure to PFOA and PFOS over certain levels may result in developmental effects to foetuses or breastfed infants (UNEP 2016b; US EPA 2016a, 2016b).

PFASs and the Stockholm Convention

Perfluorooctane sulfonic acid (PFOS) listed in **Annex B (restriction)** since 2009 is both intentionally produced and an unintended degradation product of related anthropogenic chemicals. The current intentional use of PFOS is widespread and includes in electric and electronic parts, as **fire-fighting foam**, **photo imaging**, **hydraulic fluids**, and **textiles**. PFOS is still produced in several countries. Its acceptable uses include as an active ingredient in insect bait to control leaf-cutting ants, in closed-loops systems in metal plating and as fire-fighting foam.

Perfluorooctanoic acid (PFOA) is listed in **Annex A (elimination)** since 2019. PFOA are used widely to produce non-stick kitchen ware, and food processing equipment. Unintentional formation of PFOA is created from inadequate incineration at moderate temperatures of municipal solid waste within inappropriate or open burning facilities.

In 2019, at the Second session of the International

Conference on Chemicals Management (ICCM2), SAICM stakeholders identified **managing PFASs and the transition to safer alternatives** as an issue of concern.

The 10th meeting of the Conference of the Parties in 2022 listed perfluorohexane sulfonic acid (PFHxS) widely used in fire-fighting foam, carpets, and non-stick cookware.

Perfluorocarboxylic acids (PFCAs) used in a range of applications, including in coating products, fabric/ carpet protectors, textile impregnation agents and firefighting foams is a **candidate POPs** proposed for listing under the Stockholm Convention.

Occupational exposure

Occupational exposure to PFASs occurs in numerous industries due to the widespread use of the chemicals in products and as an element of industrial process streams. PFASs are used in more than 200 different ways in industries as diverse as electronics and equipment manufacturing, plastic and rubber production, food and textile production, and building and construction. Occupational exposure to PFASs can occur at fluorochemical facilities that produce them and other manufacturing facilities that use them for industrial processing like the chrome plating industry. Workers who handle PFAS-containing products can also be exposed during their work, such as people who install PFAS-containing carpets and leather furniture with PFAS coatings, professional ski-waxers using PFAS-based waxes, and fire-fighters using PFAS-containing foam and wear flame-resistant protective gear made with PFASs.

Exposure pathways

People who are exposed to PFASs through their jobs typically have higher levels of PFASs in their blood than the general population. While the general population is exposed to PFASs through ingested food and water, occupational exposure includes accidental ingestion, inhalation exposure, and skin contact in settings where PFAS become volatile. The severity of PFAS-associated health effects can vary based on the length of exposure, level of exposure, and health status.

Professional ski wax technicians

Compared to the general public exposed to contaminated drinking water, professional ski wax technicians are more strongly exposed to PFASs (PFOA, PFNA, PFDA, PFHpA, PFDoDA) from the glide wax used to coat the bottom of skis to reduce the friction between the skis and snow. During the coating process, the wax is heated, which releases fumes and airborne particles. Compared to all other reported occupational and residential exposures, ski waxing had the highest total PFAS air concentrations.

Manufacturing workers

People who work at fluorochemical production plants and in manufacturing industries that use PFASs in the industrial process can be exposed to PFASs in the workplace. Much of what we know about PFASs exposure and health effects began with medical surveillance studies of workers exposed to PFASs at fluorochemical production facilities. These studies began in the 1940s and were conducted primarily at U.S. and European manufacturing sites. Between the 1940s and 2000s, thousands of workers exposed to PFASs participated in research studies that advanced scientific understanding of exposure pathways, toxicokinetic properties, and adverse health effects associated with exposure.

The first research study to report elevated organic fluorine levels in the blood of fluorochemical workers was published in 1980. It established inhalation as a potential route of occupational PFAS exposure by reporting measurable levels of organic fluorine in air samples at the facility. Workers at fluorochemical production facilities have higher levels of PFOA and PFOS in their blood than the general population. Serum PFOA levels in fluorochemical workers are generally below 20,000 ng/mL but have been reported as high as 100,000 ng/mL, whereas the mean PFOA concentration among non-occupationally exposed cohorts in the same time frame was 4.9 ng/mL. Among fluorochemical workers, those with direct contact with PFASs have higher PFAS concentrations in their blood than those with intermittent contact or no direct PFAS contact. Blood PFAS levels have been shown to decline when direct contact ceases. PFOA and PFOS levels have declined in U.S. and European fluorochemical workers due to improved facilities, increased usage of personal protective equipment, and the discontinuation of these chemicals from production. Occupational exposure to PFASs in manufacturing continues to be an active area of study in China with numerous investigations linking worker exposure to various PFASs.

Firefighters

Firefighters using aqueous film forming foam (AFFF)

PFASs are commonly used in Class B firefighting foams due to their hydrophobic and lipophobic properties, as well as the stability of the chemicals when exposed to high heat.

Research into occupational exposure for firefighters is emergent, though frequently limited by underpowered study designs. A 2011 cross-sectional analysis of the C8 Health Studies found higher levels of PFHxS in firefighters compared to the sample group of the region, with other PFASs at elevated levels, without reaching statistical significance. A 2014 study in Finland studying eight firefighters over three training sessions observed select PFASs (PFHxS and PFNA) increase in blood samples following each training event. Due to this small sample size, a test of significance was not conducted. A 2015 cross-sectional study conducted in Australia found that PFOS and PFHxS accumulation was positively associated with years of occupational AFFF exposure through firefighting.

Due to their use in training and testing, studies indicate occupational risk for military members and firefighters, as higher levels of PFASs in exposure were indicated in military members and firefighters when compared to the general population. PFAS exposure is prevalent among firefighters not only due to its use in emergencies, but also because it is used in personal protective equipment. In support of these findings, states like Washington and Colorado have moved to restrict and penalize the use of Class B firefighting foam for firefighter training and testing.

Exposure after World Trade Center terrorist attacks

The September 11 attacks and resulting fires caused the release of toxic chemicals used in materials such as stain-resistant coatings. First responders to this incident were exposed to PFOA, PFNA, and PFHxS through inhalation of dust and smoke released during and after the collapse of the World Trade Center.

Fire responders who were working at or near ground zero were assessed for respiratory and other health effects from exposure to emissions at the World Trade Center. Early clinical testing showed a high prevalence of respiratory health effects. Early symptoms of exposure often presented with persistent coughing and wheezing. PFOA and PFHxS levels were present in both smoke and dust exposure, but first responders exposed to smoke had higher concentrations of PFOA and PFHxS than those exposed to dust.

Mitigation measures

Several strategies have been proposed as a way to protect those who are at greatest risk of occupational exposure to PFAS, including exposure monitoring, regular blood testing, and the use of PFAS-free alternatives such as fluorine-free firefighting foam and plant-based ski wax.

Remediation: Remediation of per- and polyfluoroalkyl substances

Water treatment

Several technologies are currently available for remediating PFASs in liquids. These technologies can be applied to drinking water supplies, groundwater, industrial wastewater, surface water, and other applications such as landfill leachate. Influent concentrations of PFASs can vary by orders of magnitude for specific media or applications. These influent values, along with other general water quality parameters (for example, pH) can influence the performance and operating costs of the treatment technologies. The technologies are:

- Photodegradation
- Foam fractionation
- Sorption
- Granular activated carbon
- Biochar
- Ion exchange
- Precipitation/flocculation/coagulation
- Redox manipulation (chemical oxidation and reduction technologies)
- Membrane filtration
- Reverse osmosis
- Nanofiltration
- Supercritical water oxidation

Low Energy Electrochemical Oxidation (EOx)

Private and public sector applications of one or more of these methodologies above are being applied to remediation sites throughout the United States and other international locations. Most solutions involve on-site treatment systems, while others are leveraging off-site infrastructure and facilities, such as a centralized waste treatment facility, to treat and dispose of the PFAS pool of compounds.

The US based Interstate Technology and Regulatory Council (ITRC) has undertaken extensive evaluation of ex situ and in situ treatment technologies for PFAS impacted liquid matrices. These technologies are divided into field implemented technologies, limited application technologies and developing technologies and typically fit into one of three technology types:

- Separation,
- Concentration
- Destruction

The type of PFAS remediation technology selected is often a reflection of the PFAS contamination levels and the PFAS signature (i.e. the combination of short and long chain PFAS substances present) in conjunction with the site specific water chemistry and cross contaminants present in the liquid stream. More complex waters such as landfill leachates and WWTP waters require more robust treatment solutions which are less vulnerable to blockage.

Stripping and enrichment

Foam Fractionation utilises the air/water interface of a rising air bubble to collect and harvest PFAS molecules. The hydrophobic tail of many long chain criteria PFAS compounds adhere to this interface and rise to the water surface with the air bubble where they present as a foam for harvesting and further concentration. The foam fractionation technique is a derivation of traditional absorptive bubble separation techniques used by industries for decades to extract amphiphilic contaminants. The absence of a solid absorptive surface reduces consumables and waste byproducts and produces a liquid hyper-concentrate which can be fed into one of the various PFAS destruction technologies. Across various full scale trials and field applications, this technique provides a simplistic and low operational cost alternative for complex PFAS impacted waters.

Destruction

In 2007, it was found that high-temperature incineration of sewage sludge reduced the levels of perfluorinated compounds significantly.

A 2022 study published in the *Journal of Environmental Engineering* found that a heat-and pressure-based technique known as *supercritical water oxidation* destroyed 99% of the PFAS present in a water sample. During this process, oxidizing substances are added to PFAS-contaminated water and then the liquid is heated above its critical temperature of 374 degrees Celsius at a pressure of more than 220 bars. The water becomes supercritical, and, in this state, water-repellent substances such as PFASs dissolve much more readily.

Theoretical and early-stage solutions

A possible solution for PFAS-contaminated wastewater treatment has been developed by the Michigan State University-Fraunhofer team. Boron-doped diamond electrodes are used for the electrochemical oxidation system where it is capable of breaking PFAS molecular bonds which essentially eliminates the contaminates, leaving fresh water.

Acidimicrobium sp. strain A6 has been shown to be a PFAS and PFOS remediator. PFAS with unsaturated bonds are easier to break down: the commercial dechlorination culture KB1 (contains *Dehalococcoides*) is capable of breaking down such substances, but not saturated PFAS. When alternative, easier-to-digest substrates are present, microbes may prefer them over PFAS.

Chemical treatment

A study published in *Science* in August 2022 indicated that perfluoroalkyl carboxylic acids (PFCAs) can be mineralized via heating in a polar aprotic solvent such as dimethyl sulfoxide. Heating PFCAs in an 8 to 1 mixture of dimethyl sulfoxide and water at 80–120 °C (176–248 °F) in the presence of sodium hydroxide caused the removal of the carboxylic acid group at the end of the carbon chain, creating a perfluoroanion that mineralizes into sodium fluoride and other salts such as sodium trifluoroacetate, formate, carbonate, oxalate, and glycolate. The process does not work on perfluorosulfonic acids such as PFOS. A 2022 study published in *Chemical Science* shows breakdown of C-F bonds and their mineralization as YF_3 or YF_6 clusters. Another study in the Journal of the American Chemical Society described the PFASs breakdown using metal-organic frameworks (MOFs).

Analytical methods

Analytical methods for specific PFASs in environmental matrices and food and food have generally improved in sensitivity and selectivity to meet lower regulatory limit values. However, sensitive and accurate targeted methods using isotope-labeled internal standards still only cover just over 50 PFASs, mostly PFCAs and PFSAs with perfluorinated alkyl chains of four or more carbon atoms. Sum parameter methods, such as total organic fluorine assays (e.g., adsorbable organic fluorine, AOF; extractable organic fluorine, EOF), and the TOP Assay, are increasingly being used across matrices to quantify the proportion of PFASs not captured by typical targeted analyses.

What We Don't Fully Understand Yet

- How to better and more efficiently detect and measure PFAS in our air, water, soil, and fish and wildlife
- How much people are exposed to PFAS
- How harmful PFAS are to people and the environment
- How to remove PFAS from drinking water
- How to manage and dispose of PFAS

Compiled By:
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CARBOHYDRATE BASED POLYMERIC SURFACTANTS IN INDUSTRIAL USE

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INTRODUCTION:

As the use of various petroleum products are rising in day to day life, there is a need to reduce these to a considerable level. Thus to reduce the use these products to a minimum level, the use of these sugar surfactants are incorporated since these are cheap, easily available and do not cause any harm to the environment. These can be used to an extent of 50-100% in the final products such as hand wash, liquid laundry, powder detergent, etc. The performance characteristics of these surfactants match with the commercial products**.**

Keywords: Surfactant, sugar, polymer, alternative, low cost, ecofriendly

SUGAR SURFACTANT:

Sugar surfactant is the class of anionic surfactants which acts as the alternative to the use of conventional surfactants, which are harmful to the environment. These at the same time are cost effective and do not cause damage to the fabric. It is used to minimize the use of petroleum based products such as Acid Slurry, SLES, AOS, etc. the properties and the efficiency are comparable with, and better than the conventional surfactants with greater lowering of surface tension, and with good foaming and detergency and stain removing properties. Another alternative is the use of Alkyl Polyglucosides (APG) which can completely replace the petroleum based products but the cost of APG is high.

The methodology involves the combination of various essential components along with the carbohydrate such as sugar or liquid glucose and mixing them in a proper ratio, temperature, retention time and other process conditions. This mass on retention leads to the formation of polymer showing the characteristic properties. These surfactants can be used in various products such as Hand wash, dish wash, powder detergent, and various homecare and personal care products. Thus, producing safer, stronger and eco-friendly products at low cost. In this work we have prepared polymer from sugar, borax, caustic soda, etc.

The process for production of Sugar surfactant is as follows:

- Measure all the known quantities of the materials
- Measure a known amount of water in the beaker and heat it to about 60°C and attach it to an overhead stirrer.
- Dissolve borax into the heated water and add previously prepared caustic soda solution into it.
- Since temperature rises as is gives rise to the exothermic reaction in which heat is evolved, add cellulosic material into it so that it can dissolve quickly.
- Then add sugar solution and SLES and allow it to cool to about 35-40°C for some time.

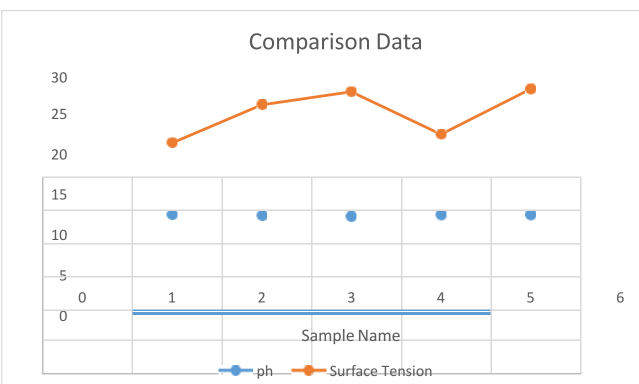
- After considerable decrease in the temperature, add acid slurry to the mixture.
- Continue the overhead stirring for 10-15 minutes and cool down the temperature to RT.

CONCLUSION:

Analysis of the prepared Polymer:

Parameters	Values
pH	9.28
Foam height (ml)	1000ml
Viscosity	11min 5sec
Surface tension (dyne/cm)	20.09
Anionic content	7.4646
%brix	About 15%

Likewise analysis of various batches was done which were as follows:



As from above, there is greater lowering of surface tension, these are effective in cleaning, foaming and detergency properties. Therefore soil and other stains are effectively removed at 1% concentrations with the help of these polymeric surfactants. These can be incorporated in various homecare and personal care products such as hand wash, toilet cleaner, floor cleaner, liquid laundry, powder detergent, etc. at a lower cost and is easily available and will be environment friendly.

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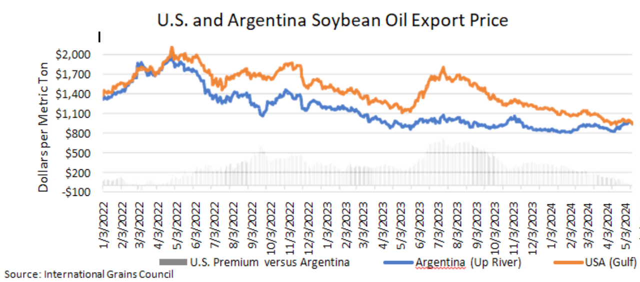
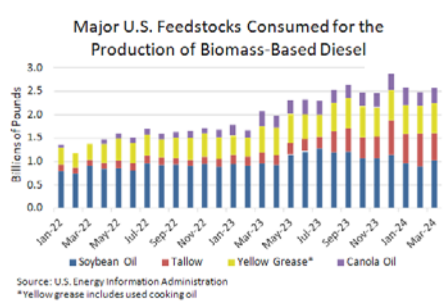
TRADE NEWS

U.S. Soybean Oil Price Premium Declines

The U.S. soybean oil price premium compared to other major exporters has declined, and the United States is expected to be a net soybean oil exporter in 2024/25. The price premium in the past couple of years was driven by higher domestic demand for soybean oil in biofuel production, particularly for increased renewable diesel production headed to the California market.



