LIPID UNIVERSE

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Modern Analytical Techniques and their Apalications in the Analysis of Fatty Acids in Oils & Fats

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

Dear Friends,

Precision, Sustainability, and the Evolving Lipid Landscape

As the lipid sector navigates in the era of heightened consumer awareness, regulatory scrutiny, and scientific advancement, this issue of *Lipid Universe* brings into focus the critical pillars shaping our industry today-**measurement accuracy, analytical rigor, sustainability, and health relevance.**

Metrology, often operating behind the scenes, has emerged as a cornerstone of trust in lipid science and trade. From ensuring reproducibility in fatty acid analysis to enabling fair transactions across global markets, precise measurement systems underpin quality assurance, regulatory compliance, and technological innovation. The growing adoption of advanced analytical techniques such as GC and GC-MS reflects the industry's commitment to accuracy, transparency, and consumer confidence.

Equally significant are the evolving dynamics of global edible oil markets. Shifts in import duties, geopolitical disruptions affecting sunflower production, rising demand for biofuel feedstocks, and climate-driven challenges in olive oil production collectively remind us of the interconnectedness of agriculture, trade, and sustainability. These developments reinforce the need for diversification, resilient supply chains, and science-led decision-making.

Health and nutrition continue to redefine the role of lipids beyond functionality. From innovative fat solutions sought by bakers to emerging evidence on lipid composition and human health, fats and oils are increasingly viewed through a holistic lens-balancing performance, nutrition, and environmental responsibility. The growing interest in carrier oils such as argan oil further exemplifies how traditional knowledge and modern science can converge to deliver functional and therapeutic value.

As we look ahead, the lipid industry's progress will depend on **precision in measurement, integrity in practice, and responsibility toward ecosystems and consumers alike.** Through informed research, ethical trade, and collaborative innovation, the lipid community is well-positioned to meet the challenges-and opportunities-of a rapidly transforming world.

Yours truly

C.S. Joshi

Editor-in-chief

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

Dear Readers,

This issue deals with Metrology (the science of measurement), modern analytical techniques and their applications in lipid science and technology, trade & health news, active carrier oil, and winter solutions being the last but not the least.

With the increasing awareness of the consumers for the product quality meeting specifications, guaranteed fair transactions by standardizing weights and measures, and minimising errors for generating confidence in analytical results; industries now-a-days are adopting Metrology System which ensures quality & manufacturing, health & safety, trade & commerce and reproducible scientific research & technological advancements. Thus Metrology, the science of measurement, has become so crucial.

In the world trade news, some important issues like - (a) the total import of vegetable oil has fallen, following the increase in import duty by the Government, (b) sunflower production in Ukraine has come down due to the ongoing conflict and economic instability thus affecting EU and global markets, (c) the cost of olive oil production is booming due to the climate change in the Mediterranean country respectively, are informed.

In the health news, most important issues are - (a) bakers are seeking some extra value addition in the nutritional aspects beyond functionality and the flavours, (b) insect provide essential fatty acids (W6 & W3 PUFA) which are crucial to birds, lizards and other animals, creating an essential link in the food chain protecting biodiversity of our natural world, are mentioned herewith.

The carrier active oil like Argon Oil finds its wide range of applications in food-grade oils and cosmetic oils. It is often called "liquid gold" and is highly valued because of its exceptionally rich in essential nutrients,fatty acids, antioxidants, and vitamin E, offering a wide array of benefits for skin,hair, and overall wellness.

The winter season is going on in some parts of the country, as a result, we have mentioned some important solutions to adjust our routine for healthy winter skin and body, in this issue.

Yours truly
Dr. S. Adhikari
Editor

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

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MODERN ANALYTICAL TECHNIQUES AND THEIR APPLICATIONS IN THE ANALYSIS OF FATTY ACIDS IN OILS & FATS

Dr. S. K. Raza, CEO Testing,FARE LABS Pvt. Ltd.
Email:

Introduction:

Edible oils and fats are very complex mixtures of different groups of compounds. Important groups are the triacylglycerols, the partial acylglycerols, the fatty acids, wax esters, sterols and sterol esters, alkanes, phospholipids and lysophospholipids.