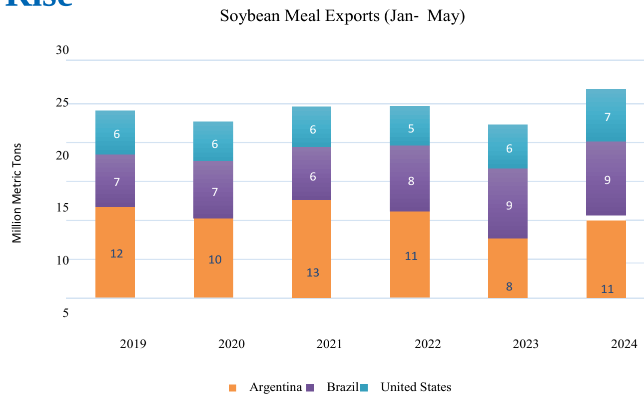
The premium U.S. soybean oil held over Argentine soybean oil peaked in the summer of 2023 as renewable diesel production ramped up. Since then, the share of soybean oil used in biofuels has decreased in part due to higher use of other feedstocks, such as tallow, yellow grease, and used cooking oil, which are incentivized under California policy. For comparison, soybean oil declined from near 45 percent of feedstock consumption in early 2022 to below 35 percent in early 2024.



U.S. soybean oil production is forecast at another record in 2024/25 driven by a 4 percent increase in domestic demand. The United States is expected to be a net exporter of soybean oil, with lower imports and a modest recovery in soybean oil exports from the multi-decade lows of the past 2 years. U.S. soybean oil ending stocks are forecast up 10 percent while prices are forecast to decline.

***Courtesy:** USDA: Oilseeds - World Market and Trade*

Early 2024 Global Soybean Meal Exports Rise



Source: Trade Data Monitor, LLC; FAS-GATS; FAS-Export Sales Reporting; Brazil Ministry of Development Industry Commerce and Services.

The 2024 soybean harvest in South America is coming to an end and soybean complex prices continue to be pressured. Global supplies are larger compared to last year when soybean production declined in Argentina due to drought. With soybean meal export prices down compared to the prior year, global protein meal demand has picked up and lifted exports.

Combined soybean meal exports between January and May 2024 for Argentina, Brazil, and the United States are estimated at nearly 27 million tons, over 20 percent higher compared to the same period last year. As expected, most of this growth was recorded for Argentina, where recovery from last year's drought has enabled higher soybean crush. In Brazil, despite headwinds of a smaller soybean crop, crush has been at a record high.

Meanwhile, the United States benefited from weaker competition from Argentina during the first quarter of the year and pushed January May exports to new highs, 16 percent above the same timeframe last year. Seasonal recovery in competition from South America may affect future meal exports from the United States. However, with expanded crush capacity and new players entering the market, U.S. soybean meal is likely to remain attractive to global buyers.

***Courtesy:** USDA: Oilseeds - World Market and Trade*

Biofuels explained - use and supply - U.S. Energy Information Administration (EIA)

Renewable diesel is the second-most consumed biofuel after fuel ethanol.

Because renewable diesel is chemically the same as petroleum diesel, it may be used in its pure form—called R100—as a drop-in fuel. It can also be blended with petroleum diesel or with biodiesel in various amounts. Renewable diesel-petroleum diesel blends are labeled with an R followed by the percentage (by volume) of the renewable diesel content. For example, a blend of 20% renewable diesel and 80% petroleum diesel is called R20. A blend of 20% biodiesel and 80% renewable diesel is called B20R80 to make a 100% biofuel. A blend of 20% biodiesel, 20% renewable diesel, and 60% petroleum diesel is called B20R20.

According to the U.S. Renewable Diesel Fuel and Other Biofuels Plant Production Capacity report, as of January 1, 2023, the United States had 17 operating renewable diesel production facilities in 12 states with a combined production capacity of about 3 billion gallons per year. Two of these facilities are former petroleum refineries converted to processing biofuels. In 2022, U.S. renewable diesel production was about 1.5 billion gallons and consumption was about 1.7 billion gallons, which included about 0.3 billion gallons of imports. California uses most U.S. renewable diesel fuel imports.

Biodiesel is the third-most consumed biofuel in the United States

Only small amounts of biodiesel were consumed and produced in the United States until the early 2000s. Since then, U.S. biodiesel consumption and production have increased substantially, largely because of government incentives and requirements that have come into effect to produce, sell, and use biodiesel. In addition to the U.S. Renewable Fuel Standard Program, the Biodiesel Mixture Excise Tax Credit and the Biodiesel Income Tax Credit are important incentives for biodiesel blenders and producers. In 2022, biodiesel accounted for about 9% of total U.S. biofuels production and consumption.

Pure biodiesel has limited direct-use applications and has supply logistics challenges because of its physical properties and characteristics. Biodiesel is a good solvent, which means it can degrade rubber in fuel lines and loosen or dissolve varnish and sediments in petroleum diesel fuel tanks, pipelines, and in engine fuel systems (which can clog engine fuel filters). Biodiesel turns into a gel at higher temperatures than petroleum diesel, which creates problems for its use in cold temperatures. So, biodiesel cannot be stored or transported in regular petroleum liquids tanks and pipelines—it must be transported by rail, vessel and barge, or truck.

Biodiesel is approved for blending with petroleum diesel (distillate) under the American Society for Testing and Materials specification ASTM D6751. Most U.S. biodiesel is consumed as blends with petroleum diesel in ratios of 2% (referred to as B2), 5% (B5), or 20% (B20). Some vehicle fleets use B100 (neat biodiesel). Much of the petroleum diesel fuel sold in the United States contains up to 1% biodiesel because biodiesel's lubrication qualities can potentially prolong the lifetime of certain engine components. Biodiesel is added to petroleum diesel at blending terminals after the petroleum diesel is loaded into tanker trucks for local distribution.

Courtesy: *U.S. biodiesel, renewable diesel, and other biofuels production, 2001-2022.*

Firefly Green Fuels is making SAF from sewage

Firefly Green Fuels, a company dedicated to reducing aviation's carbon footprint, is exploring an innovative method to transform the way the world's airlines are powered: sewage.

"Sewage is interesting to work with. At the moment the only other disposal route in the UK is through agricultural spreading, a practice which will likely be outlawed as soon as a better route is secured," he added. "Our process gives this waste a new purpose, creating SAF whilst supporting biodiversity in ecosystems currently plagued by agricultural runoff," James Hygate, Firefly Green Fuels CEO, said.

The company takes sewage sludge from water utilities and separates it into two useful materials through a high-pressure reactor process. The first product, biochar, is used as a fertilizer in the agriculture industry, while the second, bio-crude, can be refined into jet fuel. "We really do need every different route to SAF to work out if we want to meet ambitious global targets," Hygate said. "That means that more support is needed from governments and other technologies need to also be developed alongside SAF. We really don't have much time to make these changes if we want to make a significant impact on climate change."

As approved SAF routes cannot meet the necessary demand in the aviation industry, more solutions are required. Firefly has been in discussions with officials in a major metropolitan area who believe that their sewage-to-SAF process could power up to 80% of flights from their international airport using SAF alone.

Firefly is working at pace towards the making of a first-of-a-kind plant in the UK within this decade. However, that's just the start. As the feedstock is globally relevant, the company plans to roll this technology out around the world. The sewage-to-SAF process has the potential to significantly reduce aviation's carbon footprint and transform the way the world's airlines are powered.

"I think that every route to SAF is incredibly innovative and will be an important part of the puzzle moving forward, but our SAF made from sewage is an incredibly effective and green solution that promises to be very cost-effective too," Hygate continued. "When looking exclusively at biogenic wastes, the Firefly route shows potential to be the largest single source of SAF globally."

Courtesy: *https://worldbiomarketinsights.com/*

Biotech company seeks green light for 'drop-in replacement' to fish oil

Yield10 applies for US approval for crop that produces both DHA and EPA

A US biotech company has applied for regulatory approval for a variety of genetically modified camelina that may provide a "drop-in replacement" for fish oil in salmon feed.

The seeds of the camelina variety are used to produce an oil containing approximately 10% EPA and 10% DHA, the long chain fatty acids in omega-3 that are important for the health of farmed salmon and the consumers who eat the salmon. The fatty acid profile closely resembles the omega-3 EPA/DHA fatty acid profile of northern hemisphere fish oil.

The camelina was developed at Rothamsted agricultural research institute in the UK by Professor Johnathan Napier and his team and is being commercialised by Massachusetts-based Yield10 Bioscience, which has an agreement with Rothamsted.

In October last year, salmon feed producer BioMar signed an agreement with Yield10 to form a long-term partnership to commercialise the crop.

An ideal platform

"Based on the scientific work published by the Rothamsted Institute, including salmon feeding and human clinical trials, we believe the camelina omega-3 technology represents an ideal platform for the sustainable, land-based production of high value omega-3 oils to address the significant potential opportunity in the global aquafeed and human nutrition markets," said Yield10 chief science officer Kristi Snell this week.

"We believe camelina-based production of omega-3 oil containing EPA and DHA is a promising solution to address the ongoing shortfalls in supply of omega-3 oil from fish oil and sustainably meet the projected increase in global demand for omega-3 oil in the years to come. We are focused on advancing our omega-3 oil producing camelina along the regulatory path, building seed inventory and engaging with potential commercial partners."

Yield10 initially applied for product authorisation in the United States with a camelina that produces EPA and has now followed that up with the variety producing both EPA and DHA. The company currently has 50 acres of EPA-producing camelina growing in Chile to begin the ramp-up of seed inventory for future planting, as well as to produce omega-3 (EPA) oil samples for business development activities.

It is now scaling up a camelina line to produce oil containing both EPA and DHA fatty acids.

Extensively tested

"This line has been extensively tested by Rothamsted and published aquafeed studies have shown that the EPA + DHA oil produced in camelina has the potential to serve as a drop-in replacement for fish oil. Furthermore, published human clinical studies have shown this oil to be an effective alternative to fish oil in the human diet," said Yield10 in a press release.

Genetically modified (GM) products are not currently allowed in Scotland, but an omega-3 fish feed ingredient derived from genetically modified canola became the first GM product to be approved for use in Norway in June last year.

Australian-owned Nuseed won approval for its Aquaterra oil after Norway's Science Committee for Food and Environment (VKM) carried out a risk assessment of the product for use in fish feed on behalf of the Norwegian Food Safety Authority (Matillsynet).

No increased risk

The committee concluded that fish feed containing the oil does not pose an increased health risk for fish or have any indications of increased environmental risk compared to conventional fish feed with oils from other sources.

Nuseed already has approvals for Aquaterra use in the United States, Canada, and Australia, and Aquaterra was commercially launched for use in Chilean salmon production in 2020. The company is also seeking approval for Aquaterra for animal feed uses in the European Union and UK.

Napier believes the camelina created by Rothamsted has superior composition, since its oil accumulates both EPA and DHA to around 10% each, whereas Nuseed's canola products primarily accumulates only DHA.

"We might be late to the party but we're the one that's turning up with the champagne," he told Fish Farming Expert last year.

Courtesy: *https://www.fishfarmingexpert.com/*

NAMIBIA SEEKS TO EXPLORE VEGETABLE OIL PRODUCTION

Namibia is looking to cut down on the growing import bill of vegetable oils, especially for the most commonly-consumed oils such as sunflower oil, palm oil, soybean oil, olive oil and canola oil. This will be done by exploring domestic opportunities

to produce those oils locally in various parts of the country.

At present, the country does not produce its vegetable oils, and therefore remains one of the biggest net importers of vegetable oils in southern Africa. To meet its domestic demand, the country imported vegetable oils worth over N$800 million between 2022 and last year.

The Namibian Agronomic Board (NAB)'s latest Market Intelligence Report shows that from all types of vegetable oils used for human consumption, Namibia mostly imports sunflower oil, followed by palm oil while the least-imported vegetable oil is sesame oil.

In terms of consumption, sunflower oil remains the most consumed oil in Namibia. The country recorded its highest consumption record of 24 908 tonnes of sunflower cooking oil back in 2019, and the trend has more or less remained the same to date.

Palm oil consumption, on the other hand, is also slowly becoming popular in Namibia, with an over 80% increase in consumption recorded between 2017 (248 tonnes) and 2021 (1 948 tonnes). Meanwhile, canola oil is the least-consumed vegetable oil, with an average consumption of 19 tonnes per year.

To curtail the country's mammoth import bill of vegetable oils, the Namibian government, through research and technical assistance from the NAB and others, is now looking to explore the country's potential to produce at least 24 145 tonnes of vegetable oils annually at various local sites. The largest opportunity for Namibia is in sunflower oil, which has the largest import share of 22 340 tonnes, valued at over N$809.9 million.

The sunflower crop which is used for sunflower oil production is considered a fairly drought-tolerant crop which can potentially be grown successfully in Namibia, which is one of the driest countries in sub-Saharan Africa. Additionally, sunflower oil is the most consumed oil in Namibia, and it is imported in large quantities for local consumption. Hence, it provides a customer guarantee for potential sunflower crop farmers who might be seeking to explore this area.

As the most-consumed vegetable oil in Namibia, sunflower oil imports have been on an upward trend since 2018 from a value of N$350.5 million to over N$810 million between 2022 and 2023, marking an average increase of 19% per year. About 99.9% of this sunflower oil was imported from South Africa.

Namibia also has the potential and opportunity to produce olive oil, as olive trees have proven to be quite suitable for cultivation in the Erongo region (along the Swakop River), where most of the country's largest olive oil plantations are currently situated.

About 960 tonnes of palm oil valued at N$29.9 million currently being imported by Namibia is another opportunity which can be explored by potential local producers, as this is currently not being produced in Namibia.

Palm trees are in the same family as date trees, and Namibia is currently involved in the commercial production of dates in the southern parts of the country, which could prove some suitability for palm tree prduction in the same area as well.

The NAB has over the years been calling on potential local producers to research more on their production practices and requirements in order to take advantage of the existing import gaps to produce for local demand.

Apart from the production potential in terms of value and tonnages available for consumption in Namibia, possible local farmers likewise have an opportunity to tap into export markets which may be available in other SADC countries.

Courtesy: *https://neweralive.na/namibia*

Czech controls find problems with olive oil and meat products

Czech controls on olive oil have found two-thirds of samples were non-compliant. The Czech Agriculture and Food Inspection Authority (SZPI) focused on the quality of olive oils on the domestic market.

Overall, 67 percent of evaluated samples failed to meet the requirements of European legislation. The most severe findings were olive oils that did not correspond to the extra virgin label when assessed and were of lower quality. Two samples matched the category lampante oil, which is not meant for retail sale and is intended for further processing.

The Czech Republic is not an olive oil-producing country, but it sent samples to an accredited laboratory in Slovenia. The analysis confirmed that of the 21 samples evaluated, 14 were unsatisfactory. These came from Spain, Italy, and Greece. The oils were not extra virgin for ten samples as stated on the label, but lower quality oils. In six cases, inspectors found deficiencies in the labeling.

The aim was to check whether extra virgin and virgin olive oils from different countries met EU regulations' physical, chemical, and sensory parameters and labeling requirements. SZPI said findings show claims on some product labels are misleading domestic consumers.

"Regular inspections of olive oils show that products imported into the Czech Republic often fail to correspond to the declared category in terms of their characteristics. The inspections also suggest that importers underestimate the ability of the supervisory authorities in the Czech Republic to assess the quality of olive oils," said agency officials. SZPI has ordered sellers to withdraw non-compliant lots from the market and will initiate proceedings to impose fines.

Salmonella in meat findings

SZPI also warned consumers about frozen goose meat contaminated with Salmonella. The product, from Hungary via Germany, has lot code 231330, Tranzit-Food Kft as producer, and the best-before date is Sept. 30, 2025.

Inspectors took the sample at one of the sites of Kaufland Èeská Republika in Prague. Lab analysis confirmed the presence of Salmonella Senftenberg. SZPI has informed the European Union's Rapid Alert System for Food and Feed (RASFF), ordered a market withdrawal and advised consumers not to eat the implicated batch. The agency previously reported two lots of chilled chicken meat from Ukraine via Slovakia was contaminated with Salmonella.

Two samples of Tesco chicken breast fillets from different stores were positive for Salmonella Infantis. Products had use-by dates of October and September, so they were no longer on the market, but SZPI said the warning was issued as people might have them at home in the freezers. The agency started an administrative procedure to impose a fine.

Inspectors seize meat products

In December, the State Veterinary Administration (SVS) uncovered the sale of meat products through the social media site Facebook. Prague veterinary inspectors and police confiscated more than 180 kilograms of food of unknown origin.

Inspectors made a controlled purchase after an alert about suspicious advertising in the foreign-language community on Facebook. At the arranged meeting in Prague, more than 150 kilograms of pork and 30 kilograms of other meat products were seized. These goods were not marked, and the seller did not have documents relating to proof of origin.

Proceedings will be initiated against the suspect. Placing food of unknown origin on the market can result in a fine of up to Czech Koruna 50 million ($2.2 million). Another operation at an Asian market in Brno found violations of regulations on selling products of animal origin. This included food that may not be sold in the Czech Republic, the sale of food of unknown origin, and sausages from an illegal production plant.

In a freezer of one outlet, veterinary inspectors found four packages of frozen silkworm larvae, which are not allowed to be sold for human consumption in the European Union.

Officials found a crate of bird carcasses, but the species could not be determined. The vendor said they were quails, but there was no proof of origin. Inspectors uncovered eight kilograms of chilled sausages, also without documents. They were thought to have come from the seller's own domestic production operation.

Courtesy: https://www.foodsafetynews.com/

Cargill's edible oils comply with WHO standards

Cargill's fats and oils now comply with the World Health Organization's recommended maximum

tolerance level for industrially produced trans-fatty acids in fats and oils, according to the company.

The company's entire oils portfolio meets the WHO's standards on iTFAs, which means limiting iTFA content to no more than 2 grams per 100 grams of fats and oils, according to the company.

Cargill said it has invested an additional $8.5 million to upgrade its facilities in order to reduce the amount of transfat produced during oil processing within the last two years.

"We're extremely proud that we've met our commitment and helped fulfill our purpose — nourishing the world in a safe, responsible and sustainable way," said Natasha Orlova, vice president for edible oils and managing director for North America at Cargill. "Taking this industry-leading step, even in countries without current iTFA legislation, helps ensure consistency in their supply chain for larger food manufacturers, while offering Cargill's breadth of innovation and experience to smaller manufacturers."

To meet WHO's compliance, Cargill has added iTFAs to its larger food safety and quality assurance program, which includes monitoring, compliance and auditing, according to the company.

***Courtesy**: https://www.foodbusinessnews.net/*

Bio-Based Chemicals are Gaining a Following

Surfactants have been around since the first Ancient Babylonian boiled fats with ashes and made soap. A lot has changed since then, but surfactants — a portmanteau of surface-active agents — remain a vital component in today's cleaning chemicals. With a hydrophilic head that wants to be in water and a hydrophobic tail that doesn't, these molecules form micelles that trap and hold dirt. Rinse and those dirt-filled micelles float away leaving a clean surface behind.

But what happens after those surfactants go down the drain?

Today, many modern surfactants are produced using non-renewable, petroleum-based materials. This is a problem according to Roger McFadden, chief science officer,/ McFadden and Associates, LLC, Canby, Oregon.

"Many synthetic surfactants have moderate to high levels of toxicity and poor biodegradability," he says. "They can have a negative impact on wastewater treatment as well as aquatic microbial populations, fish, and other aquatic life."

Enter bio-based surfactants. Made from readily renewable, plant-based materials, bio-based surfactants offer a reportedly safer and more sustainable alternative to non-renewable, petroleum-based surfactants. These chemicals minimize toxicity, maximize biodegradability, and reduce the environmental impact of their production and use without sacrificing product performance.

McFadden explains further, "Bio-based surfactants are/ typically derived from renewable sources such as plants, coconut,/ corn, and soybean oils. Bio-based and sugar-based surfactants, such as sorbitan esters, sucrose esters, alkyl polyglucosides, and fatty acid glucamides are gaining in popularity because of improved performance along with human health and environmental compatibility compared to traditional formulations."

Experts express that bio-based surfactants can offer a big improvement over synthetic surfactants, but they are not perfect. Despite their name, the products are not always 100 percent bio-based, meaning they can be made, in part, from non-renewable raw materials. Also, the production of many bio-based surfactants requires the traditional, water- and energy-intensive chemical reactions in the manufacturing phase.

Still, the category continues to grow. Bio-based surfactants have already replaced many conventional, petroleum-based surfactants in cleaning products. Part of the reason is because bio-based surfactants represent a good step forward in sustainability. However, some experts predict that microbial biosurfactants are the next frontier.

"Microbial biosurfactants/ are produced by readily renewable microorganisms and are 100 percent biobased," says McFadden. "They are a type of bio-based surfactant produced naturally — often through fermentation."

Surfactant Breakdown

Unfortunantely, some confusion persists between the terminology of bio-based surfactants and biosurfactants.

"It's important to note that/ all biosurfactants are bio-based surfactants, but not all bio-based surfactants are biosurfactants," says McFadden.

Be that as it may, bio-based surfactants and biosurfactants share many positive qualities. When it comes to cleaning formulations, both perform and act very much like their synthetic, petroleum-based counterparts. They also both minimize toxicity, maximize biodegradability, and reduce the carbon footprint when compared to surfactants made from petroleum products.

Although similar, microbial biosurfactants will edge out bio-based surfactants on several fronts. For example, biosurfactants come in all sorts of varieties. There are options that offer solubilizing, emulsifying, dispersing, detergent and stabilizing properties — and this allows cleaning teams to have plenty of options when picking the right product for the job. üÿ Biosurfactants also function as high-performance surface-active agents and emulsifiers to remove soils, oils, and grease.

Products formulated with biosurfactants are versatile. They are highly effective and can be designed to work in cold or hot water, salt conditions, low or high pH, viscosity, or foam, compared with synthetic surfactants.

Another advantage, "biosurfactants are benign by design and therefore can be used on a wide variety of surfaces and soils without damage to surfaces or fixtures," McFadden stresses.

Manufacturing biosurfactants is a highly efficient process with a small carbon footprint. Fermenting these chemicals requires less water, uses less energy, and produces less waste than creating synthetic or even bio-based surfactants. This makes biosurfactants a "greener" choice right from the start, a shift from the cleaning industry's classic vision of an eco-friendly product.

"There is often too much attention given to the end-of-life of these products," explains Steve Ashkin, President/Founder, The Ashkin Group, LLC, Channel Island Harbor, California. "Biosurfactants offer environmental and health benefits throughout their entire life cycle."

Environmental advantages like these are one reason why the biosurfactants sector is gaining momentum from a market persepctive — which was valued at $1.2 billion in 2022 and is projected to reach $2.3 billion by 2028, according to Markets and Markets research. That growth is driven by demand from international governments and regulatory authorities for more sustainable products.

However, there is a downside. Manufacturing biosurfactants requires leading edge technology. This bumps their price higher than synthetic or even bio-based surfactants.

"These products are slowly making their way to the cleaning industry," says Ashkin. "But right now, the biggest obstacle is cost."

And cost, especially in the highly competitive cleaning industry, is a huge driver in buying decisions. This becomes truer when budget reductions are on the table.

"We need to dispel the myth that people will pay more for green products," Ashkin continues. "Sure, there are industry leaders and early adopters that may pay for these products, but they only represent maybe 10 percent of the whole market."

Good news is on the way for the other 90 percent. The cleaning sector is not the only industry that relies on surfactants. Agriculture, food processing, personal care products, pharmaceuticals, wastewater treatment, and even petroleum recovery also require surfactants. Demands in these large industries promise to attract more manufacturers into the biosurfactant space, eventually driving the price down for everyone, including cleaning product manufacturers. Meanwhile, McFadden urges patience.

"It will take some time, maybe three to five years, before we achieve cost parity," he predicts.

IMPORTANT FIGURES

Table 01: India Oilseeds and Products Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Oilseed, Cottonseed	10,316	11,166	11,123	10,614	10,614
Oilseed, Peanut	8,700	6,300	6,000	7,100	7,100
Oilseed, Rapeseed	11,100	11,300	12,500	12,100	12,100
Oilseed, Soybean	11,889	12,411	11,875	12,200	12,200
Oilseed, Sunflowerseed	140	215	112	113	113
Other	1,021	1,022	1,021	1,021	1,021
Total	43,166	42,414	42,631	43,148	43,148
Domestic Consumption					
Meal, Cottonseed	4,238	4,443	4,405	4,298	4,298
Meal, Rapeseed	4,375	4,350	4,700	5,000	4,925
Meal, Soybean	6,273	6,625	7,190	7,625	7,625
Other	2,348	2,176	2,115	2,284	2,284
Total	17,234	17,594	18,410	19,207	19,132
SME					
Meal, Cottonseed	3,434	3,600	3,569	3,483	3,483
Meal, Rapeseed	3,113	3,095	3,344	3,558	3,504
Meal, Soybean	5,873	6,225	6,740	7,150	7,150
Other	2,177	2,021	1,923	2,102	2,102
Total	14,597	14,941	15,576	16,292	16,239
Food Use Dom. Cons.					
Oil, Cottonseed	1,250	1,315	1,290	1,310	1,310
Oil, Palm	7,800	8,300	8,700	9,200	9,200
Oil, Peanut	1,185	1,050	1,040	1,125	1,115
Oil, Rapeseed	3,700	3,600	4,000	4,100	4,100
Oil, Soybean	5,825	5,400	5,150	5,600	5,600
Oil, Sunflowerseed	1,900	2,700	2,900	2,550	2,550
Other	375	400	416	415	415
Total	22,035	22,765	23,496	24,300	24,290
Domestic Consumption					
Oil, Cottonseed	1,295	1,361	1,345	1,350	1,350
Oil, Palm	8,150	8,900	9,350	9,850	9,850
Oil, Peanut	1,195	1,060	1,050	1,135	1,125
Oil, Rapeseed	3,780	3,680	4,080	4,180	4,180
Oil, Soybean	5,825	5,400	5,150	5,600	5,600
Oil, Sunflowerseed	1,900	2,700	2,900	2,550	2,550
Other	674	710	736	740	740
Total	22,819	23,811	24,611	25,405	25,395
Imports					
Oil, Cottonseed	4	1	3	5	5
Oil, Palm	8,004	10,045	9,000	9,200	9,200
Oil, Peanut	0	0	0	0	0
Oil, Rapeseed	34	6	5	5	5
Oil, Soybean	4,231	3,968	2,950	3,500	3,500
Oil, Sunflowerseed	1,956	2,988	2,900	2,200	2,200
Other	80	111	135	140	140
Total	14,309	17,119	14,993	15,050	15,050

SME - 44 Percent Protein Soybean Meal Equivalent

Table 02: Major Oilseeds: World Supply and Distribution (Commodity View)

Million Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Oilseed, Copra	6.03	6.00	6.21	5.81	5.81
Oilseed, Cottonseed	41.27	42.42	41.59	43.17	43.21
Oilseed, Palm Kernel	19.16	20.06	20.70	20.74	20.72
Oilseed, Peanut	51.97	49.41	48.82	51.32	51.32
Oilseed, Rapeseed	75.83	88.85	88.74	88.34	87.07
Oilseed, Soybean	360.46	378.37	395.91	422.26	422.26
Oilseed, Sunflowerseed	56.86	52.78	54.86	55.43	55.43
Total	611.57	637.89	656.83	687.06	685.81
Imports					
Oilseed, Copra	0.10	0.08	0.09	0.09	0.09
Oilseed, Cottonseed	0.98	1.36	1.16	1.15	1.15
Oilseed, Palm Kernel	0.15	0.15	0.16	0.15	0.15
Oilseed, Peanut	4.05	4.27	4.08	4.26	4.26
Oilseed, Rapeseed	13.92	20.04	16.22	17.27	16.47
Oilseed, Soybean	154.47	167.86	170.53	176.40	176.40
Oilseed, Sunflowerseed	3.83	3.78	2.72	2.41	2.41
Total	177.50	197.54	194.96	201.73	200.93
Exports					
Oilseed, Copra	0.10	0.10	0.10	0.09	0.09
Oilseed, Cottonseed	1.27	1.07	1.43	1.48	1.48
Oilseed, Palm Kernel	0.05	0.05	0.04	0.04	0.04
Oilseed, Peanut	4.43	4.83	4.72	4.82	4.82
Oilseed, Rapeseed	15.35	19.55	16.80	17.64	16.89
Oilseed, Soybean	154.44	172.07	172.62	180.20	180.20
Oilseed, Sunflowerseed	3.95	4.02	2.84	2.58	2.58
Total	179.57	201.69	198.56	206.84	206.10
Crush					
Oilseed, Copra	5.96	5.91	5.98	5.78	5.78
Oilseed, Cottonseed	31.98	32.59	32.92	33.84	33.88
Oilseed, Palm Kernel	19.01	20.08	20.62	20.82	20.82
Oilseed, Peanut	19.83	19.15	18.38	19.28	19.28
Oilseed, Rapeseed	72.06	81.11	83.75	83.78	82.95
Oilseed, Soybean	316.66	315.44	329.78	345.87	345.78
Oilseed, Sunflowerseed	46.72	51.41	51.70	51.47	51.47
Total	512.22	525.69	543.13	560.84	559.96
Ending Stocks					
Oilseed, Copra	0.06	0.05	0.04	0.04	0.04
Oilseed, Cottonseed	1.49	1.45	1.51	1.57	1.58
Oilseed, Palm Kernel	0.33	0.28	0.30	0.28	0.28
Oilseed, Peanut	4.85	4.12	3.79	4.18	4.11
Oilseed, Rapeseed	4.40	8.28	8.33	7.83	7.50
Oilseed, Soybean	92.58	100.59	111.07	128.50	127.90
Oilseed, Sunflowerseed	7.85	4.15	2.78	2.45	2.49
Total	111.54	118.92	127.82	144.84	143.88

Totals may not add due to rounding

Table 03: Major Protein Meals: World Supply and Distribution (Commodity View)

Million Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Meal, Copra	1.97	1.96	1.98	1.92	1.92
Meal, Cottonseed	14.69	14.96	15.15	15.58	15.60
Meal, Fish	4.97	4.51	4.91	5.14	5.14
Meal, Palm Kernel	9.86	10.44	10.74	10.87	10.87
Meal, Peanut	7.91	7.64	7.35	7.71	7.71
Meal, Rapeseed	41.93	47.22	48.63	48.62	48.15
Meal, Soybean	248.26	247.83	258.77	271.31	271.24
Meal, Sunflowerseed	21.23	23.07	23.05	22.99	22.99
Total	350.81	357.63	370.57	384.14	383.62
Imports					
Meal, Copra	0.69	0.62	0.63	0.63	0.63
Meal, Cottonseed	0.27	0.19	0.24	0.21	0.21
Meal, Fish	3.59	3.35	3.41	3.62	3.62
Meal, Palm Kernel	7.34	7.74	7.73	7.77	7.77
Meal, Peanut	0.13	0.12	0.09	0.09	0.09
Meal, Rapeseed	7.67	9.29	9.98	10.03	10.13
Meal, Soybean	67.13	62.98	67.89	70.94	70.94
Meal, Sunflowerseed	7.35	8.57	9.57	9.20	9.20
Total	94.17	92.85	99.55	102.48	102.58
Exports					
Meal, Copra	0.75	0.62	0.69	0.67	0.67
Meal, Cottonseed	0.45	0.28	0.34	0.35	0.35
Meal, Fish	2.84	2.50	2.85	3.04	3.04
Meal, Palm Kernel	7.90	8.13	8.23	8.28	8.28
Meal, Peanut	0.18	0.18	0.16	0.17	0.17
Meal, Rapeseed	7.76	9.78	10.15	10.18	10.28
Meal, Soybean	68.80	67.17	71.34	74.51	74.60
Meal, Sunflowerseed	7.84	9.16	9.98	9.78	9.78
Total	96.52	97.81	103.74	106.98	107.16
Domestic Consumption					
Meal, Copra	1.90	1.96	1.92	1.88	1.88
Meal, Cottonseed	14.52	14.86	15.05	15.44	15.46
Meal, Fish	5.64	5.39	5.50	5.69	5.69
Meal, Palm Kernel	9.46	10.20	10.19	10.31	10.31
Meal, Peanut	7.85	7.59	7.28	7.64	7.64
Meal, Rapeseed	41.63	46.97	48.10	48.39	48.09
Meal, Soybean	246.11	246.66	254.24	265.64	265.65
Meal, Sunflowerseed	20.98	21.84	22.69	22.41	22.41
Total	348.09	355.47	364.97	377.39	377.12
Ending Stocks					
Meal, Copra	0.04	0.04	0.04	0.03	0.03
Meal, Cottonseed	0.10	0.11	0.10	0.11	0.11
Meal, Fish	0.27	0.23	0.21	0.23	0.23
Meal, Palm Kernel	0.67	0.52	0.57	0.61	0.61
Meal, Peanut	0.03	0.03	0.03	0.03	0.03
Meal, Rapeseed	1.49	1.25	1.61	1.69	1.52
Meal, Soybean	16.23	13.20	14.28	16.29	16.21
Meal, Sunflowerseed	1.08	1.72	1.67	1.68	1.68
Total	19.90	17.09	18.50	20.67	20.42