Together, these groups probably account for over 99.9% of the mass of the sample.

In addition to these main compounds there are numerous other compounds and groups of compounds that although minor in terms of mass, are crucial for the quality and safety of the health. These include, flavour and taste compounds, micronutrients such as vitamins, minerals phytochemicals undesired compounds such as residual solvents, polyaromatic hydrocarbons, process contaminants such as MCPDs and glycidyl esters, environmental pollutants such as dioxins, a variety of transformation products, metal residues, naturally occurring toxins, crop contaminants such as pesticides and fumigants, leached chemicals from packaging material.

Gas Chromatography (GC)

Gas Chromatography is a widely used analytical technique used to separate & analyse the volatile compounds. In the early 1950s this technique was first used for the separation of amino acids.

Now GC has a large number of applications as this technique is rapid & has a great sensitivity. Both qualitative & quantitative analysis can be done through GC. Even minute quantity samples can be analysed through GC.

In gas chromatography, the sample is dissolved in a solvent and vaporized in order to separate the analytes. The sample is distributed between two phases: a stationary phase and a mobile phase. The mobile phase is a chemically inert gas such as helium, nitrogen etc. and hence GC. The stationary phase is either a solid adsorbent, termed GSC, or a liquid on an inert support, termed GLC.

GLC is the most commonly used technique. The sample which is to be separated is first converted into vapours & thus mixed with gaseous mobile phase. The criteria for the compounds to be analysed in GC is volatility & thermo stability.

Instrumentation

Generally, all the chromatographs consist of six basic components:

1. Sample injection system
2. Carrier Gas
3. Separation column:
4. Column Oven or Thermostat chambers
5. Detectors
6. Amplification & Recorder system # GC Detectors Most common types of detectors used in GC are:

   (a) Flame ionization detector (FID),

   (b) Electron capture detector (ECD),

   © Thermal conductivity detector (TCD),(d)

   (d) Photoionization detector (PID),

   (e) Nitrogen phosphorus detector(NPD),

   (f) Flame photometric detector (FPD) and

   (g) Mass Spectrometry detector (MSD) # How does GC work?

In GC, firstly vaporized sample is injected into the chromatographic column and then sample moves through the column with the flow of inert gas & results in the separation of the components of sample which are recorded as a sequence of peaks as they leave the column.

The different components of the sample separated & eluded at different & particular times which is called retention time. Retention time is determined by each component reaching the detector at a characteristic time.

GC Analysis:

The number of peaks determines the number of components present in the given sample, the identity of the components are determined by their characteristic retention times & the quantity of the component in a given sample is determined by the area under the peaks.

What is Mass Spectrometry ?

Mass spectrometry (MS) is an analytical technique that is used to measure the mass to charge (m/z) of ions. The results are typically presented as a mass spectrum, a plot of intensity as a function of the mass-to-charge ratio. Mass spectrometry is used in many different fields and is applied to pure samples as well as complex mixtures.

A mass spectrum is a plot of the ion signal as a function of the mass-to-charge ratio. These spectra are used to determine the elemental or isotopic signature of a sample.

Mass Spectrometer

A SOPHISTICATED WEIGHING MACHINE. APPROACH REVOLVES AROUND THE PROCESS OF "IONISATION" (MOLECULES CONVERTED TO IONS PRIOR TO MEASUREMENT OF MASS). PROPERTIES OF IONS MAKE THEM EASIER TO EXPLOIT. BEHAVIOUR OF IONS MONITORED TO ASCERTAIN THEIR MASSES. USEFULNESS OF MS AS AN IDENTIFICATION TOOL REQUIRES MORE TO IT THAN JUST MEASURING INTACT MOLECULES INITIALLY FORMED IONS CALLED "MOLECULAR IONS" HAVE SUFFICIENT ENERGY UNDERGO "FRAGMENTATION" TO GIVE "FRAGMENT IONS" WHICH ARE ALSO MEASURED.