Totals may not add due to rounding

Table 04: Major Vegetable Oils: World Supply and Distribution (Commodity View)

Million Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Oil, Coconut	3.73	3.72	3.77	3.65	3.65
Oil, Cottonseed	4.82	4.91	4.97	5.10	5.11
Oil, Olive	3.30	2.45	2.35	2.92	2.92
Oil, Palm	73.08	77.96	79.28	80.03	79.99
Oil, Palm Kernel	8.36	8.88	9.10	9.17	9.17
Oil, Peanut	6.44	6.22	5.97	6.26	6.26
Oil, Rapeseed	29.17	32.86	33.97	34.02	33.68
Oil, Soybean	60.03	59.62	62.37	65.39	65.37
Oil, Sunflowerseed	19.69	21.73	21.85	21.74	21.74
Total	208.62	218.34	223.63	228.28	227.89
Imports					
Oil, Coconut	2.24	1.95	1.87	1.84	1.84
Oil, Cottonseed	0.12	0.08	0.08	0.08	0.08
Oil, Olive	1.28	1.09	0.92	1.00	1.00
Oil, Palm	41.60	47.12	46.40	46.57	46.62
Oil, Palm Kernel	2.55	2.74	2.75	2.89	2.89
Oil, Peanut	0.29	0.39	0.32	0.34	0.34
Oil, Rapeseed	5.13	6.89	7.61	7.35	7.33
Oil, Soybean	11.35	10.96	10.63	11.14	11.24
Oil, Sunflowerseed	9.68	12.62	12.77	11.80	11.80
Total	74.24	83.85	83.36	83.01	83.15
Exports					
Oil, Coconut	2.24	2.18	1.98	1.99	1.99
Oil, Cottonseed	0.13	0.10	0.08	0.10	0.10
Oil, Olive	1.42	1.21	1.02	1.09	1.09
Oil, Palm	43.90	49.52	48.39	48.56	48.54
Oil, Palm Kernel	2.78	2.97	3.00	3.12	3.12
Oil, Peanut	0.35	0.35	0.39	0.40	0.40
Oil, Rapeseed	5.21	6.55	7.72	7.63	7.49
Oil, Soybean	12.44	11.73	11.40	12.01	12.05
Oil, Sunflowerseed	11.22	14.33	14.35	13.38	13.38
Total	79.69	88.93	88.33	88.27	88.15
Domestic Consumption					
Oil, Coconut	3.60	3.55	3.63	3.64	3.64
Oil, Cottonseed	4.84	4.90	4.94	5.07	5.07
Oil, Olive	3.04	2.58	2.37	2.70	2.70
Oil, Palm	69.38	74.23	77.43	79.01	79.08
Oil, Palm Kernel	8.17	8.67	8.89	9.05	9.05
Oil, Peanut	6.34	6.22	5.98	6.19	6.18
Oil, Rapeseed	30.16	32.68	33.52	34.36	34.16
Oil, Soybean	59.76	58.94	61.33	64.54	64.60
Oil, Sunflowerseed	17.56	19.51	20.73	20.36	20.36
Total	202.84	211.27	218.82	224.91	224.84
Ending Stocks					
Oil, Coconut	0.91	0.85	0.88	0.74	0.74
Oil, Cottonseed	0.16	0.16	0.19	0.20	0.20
Oil, Olive	0.72	0.47	0.35	0.48	0.48
Oil, Palm	16.49	17.83	17.69	16.69	16.68
Oil, Palm Kernel	0.96	0.95	0.92	0.81	0.81
Oil, Peanut	0.34	0.38	0.30	0.35	0.32
Oil, Rapeseed	2.59	3.11	3.45	2.83	2.81
Oil, Soybean	5.10	5.01	5.28	5.28	5.25
Oil, Sunflowerseed	2.65	3.15	2.69	2.52	2.50
Total	29.91	31.90	31.74	29.91	29.80

Totals may not add due to rounding

Table 05: Major Oilseeds: World Supply and Distribution (Country View)

Million Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Brazil	135.18	166.92	158.85	175.69	175.69
United States	131.32	125.75	122.24	131.16	131.16
China	62.07	67.92	67.32	67.48	67.48
Argentina	49.88	31.45	56.09	56.76	56.76
India	43.17	42.41	42.63	43.15	43.15
Other	189.95	203.44	209.70	212.82	211.57
Total	611.57	637.89	656.83	687.06	685.81
Imports					
China	93.19	111.71	109.85	113.65	113.65
European Union	22.82	22.36	21.41	22.32	22.02
Mexico	7.20	8.13	7.93	8.33	8.23
Japan	5.78	5.49	5.63	5.51	5.51
Argentina	3.84	9.06	6.50	5.50	5.50
Thailand	3.33	3.34	4.01	4.11	4.11
Turkey	3.68	4.02	3.87	4.03	4.03
Egypt	4.61	2.01	2.84	3.34	3.34
Indonesia	2.80	2.72	2.90	3.23	3.23
Iran	1.89	2.90	2.86	3.17	3.17
Other	28.36	25.81	27.16	28.56	28.16
Total	177.50	197.54	194.96	201.73	200.93
Exports					
Brazil	79.45	95.92	102.43	105.47	105.47
United States	59.55	55.12	47.52	50.83	50.83
Canada	9.58	12.22	11.00	11.25	11.40
Ukraine	5.71	8.37	7.13	7.08	7.08
Paraguay	2.28	6.50	6.65	6.81	6.81
Argentina	3.99	5.12	5.76	6.63	6.63
Australia	6.66	6.70	5.40	6.20	5.30
Other	12.35	11.73	12.67	12.57	12.57
Total	179.57	201.69	198.56	206.84	206.10
Crush					
China	127.05	135.20	137.10	140.70	140.70
United States	63.87	64.16	66.43	70.32	70.32
Brazil	54.87	57.54	59.05	59.67	59.67
European Union	47.91	48.25	48.69	49.74	49.34
Argentina	42.79	34.59	39.74	43.70	43.70
India	32.20	34.78	35.88	35.88	35.88
Russia	21.20	24.50	25.75	26.13	26.13
Ukraine	12.50	15.68	17.40	16.35	16.35
Indonesia	12.79	13.56	13.74	13.88	13.88
Canada	10.40	11.75	12.75	13.45	13.45
Mexico	7.46	8.17	7.76	8.04	7.96
Turkey	5.34	6.03	5.05	5.49	5.49
Malaysia	4.91	5.09	5.29	5.32	5.32
Pakistan	5.60	3.85	4.57	5.25	5.05
Japan	4.79	4.63	4.58	4.48	4.54
Other	58.57	57.93	59.36	62.45	62.19
Total	512.22	525.69	543.13	560.84	559.96
Ending Stocks					
China	26.26	35.15	38.63	41.41	41.41
Brazil	27.50	37.03	30.78	37.77	36.93
Argentina	24.83	18.38	27.28	30.69	30.70
United States	9.14	8.85	11.08	13.76	14.04
European Union	3.01	3.43	3.68	3.77	3.62
Other	20.80	16.08	16.38	17.45	17.20
Total	111.54	118.92	127.82	144.84	143.88

Major Oilseeds includes Copra, Cottonseed, Palm Kernel, Peanut, Rapeseed, Soybeans and Sunflowerseeds.

Table 06: Major Protein Meals: World Supply and Distribution (Country View)

Million Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
China	90.10	96.07	98.03	100.94	100.94
United States	49.23	49.94	51.35	54.25	54.25
Brazil	41.03	43.09	43.98	44.27	44.27
Argentina	32.03	25.56	29.59	32.86	32.86
European Union	30.75	30.74	31.14	31.78	31.55
Other	107.67	112.24	116.49	120.05	119.75
Total	350.81	357.63	370.57	384.14	383.62
Imports					
European Union	21.44	21.58	21.49	21.20	21.30
China	7.18	8.39	9.70	10.20	10.20
Vietnam	6.52	5.92	6.51	6.71	6.71
Indonesia	5.73	5.67	5.97	6.22	6.22
United States	3.57	4.31	4.23	4.28	4.28
Thailand	3.51	4.01	4.05	4.11	4.11
Korea, South	3.52	3.43	3.52	3.60	3.60
Other	42.70	39.54	44.08	46.16	46.16
Total	94.17	92.85	99.55	102.48	102.58
Exports					
Argentina	27.60	21.91	25.58	28.28	28.28
Brazil	20.21	21.33	21.10	20.50	20.50
United States	12.46	13.50	14.71	15.90	16.08
Canada	4.93	5.69	6.03	6.32	6.42
Indonesia	5.85	5.87	5.97	6.03	6.03
Ukraine	3.92	4.60	5.88	5.18	5.18
Russia	3.07	3.82	4.29	3.99	3.99
Other	18.50	21.09	20.19	20.79	20.69
Total	96.52	97.81	103.74	106.98	107.16
Domestic Consumption					
China	97.02	103.41	106.61	109.95	109.95
European Union	49.26	49.71	49.91	49.85	49.85
United States	40.38	40.69	40.84	42.58	42.40
Brazil	21.64	22.26	22.99	23.89	23.89
India	17.23	17.59	18.41	19.21	19.13
Russia	8.49	8.93	9.36	9.93	9.93
Mexico	7.61	7.84	7.95	8.24	8.22
Vietnam	7.55	7.25	7.76	8.15	8.20
Indonesia	6.53	6.77	6.84	7.16	7.16
Thailand	5.97	6.26	6.54	6.80	6.80
Other	86.41	84.77	87.77	91.64	91.60
Total	348.09	355.47	364.97	377.39	377.12
SME					
China	91.17	96.47	99.40	102.76	102.76
European Union	42.35	42.31	42.42	42.56	42.56
United States	39.21	39.25	39.40	41.11	40.93
Brazil	21.28	21.88	22.53	23.39	23.39
India	14.60	14.94	15.58	16.29	16.24
Russia	6.91	7.26	7.62	8.07	8.07
Mexico	7.38	7.55	7.69	7.98	7.97
Other	96.53	94.65	98.47	103.33	103.39
Total	319.43	324.30	333.11	345.50	345.32
Ending Stocks					
Brazil	3.67	3.17	3.06	2.95	2.95
Argentina	3.04	2.61	2.45	2.78	2.78
European Union	1.36	1.26	1.53	1.64	1.52
China	0.71	0.94	1.05	1.22	1.22
India	0.88	0.40	0.78	0.83	0.80
Other	10.25	8.73	9.63	11.25	11.16
Total	19.90	17.09	18.50	20.67	20.42

Major Protein Meals include Copra, Cottonseed, Fish, Palm Kernel, Peanut, Rapeseed, Soybean, and Sunflower Meal.

Table 07: Major Vegetable Oils: World Supply and Distribution (Country View)

Million Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Indonesia	47.90	52.73	53.32	53.88	53.88
China	27.56	29.30	29.65	30.20	30.20
Malaysia	20.22	20.59	21.27	21.27	21.27
European Union	18.80	18.33	18.48	19.19	19.02
United States	13.05	13.18	13.54	14.29	14.29
Brazil	11.50	11.94	12.32	12.46	12.46
India	8.74	9.27	9.57	9.62	9.62
Other	60.85	63.00	65.49	67.38	67.16
Total	208.62	218.34	223.63	228.28	227.89
Imports					
India	14.31	17.12	14.99	15.05	15.05
China	7.13	11.40	11.08	10.76	10.76
European Union	9.82	9.15	9.20	8.55	8.62
United States	5.26	6.27	6.80	7.10	7.10
Pakistan	3.08	3.92	3.97	3.94	3.99
Turkey	2.42	2.75	2.28	2.36	2.36
Bangladesh	2.03	2.29	2.40	2.25	2.25
Egypt	1.71	1.65	1.95	1.95	1.95
Iran	1.51	1.45	1.67	1.79	1.79
Malaysia	1.99	1.57	1.29	1.37	1.37
Other	24.97	26.28	27.73	27.89	27.91
Total	74.24	83.85	83.36	83.01	83.15
Exports					
Indonesia	24.27	30.25	28.85	28.75	28.75
Malaysia	16.82	16.64	17.10	17.27	17.27
Russia	4.79	6.06	6.55	6.44	6.44
Argentina	5.85	5.33	5.91	6.35	6.35
Ukraine	4.87	6.05	6.52	6.18	6.18
Canada	2.74	3.16	3.91	4.13	4.16
European Union	3.28	3.65	3.12	3.32	3.25
Other	17.09	17.78	16.37	15.83	15.76
Total	79.69	88.93	88.33	88.27	88.15
Domestic Consumption					
China	37.15	39.17	40.12	41.28	41.28
Indonesia	21.59	23.30	25.08	25.86	25.86
India	22.82	23.81	24.61	25.41	25.40
European Union	24.48	24.40	24.38	24.38	24.38
United States	17.27	19.28	19.96	20.93	20.88
Brazil	9.60	10.22	10.99	11.54	11.54
Malaysia	4.63	5.49	5.59	5.59	5.59
Pakistan	4.62	4.85	5.02	5.15	5.15
Russia	3.70	3.78	3.85	3.94	3.94
Thailand	2.97	3.08	3.28	3.40	3.40
Bangladesh	3.11	3.13	3.17	3.30	3.30
Mexico	3.05	3.11	3.15	3.20	3.20
Argentina	3.29	2.75	2.96	3.07	3.07
Nigeria	2.56	2.65	2.76	2.88	2.88
Turkey	2.51	2.66	2.74	2.84	2.84
Other	39.51	39.60	41.15	42.16	42.15
Total	202.84	211.27	218.82	224.91	224.84
Ending Stocks					
Indonesia	7.93	7.17	6.68	6.08	6.08
India	2.02	4.42	4.20	3.37	3.32
China	1.65	3.01	3.45	2.98	2.98
Malaysia	2.84	2.87	2.74	2.52	2.52
European Union	2.78	2.22	2.40	2.43	2.41
Other	12.70	12.21	12.28	12.54	12.50
Total	29.91	31.90	31.74	29.91	29.80

Major Vegetable Oils includes Coconut, Cottonseed, Olive, Palm, Palm Kernel, Peanut, Rapeseed, Soybean, and Sunflower-seed oil

Table 08: Soybeans: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Brazil	130,500	162,000	153,000	169,000	169,000
United States	121,504	116,221	113,344	121,109	121,109
Argentina	43,900	25,000	50,000	51,000	51,000
China	16,395	20,284	20,840	20,700	20,700
India	11,889	12,411	11,875	12,200	12,200
Paraguay	4,183	10,050	10,500	10,700	10,700
Russia	4,760	5,996	6,800	6,800	6,800
Other	27,330	26,409	29,552	30,753	30,753
Total	360,461	378,371	395,911	422,262	422,262
Imports					
China	90,297	104,500	105,000	109,000	109,000
European Union	14,544	13,143	14,300	14,300	14,300
Mexico	5,956	6,442	6,400	6,700	6,700
Argentina	3,839	9,059	6,500	5,500	5,500
Thailand	3,243	3,238	3,900	4,000	4,000
Japan	3,455	3,332	3,375	3,350	3,350
Egypt	4,566	1,992	2,800	3,300	3,300
Turkey	2,949	2,888	3,100	3,300	3,300
Iran	1,817	2,803	2,800	3,100	3,100
Taiwan	2,622	2,559	2,750	2,850	2,850
Other	21,177	17,904	19,604	20,997	20,997
Total	154,465	167,860	170,529	176,397	176,397
Exports					
Brazil	79,063	95,504	102,000	105,000	105,000
United States	58,571	54,208	46,266	49,668	49,668
Paraguay	2,273	6,495	6,650	6,800	6,800
Argentina	2,861	4,185	4,600	5,500	5,500
Canada	4,289	4,239	4,550	4,300	4,300
Other	7,379	7,438	8,554	8,932	8,932
Total	154,436	172,069	172,620	180,200	180,200
Crush					
China	90,000	96,000	99,000	103,000	103,000
United States	59,980	60,199	62,324	65,998	65,998
Brazil	50,767	53,409	54,000	54,000	54,000
Argentina	38,825	30,318	35,500	40,000	40,000
European Union	15,400	14,300	14,900	15,200	15,200
India	8,500	10,300	11,100	11,000	11,000
Mexico	6,350	6,650	6,480	6,650	6,650
Russia	4,900	5,400	5,900	6,000	6,000
Paraguay	2,200	3,450	3,500	3,650	3,500
Egypt	4,500	2,200	2,725	3,300	3,300
Iran	2,500	3,000	2,900	3,200	3,200
Bolivia	3,100	3,500	2,800	3,000	3,000
Thailand	2,500	2,100	2,550	2,750	2,750
Japan	2,640	2,600	2,500	2,500	2,560
Taiwan	2,075	1,950	2,100	2,200	2,200
Other	22,426	20,064	21,496	23,426	23,426
Total	316,663	315,440	329,775	345,874	345,784
Ending Stocks					
China	25,146	32,340	36,380	39,180	39,180
Brazil	27,378	36,819	30,569	37,469	36,619
Argentina	23,691	16,997	26,147	29,547	29,547
United States	7,468	7,190	9,528	12,111	12,384
European Union	1,446	1,098	1,458	1,488	1,488
Other	7,449	6,149	6,988	8,701	8,678
Total	92,578	100,593	111,070	128,496	127,896

Most countries are on an October/September Marketing Year (MY). The United States, Mexico, and Thailand are on a September/AugustMY. Canada is on an August/July MY. Paraguay is on a Jan/Dec MY.

Table 09: Soybean Meal: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
China	71,280	76,032	78,408	81,576	81,576
United States	47,005	47,621	48,992	51,778	51,778
Brazil	39,091	41,125	41,580	41,580	41,580
Argentina	30,287	23,648	27,690	31,200	31,200
European Union	12,166	11,297	11,771	12,008	12,008
India	6,800	8,240	8,880	8,800	8,800
Mexico	5,020	5,255	5,120	5,255	5,255
Other	36,609	34,608	36,333	39,116	39,046
Total	248,258	247,826	258,774	271,313	271,243
Imports					
European Union	16,536	16,012	15,800	16,200	16,200
Indonesia	5,535	5,434	5,750	6,000	6,000
Vietnam	5,531	4,800	5,400	5,700	5,700
Thailand	3,077	3,141	3,150	3,250	3,250
Philippines	2,895	2,826	3,025	3,150	3,150
Mexico	1,827	1,668	2,075	2,200	2,200
United Kingdom	2,015	1,762	2,000	2,100	2,100
Ecuador	1,775	1,600	1,850	2,050	2,050
Colombia	1,831	1,603	1,900	2,000	2,000
Japan	1,699	1,540	1,750	1,750	1,750
Other	24,412	22,591	25,186	26,537	26,537
Total	67,133	62,977	67,886	70,937	70,937
Exports					
Argentina	26,589	20,751	24,400	27,300	27,300
Brazil	20,207	21,334	21,100	20,500	20,500
United States	12,283	13,303	14,515	15,694	15,876
Paraguay	1,270	1,992	2,000	2,150	2,050
Bolivia	2,153	2,151	1,900	1,900	1,900
Other	6,298	7,640	7,427	6,970	6,970
Total	68,800	67,171	71,342	74,514	74,596
Domestic Consumption					
China	71,100	75,050	77,350	80,450	80,450
United States	35,343	34,837	35,040	36,583	36,401
European Union	27,742	26,742	26,742	27,242	27,242
Brazil	19,700	20,300	20,600	21,200	21,200
India	6,273	6,625	7,190	7,625	7,625
Mexico	6,875	6,930	7,150	7,400	7,425
Vietnam	6,235	5,785	6,290	6,795	6,845
Indonesia	5,550	5,580	5,700	5,950	5,950
Thailand	4,900	4,750	4,980	5,270	5,270
Russia	3,500	3,650	3,900	4,100	4,100
Iran	3,500	3,550	3,800	4,050	4,050
Japan	3,610	3,550	3,610	3,610	3,665
Argentina	3,325	3,450	3,475	3,550	3,550
Egypt	3,700	2,700	2,800	3,300	3,300
Philippines	2,950	2,950	3,050	3,200	3,200
Other	41,803	40,215	42,565	45,312	45,377
Total	246,106	246,664	254,242	265,637	265,650
Ending Stocks					
Brazil	3,656	3,153	3,043	2,933	2,933
Argentina	2,797	2,311	2,136	2,496	2,496
China	710	937	1,045	1,221	1,221
European Union	658	485	614	680	680
Iran	274	278	369	447	447
Other	8,137	6,036	7,069	8,514	8,433
Total	16,232	13,200	14,276	16,291	16,210

Most countries are on an October/September Marketing Year (MY). The Mexico and Thailand are on a September/August MY. Canada ison an August/July MY. Paraguay, Vietnam and the Philippines are on a January/December MY and Bolivia is on a March/February MY.

Table 10: Soybean Oil: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2 024/25
Production					
China	16,128	17,203	17,741	18,458	18,458
United States	11,864	11,897	12,227	12,934	12,934
Brazil	10,153	10,579	10,800	10,800	10,800
Argentina	7,664	5,991	7,011	7,900	7,900
European Union	2,926	2,717	2,831	2,888	2,888
India	1,530	1,854	1,998	1,980	1,980
Mexico	1,171	1,227	1,196	1,227	1,227
Other	8,597	8,147	8,561	9,204	9,187
Total	60,033	59,615	62,365	65,391	65,374
Imports					
India	4,231	3,968	2,950	3,500	3,500
Bangladesh	689	681	700	650	650
Peru	471	535	575	590	590
Morocco	529	525	550	560	560
European Union	459	623	500	450	525
Algeria	460	490	500	450	450
China	291	395	400	400	400
Iran	375	395	275	375	375
Korea, South	392	353	350	350	350
Colombia	317	242	350	345	345
Other	3,136	2,750	3,484	3,467	3,497
Total	11,350	10,957	10,634	11,137	11,242
Exports					
Argentina	4,873	4,137	4,800	5,500	5,500
Brazil	2,409	2,686	1,800	1,400	1,400
European Union	970	922	800	1,050	1,050
Russia	665	750	760	750	750
Paraguay	371	523	640	610	580
Bolivia	523	620	430	480	480
Turkey	289	289	300	330	330
Other	2,337	1,799	1,869	1,886	1,956
Total	12,437	11,726	11,399	12,006	12,046
Domestic Consumption					
China	17,100	17,000	17,900	18,800	18,800
United States	11,262	12,070	12,247	12,836	12,791
Brazil	7,725	8,375	8,950	9,425	9,425
India	5,825	5,400	5,150	5,600	5,600
European Union	2,305	2,405	2,455	2,405	2,480
Argentina	2,650	2,060	2,250	2,360	2,360
Mexico	1,300	1,305	1,320	1,330	1,360
Bangladesh	1,100	985	1,005	1,045	1,045
Iran	850	900	850	940	940
Algeria	750	750	750	780	780
Egypt	960	560	630	710	710
Peru	555	540	550	575	575
Morocco	525	525	535	540	540
Korea, South	590	545	540	535	535
Japan	533	525	495	505	505
Other	5,730	4,996	5,701	6,157	6,157
Total	59,760	58,941	61,328	64,543	64,603
Ending Stocks					
China	387	874	1,015	973	973
United States	903	729	754	836	829
Brazil	945	492	582	597	597
European Union	550	563	639	522	522
Argentina	526	320	281	321	321
Other	1,791	2,029	2,008	2,035	2,004
Total	5,102	5,007	5,279	5,284	5,246

Most countries are on an October/September Marketing Year (MY). Mexico is on a September/August MY. Paraguay and Peru are on anJanuary/December MY and Bolivia is on a March/February MY.

Table 11: Soybeans and Products: World Trade

Thousand Metric Tons

	Marketing Year	Meal, Rapeseed 2022/23	Meal, Rapeseed 2023/24	Meal, Rapeseed 2024/25	Oil, Rapeseed 2022/23	Oil, Rapeseed 2023/24	Oil, Rapeseed 2024/25	Oilseed, Rapeseed 2022/23	Oilseed, Rapeseed 2023/24	Oilseed, Rapeseed 2024/25
North America		13,683	14,841	16,092	346	429	477	58,448	50,824	53,970
South America		46,240	49,407	51,757	8,027	7,735	8,010	107,435	116,205	120,255
South Asia		1,897	1,551	1,201	11	30	30	22	50	50
India	(Oct-Sep)	1,871	1,550	1,200	11	15	15	22	50	50
Other		5,351	5,543	5,546	3,342	3,205	3,529	6,164	5,541	5,925
World Total	67,171		71,342	74,596	11,726	11,399	12,046	172,069	172,620	180,200
Imports										
European Union	(Oct-Sep)	16,012	15,800	16,200	623	500	525	13,143	14,300	14,300
East Asia		3,115	3,520	3,595	855	875	895	111,733	112,405	116,630
China	(Oct-Sep)	40	50	50	395	400	400	104,500	105,000	109,000
Japan	(Oct-Sep)	1,540	1,750	1,750	7	10	10	3,332	3,375	3,350
Korea, South	(Oct-Sep)	1,492	1,650	1,695	353	350	350	1,337	1,275	1,425
Taiwan	(Oct-Sep)	43	70	100	0	0	0	2,559	2,750	2,850
Southeast Asia		18,217	19,445	20,325	268	261	265	8,282	9,382	10,052
Indonesia	(Oct-Sep)	5,434	5,750	6,000	31	36	40	2,308	2,400	2,650
Malaysia	(Oct-Sep)	1,346	1,400	1,450	88	100	100	684	750	750
Philippines	(Jan-Dec)	2,826	3,025	3,150	60	60	60	160	190	210
Thailand	(Sep-Aug)	3,141	3,150	3,250	0	0	0	3,238	3,900	4,000
Vietnam	(Jan-Dec)	4,800	5,400	5,700	75	50	50	1,858	2,100	2,400
North America		3,448	3,965	4,144	414	799	634	7,609	7,430	7,508
Canada	(Aug-Jul)	1,207	1,300	1,400	147	375	240	500	350	400
United States	(Oct-Sep)	573	590	544	170	249	204	667	680	408
Canada	(Aug-Jul)	1,207	1,300	1,400	147	375	240	500	350	400
Mexico	(Sep-Aug)	1,668	2,075	2,200	97	175	190	6,442	6,400	6,700
South America		6,622	7,345	7,895	1,253	1,449	1,478	10,095	8,160	6,825
Argentina	(Oct-Sep)	67	10	10	0	0	0	9,059	6,500	5,500
Brazil	(Oct-Sep)	6	10	10	29	40	40	154	600	150
Paraguay	(Jan-Dec)	5	0	0	1	2	1	10	20	20
Brazil	(Oct-Sep)	6	10	10	29	40	40	154	600	150
Colombia	(Oct-Sep)	1,603	1,900	2,000	242	350	345	444	575	640
Central America		1,600	1,765	1,840	198	241	275	313	332	377
Caribbean		755	800	840	204	264	281	31	55	55
Middle East		5,221	6,470	6,910	515	436	546	6,668	7,181	7,731
Iran	(Oct-Sep)	1,185	1,600	1,600	395	275	375	2,803	2,800	3,100
Israel	(Oct-Sep)	308	325	350	10	20	20	297	330	360
Syria	(Jan-Dec)	69	80	90	1	1	1	1	1	1
Turkey	(Oct-Sep)	1,400	1,425	1,650	2	0	0	2,888	3,100	3,300
North Africa		2,161	1,915	1,985	1,278	1,300	1,250	3,964	5,150	5,800
Egypt	(Oct-Sep)	866	725	750	198	175	150	1,992	2,800	3,300
Other Europe		2,255	2,540	2,652	170	189	211	1,437	1,447	1,547
United Kingdom	(Oct-Sep)	1,762	2,000	2,100	159	175	200	910	925	950
Other		3,571	4,321	4,551	5,179	4,320	4,882	4,585	4,687	5,572
World Total	62,977		67,886	70,937	10,957	10,634	11,242	167,860	170,529	176,397

Table 12: Palm Oil: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24	May 2024/25	Jun 2024/25
Production					
Indonesia	42,000	46,500	47,000	47,500	47,500
Malaysia	18,152	18,389	19,000	19,000	19,000
Thailand	3,376	3,328	3,280	3,360	3,360
Colombia	1,762	1,800	1,900	1,950	1,950
Nigeria	1,400	1,400	1,500	1,500	1,500
Other	6,385	6,545	6,604	6,719	6,684
Total	73,075	77,962	79,284	80,029	79,994
Imports					
India	8,004	10,045	9,000	9,200	9,200
China	4,387	6,190	5,900	6,000	6,000
European Union	5,015	4,548	4,400	4,200	4,200
Pakistan	2,824	3,685	3,700	3,650	3,700
United States	1,588	1,887	1,900	1,900	1,900
Bangladesh	1,339	1,610	1,700	1,600	1,600
Egypt	1,154	1,052	1,175	1,200	1,200
Vietnam	995	1,050	1,100	1,100	1,100
Kenya	789	848	1,000	1,075	1,075
Philippines	1,177	892	1,100	1,000	1,000
Other	14,323	15,316	15,423	15,647	15,647
Total	41,595	47,123	46,398	46,572	46,622
Exports					
Indonesia	22,321	28,077	26,750	26,600	26,600
Malaysia	15,527	15,355	15,800	15,900	15,900
Guatemala	792	883	900	945	945
Papua New Guinea	834	813	800	820	820
Colombia	449	425	625	625	625
Other	3,978	3,969	3,516	3,669	3,649
Total	43,901	49,522	48,391	48,559	48,539
Domestic Consumption					
Indonesia	17,430	19,090	20,750	21,460	21,460
India	8,150	8,900	9,350	9,850	9,850
China	5,100	5,600	6,000	5,900	5,900
European Union	4,850	4,400	4,210	4,100	4,100
Malaysia		3,971	4,040	4,045	4,045
Pakistan	3,145	3,595	3,670	3,660	3,735
Thailand	2,335	2,585	2,685	2,785	2,785
Nigeria	1,715	1,790	1,865	1,950	1,950
United States	1,561	1,875	1,882	1,890	1,890
Bangladesh	1,470	1,600	1,600	1,595	1,595
Colombia	1,380	1,487	1,545	1,565	1,565
Egypt	1,175	1,060	1,160	1,170	1,170
Philippines	1,270	1,020	1,110	1,120	1,120
Vietnam	927	947	1,007	1,025	1,025
Mexico	760	820	860	880	880
Other	14,810	15,486	15,700	16,016	16,011
Total	69,378	74,226	77,434	79,011	79,081
Ending Stocks					
Indonesia	7,304	6,637	6,137	5,577	5,577
Malaysia	2,318	2,316	2,276	2,131	2,131
India	972	2,419	2,371	2,023	2,023
China	420	981	851	921	921
Colombia	836	826	741	681	681
Other	4,643	4,651	5,311	5,360	5,350
Total	16,493	17,830	17,687	16,693	16,683