Components of a Mass Spectrometer # EI vs CI

Gas Chromatography- Mass Spectrometry (GC-MS) # Injector,Column

MS: Detector, Total Ion Chromatogram (TIC)

Applications of GC and GC-MS in the Analysis of Fatty Acids # Typical Analysis

Fat and fatty acids are extracted from food by hydrolytic method. Fat is extracted into ether,then methylated to fatty acid methyl esters (FAMEs). FAMEs are quantitatively measured by gas chromatography.

Fatty Acids (Saturated) # Tricosylic (C23) Lignoceric (C24) Pentacosylic (C25) Cerotic (C26)

Carboceric (C27) Montanic (C28) Nonacosylic (C29) Melissic (C30) Hentriacontylic (C31) Lacceroic (C32) Psyllic (C33)

Geddic (C34) Ceroplastic (C35) Hexatriacontylic (C36)

Heptatriacontanoic (C37) Octatriacontanoic (C38) Nonatriacontanoic (C39) Tetracontanoic (C40) Propionic (C3)

Butyric (C4) Valeric (C5) Caproic (C6) Enanthic (C7) Caprylic (C8) Pelargonic (C9) Capric (C10) Undecylenic (C11) Lauric (C12) Tridecylic (C13) Myristic (C14) Pentadecylic (C15) Palmitic (C16) Margaric (C17) Stearic (C18)

Nonadenylic (C19) Arachidic (C20) Heneicosylic (C21) Behenic (C22) trans-Fatty Acids

14:1 trans-Myristelaidic

16:1 trans-Palmitelaidic

18:1 trans 6-Petroselenic

18:1 trans-Elaidic

18:1 trans 11-Vaccenic

18:2 trans-Linolelaidic

18:2 trans 9-Linolelaidic

18:2 trans 12-Linolelaidic

18:2 cis-9, trans-11-Octadecadienic 18:2 Linoleic – conjugated

20:1 Eicosenic trans 11

22:1 13-trans Docosenic

Thermal Conductivity Detector (TCD) Electron Capture Detector (ECD) Nitrogen Phosphorus Detector (NPD)

Oils & Fats Analysis: FARE Labs Facility

Total, 2173 samples of oils/fats during the last two years.

The trans-fat content - determined based on 11 Trans Isomers (18:1 (1 isomer), 18:2 (3 isomers) and 18:3 (7 isomers).

Only 3.49 % (76 samples) contained trans-fat exceeding 2%.

254 samples, 1-2% trans-fat <1% trans fat(1843 samples)- (85%).

2097 samples (96.51%) contained <2% trans fat.

Analysis of Trans Fatty Acids in Oils/Fats at FARE Labs

GC-FID Analysis of Fatty Acid Methyl Esters (FAME)

 # Ref: Michael D. Buchanan, Reporter US Volume 26.4,GC-FID Analysis of Palmoline Oil

GC-FID Analysis of Milk Fat

GC-FID Analysis of Vanaspati

GC-FID Analysis of Peanut Butter

GC-FID Analysis of Fatty Acids Methyl Esters from Coconut Oils

 # Ref: DOI: http://dx.doi.org/10.21776/ub.jpacr.2016.005.03.255, Fatty Acids Analysis Using GC/MS.

A Rapid GC-MS Method for Quantification of Positional and Geometric Isomers of Fatty Acid Methyl Esters (FAMEs).

 # J.REF: Ecker, Max Scherer, +1 author G. Liebisch Published in Journal of chromatography. B… 15 May 2012

Conclusions:

GC with FID is the method of choice for the analysis

of fatty acids in oils & fats. Fatty Acids need to be volatilised by making their Methyl Esters (FAME) for analysis by GC.

GC-MS, being a highly sensitive analytical technique, helps in identifying unknown compounds present in oils & fats.

FARE Labs possesses all the state-of-the-art equipment with highly trained and experienced manpower to undertake the analysis of fatty acids in oils & fats.

FARE Labs is also a PT Provider for the testing of Fatty Acids in various Food Matrices.

10.1016/j.ad.2014.02.004. Epub 2014 Mar 20. PMID: 24656996.