Table 13: Rapeseed and Products: World Supply and Distribution

Thousand Metric Tons

		Meal, Rapeseed			Oil, Rapeseed			Oilseed, Rapeseed		
	Marketing Year	2022/23	2023/24	2024/25	2022/23	2023/24	2024/25	2022/23	2023/24	2024/25
Production										
China	(Oct-Sep)	10,917	11,035	10,740	7,215	7,293	7,098	15,531	15,400	15,600
India	(Oct-Sep)	6,015	6,487	6,411	3,840	4,146	4,109	11,300	12,500	12,100
Canada	(Aug-Jul)	5,810	6,333	6,793	4,151	4,670	5,007	18,695	18,800	19,600
Japan	(Oct-Sep)	1,146	1,174	1,112	853	875	839	4	4	4
European Union	(Jul-Jun)	13,794	13,908	13,737	10,164	10,248	10,122	19,613	20,000	18,750
Other		9,541	9,690	9,354	6,636	6,742	6,502	23,709	22,039	21,011
World Total		47,223	48,627	48,147	32,859	33,974	33,677	88,852	88,743	87,065
Imports										
China	(Oct-Sep)	2,030	2,700	2,900	1,998	2,150	1,700	5,335	3,400	3,200
India	(Oct-Sep)	2	10	2	6	5	5	0	0	0
Canada	(Aug-Jul)	6	10	10	26	20	20	151	300	100
Japan	(Oct-Sep)	20	5	10	13	20	15	1,976	2,050	1,950
European Union	(Jul-Jun)	843	950	700	402	375	300	6,841	5,500	6,300
Other		6,388	6,308	6,505	4,448	5,037	5,294	5,741	4,966	4,920
World Total		9,289	9,983	10,127	6,893	7,607	7,334	20,044	16,216	16,470
Exports										
China	(Oct-Sep)	24	10	10	4	5	5	0	0	0
India	(Oct-Sep)	1,920	1,600	1,500	11	10	10	0	0	0
Canada	(Aug-Jul)	5,308	5,700	6,200	3,017	3,750	4,000	7,951	6,400	7,050
Japan	(Oct-Sep)	0	0	0	5	5	5	0	0	0
European Union	(Jul-Jun)	795	780	750	671	725	600	549	550	500
Other		1,730	2,062	1,815	2,839	3,228	2,871	11,053	9,852	9,338
World Total		9,777	10,152	10,275	6,547	7,723	7,491	19,553	16,802	16,888
Domestic Consumption										
China	(Oct-Sep)	12,923	13,725	13,630	8,900	9,000	9,300	19,125	19,325	18,825
India	(Oct-Sep)	4,350	4,700	4,925	3,680	4,080	4,180	11,400	12,245	12,125
Canada	(Aug-Jul)	525	600	605	1,055	1,050	1,070	10,717	12,000	12,900
Japan	(Oct-Sep)	1,168	1,178	1,125	890	870	860	2,005	2,055	1,955
European Union	(Jul-Jun)	13,800	14,000	13,800	9,925	9,900	9,850	24,850	25,050	24,750
Other		14,208	13,900	14,004	8,229	8,618	8,901	17,366	17,427	16,924
World Total		46,974	48,103	48,089	32,679	33,518	34,161	85,463	88,102	87,479
Ending Stocks										
China	(Oct-Sep)	0	0	0	1,150	1,588	1,081	2,609	2,084	2,059
India	(Oct-Sep)	197	394	382	402	463	387	419	674	649
Canada	(Aug-Jul)	134	177	175	630	520	477	1,506	2,206	1,956
Japan	(Oct-Sep)	16	17	14	17	37	26	182	181	180
European Union	(Jul-Jun)	429	507	394	343	341	313	1,822	1,722	1,522
Other		476	512	552	571	504	528	1,739	1,465	1,134
World Total		1,252	1,607	1,517	3,113	3,453	2,812	8,277	8,332	7,500

Table 14: Sunflowerseed and Products: World Supply and Distribution

Thousand Metric Tons

	Marketing Year	Oilseed, Sunflowerseed			Meal, Sunflowerseed			Oil, Sunflowerseed		
		2022/23	2023/24	2024/25	2022/23	2023/24	2024/25	2022/23	2023/24	2024/25
Production										
Argentina	(Mar-Feb)	5,019	4,100	3,800	1,789	1,713	1,469	1,752	1,675	1,436
Russia	(Sep-Aug)	16,254	17,100	17,000	6,453	6,780	6,862	6,484	6,815	6,897
Turkey	(Sep-Aug)	1,900	1,550	1,675	1,334	1,035	1,035	1,066	827	827
Ukraine	(Sep-Aug)	12,200	14,500	14,700	5,782	6,071	5,906	6,020	6,321	6,150
European Union	(Oct-Sep)	9,385	10,000	10,900	5,135	4,973	5,297	4,014	3,887	4,141
Other		8,021	7,614	7,353	2,577	2,475	2,424	2,389	2,321	2,292
World Total		52,779	54,864	55,428	23,070	23,047	22,993	21,725	21,846	21,743
Imports										
Argentina	(Mar-Feb)	1	0	0	0	0	0	0	0	0
Russia	(Sep-Aug)	75	50	50	5	5	5	1	1	1
Turkey	(Sep-Aug)	941	600	550	879	1,050	950	1,711	1,275	1,300
Ukraine	(Sep-Aug)	31	30	30	13	10	10	1	0	0
European Union	(Oct-Sep)	1,460	700	500	2,756	2,800	2,500	2,103	2,450	2,100
Other		1,271	1,344	1,281	4,913	5,707	5,738	8,806	9,047	8,403
World Total		3,779	2,724	2,411	8,566	9,572	9,203	12,622	12,773	11,804
Exports										
Argentina	(Mar-Feb)	94	180	150	1,128	1,150	950	1,115	1,000	750
Russia	(Sep-Aug)	260	450	350	2,250	2,650	2,450	4,000	4,400	4,350
Turkey	(Sep-Aug)	102	100	125	78	15	20	1,102	1,075	600
Ukraine	(Sep-Aug)	1,856	325	260	3,973	4,700	4,500	5,683	5,800	5,720
European Union	(Oct-Sep)	595	450	450	1,001	750	1,150	1,221	900	850
Other		1,110	1,330	1,243	725	717	711	1,213	1,175	1,109
World Total		4,017	2,835	2,578	9,155	9,982	9,781	14,334	14,350	13,379
Domestic Consumption										
Argentina	(Mar-Feb)	4,553	4,225	3,650	600	550	550	652	672	672
Russia	(Sep-Aug)	16,180	16,980	17,020	3,900	4,125	4,450	2,425	2,525	2,575
Turkey	(Sep-Aug)	2,672	2,102	2,102	2,025	2,150	1,950	1,290	1,490	1,490
Ukraine	(Sep-Aug)	14,175	14,875	14,475	1,700	1,400	1,400	405	420	430
European Union	(Oct-Sep)	10,535	10,235	10,855	6,860	6,960	6,610	5,213	5,413	5,263
Other		8,127	7,701	7,455	6,750	7,502	7,446	9,525	10,208	9,930
World Total		56,242	56,118	55,557	21,835	22,687	22,406	19,510	20,728	20,360
Ending Stocks										
Argentina	(Mar-Feb)	1,084	779	779	292	305	274	329	332	346
Russia	(Sep-Aug)	907	627	307	397	407	374	346	237	210
Turkey	(Sep-Aug)	168	116	114	223	143	158	611	148	185
Ukraine	(Sep-Aug)	845	175	170	247	228	244	27	128	128
European Union	(Oct-Sep)	406	421	516	320	383	420	328	352	480
Other		736	663	599	242	205	210	1,507	1,492	1,148
World Total		4,146	2,781	2,485	1,721	1,671	1,680	3,148	2,689	2,497

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

EXPLORING THE FUNCTIONAL AND PREBIOTIC PROPERTIES OF SOLUBLE DIETARY FIBER EXTRACTED FROM DE-OILED MEALS

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ABSTRACT:

Introduction: India is the fourth-largest producer of oilseeds, after countries such as the USA, China, and Brazil, having an average annual yield of 29 million tonnes approximately. Oil cakes/meals are one such by-product that is obtained after extraction of oil from the seeds and is considered as mass waste following oil extraction. Traditionally, the left-over residues of the oil processing industry, have been used as animal feeds and manures. The de-oiled meals although economically less viable are rich in numerous natural compounds like protein, fibre, antioxidants, and minerals. Therefore, this industry waste can also be exploited as unconventional resources to produce functional food components.

Objectives: The objective of the study was to note the antioxidant, functional, and prebiotic properties of extracted SDF derived from de-oiled sesame, rice bran, linseed, and mustard meal.

Methodology: The SDFs were extracted from de-oiled meals using 3 enzymes i.e. amylase, protease, and amyloglucosidase consecutively followed by alcohol precipitation to produce SDF.

Results: The de-oiled meals were good sources of protein, carbohydrate, crude fibre, polyphenols and flavonoid. The HPLC analysis of the enzymatically extracted SDFs revealed that the 4 SDFs varied significantly in their monosaccharide composition. The enzymatically extracted SDFs exhibited potent functional and anti-oxidative properties, indicating their applicability as a functional food ingredient. The SDFs had a moderate content of polyphenols and flavonoids that played an important role in enhancing their prebiotic properties. SDF from sesame and mustard meal exhibited good prebiotic activity score that was comparable to that of inulin.

In conclusion, this study not only evaluates the applicability of SDFs as a functional food ingredient but also promotes sustainability in nutrition and health by encouraging further exploration in utilizing oil seed meal wastes to produce bioactive and functional foods.

FORMULATION AND VALIDATION OF OIL BLENDS FOR ENHANCED NUTRITIONAL QUALITY AND STABILITY

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ABSTRACT:

Blending of two or more oils is an effective and economical method to get optimized fatty acid composition and physicochemical properties. In blending, oil deficient in one component is mixed with the oil having the same component to get the desired composition. Rice bran oil (RBO) is deficient in omega-3 fatty acids but rich in antioxidants. However algal oil is a good source of omega-3 fatty acids particularly long-chain omega-3 fatty acids (EPA- eicosapentaenoic acid and DHA-docosahexaenoic acid) which is not found in other vegetarian sources. Due to the presence of polyunsaturated fatty acids (EPA and DHA), algal oil has low stability. In this study, the blending ratio for rice bran oil and algal oil was optimized to get superior physicochemical characteristics and omega-3 fatty acid content.

The study was divided into three parts namely: screening and selection of microalgal culture producing EPA and DHA, optimization of blending ratio of RBO and algal oil for improved nutritional quality and stability and *in-vivo* validation of health benefits of the oil blend. Among the seven microalgal cultures *viz. Chlorella minutissima*, *Chlorella sorokiniana*, *Haematococcus* sp., *Coelastrella* sp., *Nannochloropsis* sp., *Dunaliella* sp., and *Spirulina platensis*, EPA and DHA were detected in *Nannochloropsis* sp. and *Spirulina platensis* (0.46 % and 0.50% respectively). The algal oils *viz.* oil extracted from *Nannochloropsis* sp. (NAO) and *Spirulina platensis* (SPO) and purified algal oil from *Schizochytrium* sp (SCO) were used for blending with RBO.

Binary oil blends (RBO: SCO, RBO: NAO, RBO: SPO) were formed in six ratios *viz.* 90:10, 85:15, 80:20, 75:25, 65:35 and ternary oil blends (RBO: NAO: SPO) were formed in four ratios *viz.* 80:10:10, 80:05:15, 70:10:20 and 65:10:25. Among the formulated oil blends, RBO: SCO (80:20) was found superior in physicochemical parameters, fatty acid composition and omega-3 fatty acids content which were evaluated through chemometric approach *viz.* principle component analysis and cluster plot analysis. This oil blend has the lowest peroxide value (2.5 meq O_2/kg), acid value (4.2 mg KOH/g), iodine value (118 g/100g) and a significant amount of total tocopherol (426 mg/g) and total oryzanol (1.19 %). SFA: MUFA: PUFA (saturated: monounsaturated: polyunsaturated fatty acid) was 1.09: 1: 1.29 which is very near to the ideal fatty acid composition (1:1.5:1) as given by WHO. The total omega-3 fatty acids content was 20.71% compared to 0.79% in RBO. This result showed improvement in omega-3 fatty acids content and oil stability-related parameters of oil blend (RBO: SCO, 80:20). The hypocholesterolemic, hepatoprotective and non-allergic properties of RBO: SCO (80:20) were validated in the hypercholesterolemic rats.

This revealed the health benefit of formulated oil blends which could have promising applications in the fields of neutraceuticals, oil industry, feed and food industry.

Advantages of microalgae as a feed ingredient explored

Scientists have shown that microalgae can grow faster and form more omega-3 if bred, making them increasingly interesting as a potential feed ingredient for farmed fish.

Algae need light, temperature and nutrients to grow but growth is also affected by algae genes. Researchers at the Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima) tested whether it was possible to breed microalgae in a similar way to farmed fish. When crossing individuals or genera that produce high yields, the next generation produces higher yields than the previous one.

Trial: Selective breeding

Nofima senior scientist Marie Lillehammer said the research wanted to see if selective breeding can contribute to faster growth and increased omega-3 content, adding that the initial trials were promising, including arguably being the first to calculate genetic variation in microalgae.

The team chose the species Seminavis robusta – a well-studied algae that has sexual reproduction. 8 lines of the species were crossed with each other in one generation and tested in the breeding trial.

HOW CAN ALGAE CONTRIBUTE TO FEED SUSTAINABILITY?

The application of algae in animal feed seems promising, since many algae species have a high protein content, and they could help global agriculture meet its sustainability goals. And there is also evidence that algae in the form of feed additives can support the immune function of the animal, which contributes to the reduction of antibiotics use.

Omega-3 production

Although the species is not very relevant as a feed resource, the trial showed that 18% of omega-3 production in the algae is determined by the genes. Breeding gives an 8.8% increase of omega-3 in one generation. Marine omega-3 fatty acids, important for fish nutrition, are at present sourced from fish oil.

Growth

Growth percentages were found to be even higher. With a 50% heritability, the microalgae grows 25% faster per generation, which could lead to a 9-fold increase per year, given ten generations are produced every 12 months.

NewTechAqua project

The research is part of the NewTechAqua project, which is financed by the EU through Horizon 2020, and runs in collaboration with the University of Las Palmas and Ghent University. Among its other objectives are to:

- Deliver solutions to improve fish and mollusc health and disease resistance.

- Make the aquaculture sector more sustainable and circular through different rearing systems, looking at new diets using fish by-products, fish processing wastewaters and low fishmeal organic diets.
- Increase the efficiency of aquaculture production systems via real-time management systems, satellite systems and recommendations.
- Support diversification of fish species by studying the reproductive cycle of emerging fish species
- Develop new eco-friendly fish and mollusc products with high nutritional value.
- Raise awareness and train professionals from the aquaculture sector by creating training programmes and conducting studies on consumer preferences.

Courtesy: https://www.allaboutfeed.net/

Tracking the latest fats and oils trends

CHICAGO — Today's shoppers not only want more for their dollar — they also want more for their calories. And with fat being the most calorically dense nutrient at 9 calories per gram, the fat type matters to many consumers.

Eight in 10 consumers said they are seeking foods that offer nutrition profiles personalized to their needs, according to a 2023 report published by the consultancy Deloitte, New York. The result is up three percentage points from 2022 and up 18 points from 2021 and includes seeking functional fats with health halos.

"Most of these consumers are motivated by health considerations, such as reducing risk of heart disease, lowering cholesterol or losing weight," said Jamie Mavec, senior marketing manager with Cargill, Minneapolis. "In fact, Fatitudes, Cargill's consumer research, showed that half of all US consumers monitor fats and oils in food purchases."

The Cargill survey, now in its 11th edition, reflects consumers' evolving attitudes toward fat in the diet. Of those shoppers checking the ingredient list in 2023, 61% said they were doing so to avoid certain fats and oils, while 31% reported they are seeking specific fats and oils.

The survey asked consumers about the fats and oils they perceive as the healthiest. It also explored what consumers look for on package labels. Claims linked to health, such as "no saturated fat" generally scored higher than other types of claims, but consumers are influenced by other factors, too.

"In our latest survey, a third of consumers said they check labels for sustainability claims around fats and oils, and two in five said they were more likely to purchase products that carried those claims, which is up 17 percentages points since 2013," Ms. Mavec said. "In 2023, we also found 45% of consumers said they were more likely to purchase products labeled as non-GMO. A similar number, 41%, said they were more likely to purchase products labeled as organic.

"Olive oil consistently ranks at the top. In 2023, 66% of consumers said they believe it is a healthful oil. A relative newcomer to our list, avocado oil, ranked second. It was perceived as a healthful oil by 59% of respondents."

The challenge with both, along with other better-for-you oils, is they are composed of mostly polyunsaturated fatty acids, which are unstable and prone to oxidation. Oxidation produces a rancid, cardboard-like taste. Many of the fats also have a flavor reflective of its source, which may not complement the carrier product. A strawberry-flavored sports gel, for example, should not have hints of avocado.

Oxidation is less of an issue with saturated fats;

however, science suggests eating too much saturated fat may raise the level of low-density lipoprotein cholesterol in the blood. It is associated with an increased risk of heart disease and stroke, according to the American Heart Association (AHA), Dallas.

Still, some saturated fats are gaining traction among the growing number of consumers following a keto lifestyle, which emphasizes high dietary fat intake and limits carbohydrates. Coconut oil, palm kernel oil and dairy fat, for example, are concentrated sources of medium-chain triglycerides (MCTs), which are saturated fats with molecular characteristics that allow them to behave differently inside the body compared to other fats. A significant difference is they bypass traditional digestion and become an instant energy source following consumption. In other words, the body starts to burn it faster than other fats.

While keto-friendly foods may favor saturated fats, most functional food formulators avoid them, just like consumers. Two out of five consumers said they try to limit or avoid saturated fats, according to the 2023 Food & Health Survey from the International Food Information Council, Washington. Another 28% try to be aware of the saturated fat content of foods.

"In recent years, the US Food and Drug Administration increased the recommended dietary allowance for total fats from 65 grams to 78 grams, while reducing the saturated fat recommendation from 22 grams to 20 grams," said Rick Cummisford, director of quality, Columbus Vegetable Oils, Des Plaines, Ill. "This is a sign that fats are not all bad nor created equal and they continue to be important in maintaining a healthy diet and reducing and treating chronic diseases."

Christian Sobolta, chief growth officer, CSM Ingredients, Bertrange, Luxembourg, said, "Fats are not only a fundamental part of the human diet; they also deliver taste and consistency features that are necessary in order to make products not only healthier and more sustainable, but also tasteful and rewarding for consumers. Furthermore, in products containing lipid-soluble vitamins (A, D, E and K), a certain amount of oil or fat is necessary to make these healthy molecules available to the body.

"Since a significant share of the population consumes too many saturated fatty acids, using unsaturated fats (as the carrier)could help eradicate this nutritional error. Using omega-3 fatty acids is a good way to contribute to the well-being of most people."

Omega-3 fatty acids are polyunsaturated fats that support the structure of cells in the body and are concentrated in the cells of the brain and eyes. They also have been shown to have a positive effect on heart health and immunity.

"Some unsaturated oils, such as extra virgin olive oil, contain additional phytonutrients and beneficial antioxidants," Mr. Cummisford said.

Michelle Peitz, technical solutions and marketing, oils, ADM, Chicago, said, "Utilizing highly polyunsaturated oils can be challenging, especially if used in shelf-stable products like cereals and nutritional bars. Formulators may consider incorporating these polyunsaturated oils at a ratio to get appropriate nutritional needs in a serving and then utilizing a high-stability oil, such as high-oleic sunflower oil or high-oleic soybean oil to provide the rest of the fat for the food product."

High-oleic oils are popular in the functional food space. They have been shown in some diets to improve heart health and reduce bad cholesterol.

"In the nutritional food and beverage space, high-oleic sunflower oil is the most commonly used fat or oil," said Isaak Brott, business development technical services manager, Cargill. "It delivers high stability over shelf life and offers several label advantages, including its naturally non-GMO status and its availability in organic options.

"Nutritionally, high-oleic sunflower oil is relatively low in saturated fats, a nutritional plus over other fats and oils. Functionally, its high oxidation stability over shelf life makes it a good choice for products stored at room temperature with longer shelf-life expectations, including plant-based beverages or nutrition bars."

Formulations may often require an emulsifier to keep the fat ingredient in solution. In nutrition beverages, for example, emulsifiers are needed to keep oil and water in suspension.

"The coconut oil and MCTs used as sources of quick digestible energy in many beverage formulations require emulsifiers to keep the oils dispersed in the solution," Mr. Cummisford said. "Lecithin is one such ingredient that can assist in this purpose."

In functional beverages, oils often are used to carry vitamins and minerals that are oil soluble. They also impact viscosity.

"Oil ingredients can provide key body and mouthfeel attributes in plant-based functional beverages," Ms. Peitz said. "Corn has been commonly used in this realm due to its linoleic content, which is an omega-6 essential fatty acid. Corn oil inherently contains plant sterols, a lipid-based ingredient that can be added to the formulation to reach nutritional goals in certain products. Sunflower, canola and soybean oils are also options for functional beverages. These oils have either omega-6 or omega-3 content that many developers are targeting."

Tatania Emmick, commercial technical support manager, Kemin, Des Moines, Iowa, said, "Because many fats are a deliberate add to functional foods and beverages, they must be protected, especially the omega-3 fatty acids from foods like flax, chia and hemp, as well as fish and algae sources."

Kemin offers antioxidant ingredients to delay oxidation, in addition to guidance on when and how to add. Antioxidants protect fats to extend shelf life.

"Our natural plant extracts can be used in either dry or liquid forms, depending on the manufacturer's needs and operational setup," Ms. Emmick said. "The dry natural plant extracts can be pre-blended with other ingredients used in formulation and offered in a pre-weighed batch pack, requiring less labor to add in all necessary ingredients. The liquid natural plant extracts can be added using metered application equipment to deliver the exact dosage."

Fat and oil suppliers may already have included antioxidants in the lipid ingredient. Some suppliers offer custom blends of oils to achieve maximum shelf life and still deliver desirable fat profiles.

Unsaturated fats may lack the richness consumers enjoy from saturated fats, which are more solid and creamy. That's where dairy concentrates may assist.

"Our ingredients provide functional effects by adding the mouthfeel and richness associated with recipes using full dairy fat," said Michael Ivey, national sales director, Butter Buds Inc., Racine, Wis. "The usage rate is quite low and contributes minimally to a finished product's nutritional value."

Courtesy: https://www.foodbusinessnews.net/

The Every Egg Co. eliminates the chicken from egg production

The Every Co. plans to introduce Every egg to the foodservice category in 2024. The product is a liquid egg developed using precision fermentation to transform yeast into egg proteins.

"We've given the recipe to make egg proteins that are identical to those from chicken eggs," said Arturo Elizondo, co-founder and chief executive officer of The Every Co. "We combine our yeast with sugar and water in a fermentation vessel. But instead of brewing beer, our yeast brews egg protein. We then separate our yeast, leaving us with a clarified broth teeming with real egg proteins. In the case of Every Egg, we add beneficial plant-based ingredients to our egg proteins to give our liquid a whole egg taste and texture."

Every Egg has 8 grams of protein per serving and no cholesterol, saturated fat or artificial flavors, the company said. The company launched in 2014 under the name Clara Foods and now focuses on providing ingredients to foodservice and consumer packaged goods companies. "Our egg protein products, such as Every EggWhite, are already commercially available for food manufacturers to use as functional ingredients in their branded products, and Every Egg will be coming to more plates through foodservice in 2024," Mr. Elizondo said.

The company's current strategy is focused on quick-service restaurant settings, college dining and independent restaurants.

"At the same time, we are continuing to commercialize our high-performance ingredients through partners such as Alpha Foods and Grupo Nutresa, a Colombia-based consumer packaged goods company, which will use Every EggWhite as a high-performance binding ingredient," Mr. Elizondo said. "We have many more exciting commercial partnerships with major food brands that we'll be announcing in the new year, and product development is well underway."

In May, The Every Co. entered into a joint development agreement with Alpha Foods, Glendale, Calif., to incorporate Every EggWhite's into some products. Alpha Foods is a manufacturer of plant-based meat alternatives.

At foodservice, the company's products will provide chefs with the attributes of conventional eggs, but without product variability, food safety or environmental issues, Mr. Elizondo said.

"We will go far and wide with our products," he said. "Every Co.'s backers include major international food and beverage brands such as Group Bimbo, LALA, and AB InBev."

Since launching, the company has raised more than $233 million in funding and it recently raised an oversubscribed $175 million in a Series C round, Mr. Elizondo said.

Mr. Elizondo said he believes The Every Co.'s process is simple, well-developed, and already fully scaled.

"Precision fermentation provides the perfect combination of product quality and manufacturing readiness," he said. "Every Egg is the first precision-fermentation-derived core food product that is indistinguishable from its animal-derived equivalent. Its launch proves to the world that this food production method is uniquely capable of creating the same essential foods we all know and love, but in a more equitable and sustainable way."

Courtesy: https://www.foodbusinessnews.net/

WHO: Great Progress Made in Eliminating Trans Fat

The World Health Organization says great progress has been made in the global elimination of industrially produced trans fat, with nearly half the world's population protected against the harmful effects of this toxic product.

"Five years ago, WHO called on countries and the food sector to eliminate industrially produced trans fats from the food supply. The response has been incredible," WHO Director-General Tedros Adhanom Ghebreyesus said Monday.

"So far, 53 countries have implemented best practice policies, including bans and limits on trans fats, with three more countries on the way. This removes a major health risk for at least 3.7 billion people, or 46% of the world's population.

"These policies are expected to save 183,000 lives every year. Just five years ago, only 6% of the world's population was protected from this toxic additive with similar policies," Tedros said.

oil, which causes the oil to become solid at room temperature.

“It is also solid in your body, in your coronary artery,” said Tom Frieden, president and CEO of Resolve to Save Lives. “And this is why it was at one point estimated to kill half a million people per year.”

With almost half the world covered, Frieden said millions of deaths will be prevented in the coming decades. He said the next two years will be critical, noting that the original deadline for the global elimination of trans fats has been extended from 2023 to 2025 due to the disruptions caused by the COVID-19 pandemic.

“Global elimination, according to published estimates, would prevent about 17.5 million deaths over 25 years. The progress of reducing trans fat globally show that the noncommunicable diseases can be beaten,” Frieden said.

He said this was important because “sometimes when it comes to the noncommunicable diseases, we have the sense that we can describe them, we can predict them, but we cannot stop them. In fact, we can, and the progress stopping trans fat shows that that is possible. And there are other areas, as well, where specific results are available.”

Health officials say no amount of trans fat is safe and regard it as the worst type of fat anyone can eat because it has no known nutritional benefits. Trans fat is cheap to make and is found in margarine, palm oil, fried foods, baked products, pastries and some processed foods.

WHO reports that a high intake of trans fat increases the risk of death from any cause by 34% and from coronary heart disease by 28%.

WHO on Monday held an awards ceremony honoring the achievements of the first five countries to have eliminated trans fat from their food supply.

“Today, we recognize Denmark, Lithuania, Poland, Saudi Arabia and Thailand as the first countries to go beyond just adopting policies, to monitoring and enforcing them,” Tedros said.

“Congratulations to all these countries. You are leading the world and showing what is possible. You are the first countries to be validated, but you will not be the last,” he said.

In accepting the award, Ib Petersen, Danish ambassador to the United Nations in Geneva, said studies show that trans fat elimination policies put in place in his country in 2003 have “led to a reduction of deaths from coronary disease of 11%, which is significant.”

“It also shows that it is the most financially disadvantaged groups that have benefited most from this policy,” he said.

Frieden said he hopes more nations will follow the lead of these five countries in putting in place the policies, regulations and enforcement mechanisms needed to rid the world of trans fat.

“Of the remaining burden, just five countries - China, Pakistan, Russia, Indonesia, and Iran - account for about 60% of the remaining estimated burden. If these five countries were to implement [the best practice policies], the world would get to about 85% of the estimated burden, banned or trans fat-free,” he said.

WHO reports progress remains uneven, and a lot of work is still to be done. While many low- and middle-income countries are advancing, it says there is a long way to go, especially in Africa and the western Pacific.

“Africa has the lowest policy coverage, but there have been leaders with Nigeria and South Africa implementing,” said Frieden. “South Africa is beginning the enforcement process, and Ethiopia, Ghana and Cameroon are considering regulations in the near future.

“They understand that trans fat is not only a toxic product, but one that might be dumped on them if they do not take action when the rest of the world is banning it," Frieden said, adding that governments and the food industry have a responsibility to ensure that does not happen.

Courtesy: https://www.voanews.com/

Saturated fatty acids play crucial role in creating new memories, study says

Including saturated fat in your diet is generally an unhealthy choice when it comes to your waistline, but interesting new research suggests saturated *fatty acids* are actually quite helpful for your brain. Scientists at the University of Queensland have discovered the crucial role saturated fatty acids play in memory consolidation. Simply put, researchers say their work suggests that fatty acids are vital for the brain to create new memories.

Dr. Isaac Akefe from UQ's Queensland Brain Institute explains this latest report uncovered the molecular mechanism and identified the genes driving the memory creation process. These findings, he says, open the door to a potential new treatment for neurodegenerative disorders.

"We've shown previously that levels of saturated fatty acids increase in the brain during neuronal communication, but we didn't know what was causing these changes," Dr. Akefe says in a media release. "Now for the first time, we've identified alterations in the brain's fatty acid landscape when the neurons encode a memory.

"An enzyme called **Phospholipase A1** (PLA1) interacts with another protein at the synapse called **STXBP1** to form saturated fatty acids."

What Are Saturated Fatty Acids?

- They're a type of fat molecule where each carbon atom in the fatty acid chain bonds with two hydrogen atoms, resulting in "saturation." This means they have only single bonds between carbon atoms, unlike unsaturated fats with at least one double bond.
- Saturated fatty acids are mainly found in animal products like **meat, poultry, dairy, and eggs**, as well as some plant-based sources like coconut and palm oil.
- Consuming high amounts of saturated fat has been linked to an increased risk of heart disease due to potential effects on cholesterol levels.

The brain is the human body's fattiest organ, as fatty compounds called lipids make up about 60 percent of its weight. Fatty acids, for reference, are the building blocks of a class of lipids called *phospholipids*.

Prior work performed in Professor Frederic Meunier's laboratory revealed that STXBP1 controls the targeting of the PLA1 enzyme through the coordination of the release of fatty acids and directing communication between the synapses of the brain.

"Human mutations in the PLA1 and the STXBP1 genes reduce free fatty acid levels and promote neurological disorders. To determine the importance of free fatty acids in memory formation, we used mouse models where the PLA1 gene is removed. We tracked the onset and progression of neurological and cognitive decline throughout their lives," Prof. Meunier explains.

"We saw that even before their memories became impaired, their saturated free fatty acid levels were significantly lower than control mice. This indicates that this PLA1 enzyme, and the fatty acids it releases, play a key role in memory acquisition."

In conclusion, the study authors believe these findings hold major implications regarding modern science's understanding of how memories crystalize in our minds.

"Our findings indicate that manipulating this memory acquisition pathway has exciting potential as a treatment for neurodegenerative diseases, such as Alzheimer's," Prof. Meunier concludes.

Courtesy: https://studyfinds.org/fatty-acids

ESSENTIAL OIL

LOTUS

Introduction

Nelumbo nucifera, commonly known as lotus, is an aquatic perennial plant cultivated in most provinces of China and even across many parts of the world. In India lotus is found growing in almost all the parts. Commercially it is being grown inin West Bengal, Chhattisgarh, Jharkhand, Tamil Naidu, Kerala and Kashmir. For its uses in different purposes, it is being cultivated in many regions or small pockets of the country at smaller scales Lotus is a perennial plant with both aerial and floating orbicular leaves. Flowers vary in colour from white to rosy and are pleasantly sweet-scented, solitary, and hermaphrodite. It has mainly been used as an aquatic vegetable, and almost all parts of N. nucifera are instrumental in traditional herbal medicines or healthcare foods. The flower of N. nucifera was primarily used for personal health care products, such as body lotions and bath soaps, or for producing scented substances in green tea. Its medicinal value is rarely reported but considered associated with aromatherapy, e.g., treating respiratory problems. *Nelumbo nucifera* comes under the family Nelumbonaceae, which has various local tribal names (Indian lotus, bean of India, Chinese water lily, and sacred lotus) and several botanical names (*Nelumbium nelumbo, N. speciosa, N. speciosum, and Nymphaea nelumbo*)

According to Rigveda, The lotus is the symbol of divinity or immortality in humanity. Lotus is an aquatic plant and is a perennial herb cultivated as an ornamental Lotus. There are two basic species viz.NelumbonuciferaandNelumbolutea belonging to the family Nelumbonaceae. The attractive yellow and pink flowers are mildly scented and offered to Gods traditionally. It is being propagated through seeds and rhizomes naturally.

In the representation of Lord Vishnu as Padma-nabha (Lotus navel), a lotus issues from his navel with Brahma on it. The Goddess Sarasvati is portrayed on a pale pink lotus. The lotus is the symbol of what is divine or immortal in humanity, and also symbolizes divine perfection. In Buddhism, the lotus represents the purity of the body, speech, and mind, as if floating above the murky waters of material attachment and physical desire. Lotus has long been revered for its ability to remain unsullied and pure, despite its environment.

The flower represents spiritual enlightenment, new beginnings, detachment from materialism, purity and calm, rebirth, wisdom, being ground, and remembering one's roots."There is hardly any symbolism in Indian poetry, sculpture, and painting more extensive than that belonging to the lotus flower and other parts of the plant," writes Thomas Kintaert, on the Cultural Significance of the Leaf of the Indian Lotus.