7. *Dorman, Jacob S.; Skin bleach and civilization: the racial formation of blackness in 1920s Harlem.; Journal of Pan African Studies, vol. 4, no. 4, 2011, p. 47+. Accessed 2 May 2021.*

8. *Drugs and Cosmetics Act – 1964*

9. *Wilson CL, Ferguson DJ, Dawber RP. Matting of scalp hair during shampooing: A new look, Clinical and Experimental Dermatology, 1990; 15(2):139– 142.*

10. *Draelos ZD. Shampoos, conditioners, and camouflage techniques. Dermatologic Clinics. 2013; 31(1):173–178.*

11. *Adams RM, Maibach HI. A five-year study of cosmetic reactions. Journal of the American Academy of Dermatology. 1985; 13(6):1062-1069.*

12. *Nigam PK, Saxena AK. Allergic contact dermatitis from henna. Contact Dermatitis, 1988; 18(1):55-56.*

13. *Mohammad Bilal, Hafiz M.N. Iqbal. An Insight into Toxicity and Human Health-related adverse Consequence of cosmeceuticals. Volume 670; 20 June 2019; pages 555-568.*

14. *Johansen JD, Rastogi SC, Menne T, Threshold responses in cinnamic-aldehyde- sensitive subjects: Results and methodological aspects, Contact Dermatitis. 1996;4(3):165-171.*

15. *Bridges B. Fragrance: emerging health and environmental concerns. Flavor Fragrances Journal. 2002; 17(5):361–371.*

16. *Donsing P, Viyoch J. Thai Breadfruit Heartwood Extract: A New Approach to Skin Whitening. Srinakharinwirot Science Journal. 2008; 24 (1): 9-23.*

17. *Gabriel J. Hydroquinone: Cancer-Causing Skin Bleach, 2008. [Online]. Available: http:// thegreenbeautyguide. com. Accessed: February 20, 2018.*

18. *Sylwia Borowska Ma³gorzata M. Brzóska Metals in cosmetics: implications for human health. 23 march 2013; volume 35, issue 6.*

19. *Ramakant S, Poornima S, Sapina J, Mathur HB, Agarwal HC. Heavy metal in cosmetics, Centre for Science and Environment. 2014; (45): 3-28.*

20. *Horii Y, Kannan K. Archives of Environmental Contamination and Toxicology. 2008; 55(4): 701-710.*

21. *Al-Dayel O, Hefne J, Al- Ajyan T. Human Exposure to Heavy Metals from Cosmetics. Oriental Journal of Chemistry. 2011; 27(1): 1-11.*

22. *Ababneh FA, Abu-Sbeih KA, Al-Momani IF. Evaluation of Allergenic Metals and Other Trace Elements in Personal Care Products. Jordan Journal of Chemistry. 2013; 8(3): 179-190.*

23. *Zakaria, A, Ho YB. Heavy metals contamination in lipsticks and their associated health risks to lipstick consumers. Regulatory Toxicology and Pharmacology. 2015; 73(1): 191–195.*

24. *Curtis J, Colas A. Medical applications of silicones, in: B.D. Ratner, A.S. Hoffman, F.J. Schoen, and J. E. Lemons, eds., Biomaterials Science. New York: Elsevier/Academic Press, New York, USA, 2004, pp. 698-707.*

25. *Park ME, Zippin JH. Allergic contact dermatitis to cosmetics. Dermatologic Clinics.2014; 32 (1):1–11.*

26. *'Sheikh Afaq Gowhar. Harmful effects of beauty care products on human health. Int J Med Sci Public Health. 2018; 7(1): 1-8.*

TRADE NEWS

With duty hike on oils, big reduction in imports; palm reaches lowest level:

Following the increase in import duty on edible oils by the Government of India, there has been a big reduction in imports of the commodity in September, according to experts. The total import of vegetable oil has fallen by more than 30% and has come down to 1.1 million tonnes. And, the overall stock of vegetable oil in the country has come down to 2.45 million tonnes from 2.93 million tonnes a month ago. In September, India's palm oil import decreased by almost one-third compared to a month ago. Because its price has increased more than other edible oils, said Shankar Thakkar, president, All India Edible Oil Traders Federation.