The lotus was chosen as the National flower of our country because it enjoyed a significant presence in ancient traditions, scriptures, and mythology. The 'Bhagavad Gita' considers it a metaphor for detachment: Just as the lotus remains untouched by the muddy waters in which it grows, human beings should rise above worldly attachments**.**

As far as history is concerned, this beautiful flowering aquatic plant has been honoured by three countries: China, India, and Egypt. Pictorial representation of the flower can be seen in the art of all these countries' cultures, symbolising perfection, purity, and beauty. Mostly, lotus plants are popular in Australia Pacific, China, India, Korea, and Japan. (Keshav Raj Paudel, 2015)

Different parts and organs of lotus have been used to treat inflammation, cancer, skin diseases, nervous system disorders, leprosy, and poisoning. Many bioactive compounds such as flavonoids, alkaloids, lipids, glycosides, triterpenoids, vitamins, and carbohydrates have been isolated from several lotus organs. Flavonoids are a group of plant polyphenols having promising potential in physiological efficiencies, such as antiallergic, anti-inflammatory, antioxidant and hemostatic effects. Alkaloids, a group of compounds containing basic nitrogen atoms in plants, have been found to possess antioxidant, anti-inflammatory, sedative effects, etc. Lipids, including fatty acids, phytosterols, glycerides, and other esters present in food, also play physiological roles in the human body. Lipids possess anti-inflammatory effects and exert potential protective effects against Alzheimer's disease etc

The seeds of the lotus are utilised in the management of a variety of conditions, including tissue inflammation, poisoning, cancer, and leprosy. The rhizomes have been shown to have antioxidant properties. The leaves are utilised to stanch bleeding in traditional Chinese medicine. The stamens of the lotus can be dried and made into a fragrant herbal Chinese tea, indicating antioxidant effects in kidney homogenates. The lotus petals are utilised to impart a scent to tea leaves. Palmitic acid was analysed as a predominant component of lotus plumule oil. It is known to induce melanogenesis.

The bioactive constituents of lotus are mainly alkaloids and flavonoids. The whole lotus plant was traditionally used as an astringent, emollient, and diuretic. (Keshav Raj Paudel, 2015) (Keshav Raj Paudel, 2015) (Xu Zhao, 2023)

The major essential oil components are extracted by the steam distillation method. The essential oil extract of lotus flowers increases melanogenesis, representing a potential use for photoprotection. (Songhee Jeon, 2009)

Its lipid composition was assessed to verify the effective components of the lotus flower oil. It was found to be comprised of palmitic acid methyl ester (22.66%), linoleic acid methyl ester (11.16%), palmitoleic acid methyl ester (7.55%) and linolenic acid methyl ester (5.16%).

Despite of having high economic importance not much attention has been given to the commercial cultivation of this crop in our country.There is a need to carry out research on the commercial cultivation of this crop under Indian conditions combined with organization of trainings to the farmers and entrepreneurs to take up its cultivation. Floriculture business is based on novelty and hence this forgotten traditional flower has again found its way in modern decorations where lotus has become a specialty today. There is a huge potential to use this flower in modern landscaping also where eco-tourism is coming up very fast and offers a unique business opportunity to the farmers. Simultaneously, there is a unique opportunity for converting the waste and barren lands into a profitable venture.

INCI: Nelumbo Nucifera Flower Extract

- **Synonyms:** Lotus flower essential oil
- **Description:** nelumbo nucifera flower extract is an extract of the flowers of Nelumbo Nucifera, Nymphaeaceae.
- **Aroma:** Vary from sweet and floral to slightly green & herbaceous, depending on the variety of lotus used & the extraction method.

Cultivation and Production

American lotus is not widely planted as a crop or ornamental as is Asian lotus and it usually grows in wild areas. Asian lotus has an extremely long history in cultivation as a vegetable, medicinal, and ornamental plant in Asian countries. Recently, N. nucifera is becoming a potential crop in Australia New Zealand and the United States

Lotus is usually planted in a tilled pond or rice field for vegetable production. It is also planted often in bowls, containers, small ponds, and lakes for landscape use.

Cultivar selection and cultivation techniques are dependent on where lotus is planted. Large cultivars are planted in ponds and lakes for vegetable and seed production, or for landscape uses. Medium and small cultivars are usually planted in containers and water gardens for ornamental use. China is the largest producer and consumer of lotus. Currently, the planting area of rhizome lotus is about 5 to 7 million ha in China. The total yield of edible rhizomes is about 6 million tons. Wild lotus can be naturally distributed at sites with water depths up to 2 to 3 m in that no petioles of N. nucifera elongated in 3 to 5 m depths of water. Most cultivated lotus generally cannot survive in pond with water depth > 1.8 m and is usually grown better in water < 1.5 m deep

The survival decreased with increasing planting depth and the biomass of plants is significantly reduced from 0.5, 1.0, to 1.5 m water depth in tank experiments. Lotus planted in shallow water generated higher yield and the ideal water depth was approximately 10 to 20 cm However, optimum water depth is plant size dependent. Small-medium size varieties grow better in shallow water with a depth of 5 to 50 cm, so so-called shallow water lotus, while large large-size varieties grow better in water with a depth of 50 to 100 cm, so so-called deep-water lotus

Climate and Soil:

Growing climate: Lotus is widely adapted to varied climatic conditions. For commercial cultivation, however, a warm to tropical environment is most suitable. Temperature: 20! – 30! is the most ideal and should not drop below 18!. Sunshine: At Least 6 hr Day Light is required. Intense sunlight and long day hours for successful growth.

Loam or clay soil (Anonymous, 1987) are the most suitable. Lotus germinates or sprouts at temperatures above 13 ºC and prefers warm climates. Higher temperatures from 20 to 30 ºC have been found to greatly accelerate plant growth, while below 15 ºC, growth of N. lutea was very limited. Optimal temperatures are 22 to 32 ºC for lotus growth. N. nucifera can endure high temperatures of 41 ºC and continuous temperatures above 35 ºC for 20 days. For lotus production in tunnel houses during cool seasons, 28 to 30 ºC soil temperatures were suitable. When soil temperature was below 18 ºC and ambient temperature was less than 20 ºC, plants almost stopped growth

Lotus performs much better under full sun than in shady places. Reported that increase of light intensity improved leaf greenness, stalk thickness, and flower number of lotus in tunnel houses for winter production. Based on results from a tank–experiment, the total biomass increased significantly with increasing light, although the survival of N. lutea seedlings was high in all tested light levels (Snow, 2000). Soil is an extremely important ingredient for plant nutrition.

The soil type is probably the most important factor in the proper development of Nelumbo, and loam soil is much better than sandy soil (Meyer, 1930). Heavy garden loam containing a high percentage of clay with very small particles is best and topsoil is always good for water garden plants.

Lotus Essential Oil Extractions and Chemical Composition:

Essential oil components of Nelumbo nucifera flowers from cultivated and wild lotus samples were analysed and compared using three different extraction techniques, i.e., headspace extraction (HE), steam distillation (SD) and solvent extraction (SE). The major essential oil components are extracted by the steam distillation method. The solvent extraction method is different from steam distillation, and the Head extraction method demonstrated a possibility to be used simplest way for extracting the essential oil components from raw materials.

To facilitate large-scale use of this plant material, including the cultivated material sources and multiple extraction methods is important to account for potential variation in the essential oil components. Therefore, the analysis of the essential oil components of N. nucifera flowers, including components extraction, separation and identification, and the comparison of the essential oil components extracted by different techniques.

According to research work, the wild N. nucifera flower extracts using the three techniques, i.e., headspace extraction (HE), steam distillation (SD) and solvent extraction (SE), were analysed by GC-MS (one type of system) under the same operating conditions.

It was found that the chemicals in essential oil from N. nucifera flower were the alkene aldehydes and alcohols, n-alkenes and n-alkanes, which were also reported on the essential oil components from other aromatic plant species, such as Osmanthus fragrans, Thymus vulgaris and Lavandula angustifolia. Among them, terpene aldehydes and alcohols were reported as common chemicals with promising bioactivities. Different chemical information, including composition and contents, was obtained from the three extraction techniques as follows…

Peak Number	Retentiontion Time, Min	Components 3	lati Relative Contents, %			Chemical Class
			HE	SD	SE	
7	7.188	teuadetane	3.16	0,0999	00696	
9	9.832	pentadecane		13.7	4.98	
14	12.319	hexadecane		0.309		
19	15.078	heptadecane	2.61	5.33	0.879	
21	17.566	ociaciecane	0.0718	0.242	0.0729	
25	20.171	nonadeosne	126	6.26	3.63	
28	22.505	eicosane		0.749	3.89	
30	25.248	heneicosane	0.822	9.13	521	
						Manes
32	28.541	cicossane		0.426		
34	33.501	tricosane		6,47	4.51	
35	36.121	tmacosane		0.248	0.405	
38	37.672	pentacocane		1.62	4.21	
39	38.899	hexacosane		0.127	0.367	
40	40.324	heptacomacosane	-	1.29	50.29	
41	42613	octacosane		0.100	0.691	
42	44679	noncosane		0.880	5.76	
6	7.000	7-tetradecene	0.128	0.00677	-	
8	9.368	1-ptentadecene	129	626	0.410	
10	11.506	E-1.9-hexadecadierse	-	0.107	-	
11	11.725	Z-7-hexadecence	-	0.315	-	
12	11.931	Z-3-hexadecence	-	0.151	-	
13	12.014	Z-8-hexadecence	-	0.114	-	
18	14.752	8-heptadecene	4.24	ASS	0.593	Alkenes
20	17213	E-5octadecene	-	0.08115	-	
23	19.390	Z-5-nonadecene	0.110	0.863	-	
24	19.753	1-nonadecene	-	1.14	0.0973	
20	24.710	10-hendcosene	0.191	0.267	2.40	
33	3294	Z-9-tricosene	-	0.109	-	
36	38.581	1,12-docosdecene	-	0.113	-	
37	37.520	Z-12pentacosene	-	0.0458	-	
4	3.2110		-	90325	-	
6	3.471	terpinen-4-ol	-	0.0414	-	Alcohols
16	13.17	a-terpineol	-	0.359	-	

No common component was found between the headspace extraction (HE) and solvent extraction (SE) methods except the 11 common components among the three extraction techniques. Steam distillation (SD) and Solvent extraction (SE), used as the conventional methods, can obtain more similar results in essential oil composition, and the headspace extraction (HE) method is preferable for components with relatively higher volatility. Unsurprisingly, the three ways resulted in different essential oil profiles in the extraction.

In the headspace extraction method, acetic acid had the most significant relative content of 38.1%, more likely due to its high volatility. While in the steam distillation method, two olefine aldehydes were found to be the major components of essential oil. However, in the solvent extraction method, the main components of essential oil were two olefine acids, i.e., n-hexadecanoic and octadecadienoic acid.

Overall, the Solvent extraction (SE) and Steam distillation (SD) methods are more suitable for achieving broader coverage of the essential oil components for both analytical and production purposes. In contrast, the Headspace extraction (HE) method is preferable for targeted analysis of highly volatile components.

Therefore, N. nucifera flowers from different growing environments, i.e., cultivated and wild samples, showed differences in relative contents of essential oil but not in chemical components.

Lotus Oil Benefits & Uses:

1. The flower of N. nucifera was primarily used for personal health care products, such as body lotions and bath soaps, or for producing scented substances in green tea.
2. Flavonoids are a group of plant polyphenols having promising potential in physiological efficiencies, such as antiallergic, anti-inflammatory, and antioxidant effects.
3. Alkaloids possess antioxidants, anti-inflammatory, and sedative effects.
4. Lipids, including fatty acids, phytosterols, and glycerides, possess anti-inflammatory effects and exert potential protective effects against Alzheimer's disease etc.
5. The lotus petals are utilised to impart a scent to tea leaves. Palmitic acid was analysed as a predominant component of lotus plumule oil. It is known to induce melanogenesis.
6. The whole lotus plant was traditionally used as an astringent, emollient, and diuretic.
7. The major essential oil components are extracted by the steam distillation method. The essential oil extract of lotus flowers increases melanogenesis, representing a potential use for photoprotection.
8. The lotus flower & flower buds have been used to treat vomiting blood, bleeding caused by internal and external injuries, and various skin diseases.
9. Flowers, with their parts or extracts, possess antimicrobial activities, vasodilating effects, antihypertensive and antiarrhythmic abilities, aphrodisiac activity, and antioxidant and free radical scavenging capacity.
10. Lotus has been reported as a highly effective whitening & anti-wrinkling agent and hence is widely utilised in anti-ageing cosmetics preparations.
11. Research said the essential oil derived from an extract of the lotus flower, which included the petals and stamens, was effective in melanogenesis in human melanocytes.
12. Linoleic acid, an unsaturated fatty acid, reduces melanin contents in melanoma cells, whereas palmitic acid, a saturated fatty acid, increases it. Thereby indicating that it may regulate melanin content.
13. Lotus flower extracts are suggested to reduce the activity of sebum overproduction and help to balance sebum secretion.
14. Polyunsaturated fatty acids and incorporating zinc compounds may all contribute to reducing sebum secretions associated with pathophysiological conditions like acne.
15. Containing palmitic acid methyl ester-induced melanogenesis due to increased tyrosinase expression. Thus, the results suggest that lotus flower oil may help to develop grey hair prevention agents

PRECAUTIONS

Pregnancy and breast-feeding: There is not enough reliable information about the safety of takinglotus if you are pregnant or breast-feeding. Stay on the safe side and avoid use.

Diabetes: Lotus might lower blood sugar levels in some people. Watch for signs of low bloodsugar (hypoglycemia) and monitor your blood sugar carefully if you have diabetes and use lotusas a medicine.

Surgery: Lotus might lower blood sugar levels. There is concern that taking lotus as a medicinemight interfere with blood sugar control during and after surgical procedures. Stop using lotus atleast 2 weeks before a scheduled surgery.

Compiled by Dr. S. Adhikari

LAUGH AND LOUD

Q. What is a physicist's favourite food?

A. Fission chips.

****

Q. Did you hear about the girl who got cooled to absolute zero?

A. She's 0K now

****

A little girl to her mother, "Mommy, today in school I was punished for me for thing that I didn't do." The mother said in anger, "But that's right! I'm going to have a talk with your teacher about this … by the way, what was it that you didn't do?" The little girl replied, "My homework.

****

A photon checks into a hotel. When asked if they need help with their bags, it responds, "No, I'm travelling light".

****

Q. What did the biologist wear to impress his date?

A . Designer genes

****

Q. What type of fish is made out of 2 sodium atoms?

A. 2 Na

****

Q. What did the volcano say to his beautiful wife?

A. I lava you

****

Q. What do you call a fly that lands on the butter?

A. butterfly

****

Q. What does Earth say to make fun of the other planets?

A. You guys have no life.

****

Q. How do you know that Saturn has been married multiple times?

A. Because she has a lot of rings!

****

Q. How do astronauts organize a successful surprise party?

A. They planet.

****

MEMBERS' PAGE

WHETHER SUGARCANE JUICE SHOULD BE CONSUMED IN SUMMER OR NOT, KNOW ICMR'S ANSWER

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

Whether consuming sugarcane juice is healthy for health or not, this question often remains in the minds of people. Now, ICMR has answered this question by issuing new guidelines.

To keep themselves hydrated in the summer season, people like to drink all kinds of drinks from time to time. One of these is sugarcane juice. People also like its taste very much. However, apart from the taste, whether the consumption of sugarcane juice is healthy for health or not, this question often remains in the minds of people. Now, ICMR has answered this question by issuing new guidelines. Let's know about it-

Is sugarcane juice healthy or not?

According to ICMR, excessive consumption of sugarcane juice can be very harmful for health. Not only this, drinking it in small quantities is also not good for certain people. This is because sugarcane juice contains high amount of sugar.

According to ICMR, an adult should not consume more than 30 grams of sugar in a day, while for children between 7 and 10 years this amount decreases to 24 grams. At the same time, 100 ml of sugarcane juice contains about 13-15 grams of sugar.

That means by drinking just one glass of sugarcane juice, you reach your daily sugar limit. In such a situation, avoid consuming sugarcane juice in large quantities. At the same time, even if you drink this juice in small quantities, keep your day's sugar intake in mind.

These people should not consume it

According to health experts, especially diabetes patients should avoid consuming sugarcane juice even in small quantities. Along with natural sugar, sugarcane juice also has a high glycemic load, which can affect the blood sugar level of diabetes patients. In such a situation, diabetes patients should stay away from consuming this juice.

***Sugarcane Juice cane has a Glycemic Index of 43, making it a low Glycemic food, indicating it will not suddenly create a spike in your Blood level sugar.**

Disclaimer: The advice and suggestions written in the article are just general information. Consult a doctor for any kind of problem or question.

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