He added that palm oil imports have reached the lowest level in the last six months. At the same time,Sunflower oil imports have also decreased. It has come to a 10-month low. India buys most of the palm oil from Indonesia, Malaysia and Thailand, while it buys soyabean oil and sunflower oil from Argentina, Brazil, Russia and Ukraine. Palm oil imports have fallen by more than 30% to 527,314 metric tonnes. Due to which the supply of palm oil in India may be disrupted.

Soya oil imports also fell by 15.4% to 384,382 tonnes. At the same time, sunflower oil imports fell by 46.2% to 152,803 tonnes, which is the lowest in the last 10 months. Thakkar added that there was little chance of prices going down due to festivals for the next one week, but after Diwali, locally produced oilseeds would start coming to the markets on a large scale, and prices might come down due to weak demand.

Courtesy: FnB News.co.

Ukraine's Sunflower Production Crisis: What It Means for the EU and Global Markets:

Ukraine has long been recognized as one of the world's leading producers of sunflowers and sunflower oil, a vital commodity in global markets.

However, the ongoing conflict, economic instability, and shifting agricultural patterns have placed immense pressure on the sunflower industry in Ukraine. As the country grapples with disruptions in production and export, the impact is being felt not only within Ukraine but across Europe and beyond. You can follow the situation daily by following this link https://ukragroconsult.com/en/. This article explores the current state of sunflower production in Ukraine, how it is affecting the EU and global markets, and what trends to expect in 2025.

The Current Situation in Ukraine:

Since 2022, Ukraine's sunflower production has been significantly impacted by the war, with agricultural activities in the eastern and southern regions—the heart of the country's sunflower belt—severely disrupted.

Farmers have struggled to maintain regular planting schedules, while damaged infrastructure has hampered transportation and export routes. In addition to these challenges, economic instability and rising costs for inputs such as fertilizers and seeds have further compounded the difficulties for Ukrainian farmers.

As a result, the 2023 harvest was below expectations, causing a ripple effect throughout the global market. While some regions of Ukraine are managing to maintain limited production, the overall output remains reduced compared to pre-war levels. This reduction in sunflower availability is contributing to a tighter supply on the global market and fueling concerns about price volatility.

Impact on the EU Market:

The European Union is one of the largest importers of Ukrainian sunflower oil, relying heavily on the country for this crucial commodity. In particular, EU countries such as Spain, Italy, and Germany depend on Ukraine for a significant portion of their sunflower oil needs. Sunflower oil is widely used in the food industry, as well as for biodiesel production, making it a vital component of both the consumer and industrial sectors in the EU.

The disruptions in Ukraine's sunflower production have caused a noticeable increase in sunflower oil prices across the EU. With less sunflower oil available for export from Ukraine, the supply-demand imbalance has driven up costs, putting pressure on both manufacturers and consumers.

Additionally, the EU has been forced to seek alternative sources for sunflower oil, including other Eastern European countries and even Argentina. However, these alternative suppliers have struggled to fully meet the demand, especially considering the scale of Ukrainian exports prior to the conflict.

The EU's dependence on Ukrainian sunflower oil also highlights the vulnerability of European markets to supply chain disruptions. This dependence has not only led to price increases but has also resulted in uncertainty in the availability of sunflower oil, prompting discussions on the need for diversification in suppliers moving forward.

Global Impact of Ukraine's Sunflower Production Decline:

Beyond the European Union, the global sunflower oil market is feeling the effects of Ukraine's diminished production. As one of the world's largest exporters, Ukraine's role in stabilizing sunflower oil prices has been critical.

Countries in Asia, Africa, and the Middle East that rely on affordable sunflower oil have been hit particularly hard by the disruptions in supply.

China and India, two of the largest global importers of vegetable oils, including sunflower oil, have experienced price hikes due to reduced exports from Ukraine. This has forced them to increase imports of other vegetable oils, such as palm oil and soybean oil, placing additional pressure on those markets and driving up prices across the board.

The global edible oils market is thus in a precarious position, with sunflower oil shortages leading to ripple effects in other oil markets. This interconnectedness highlights the importance of Ukraine's sunflower production to the global economy and underscores the challenges that other producers face in compensating for Ukraine's shortfall.

Trend for 2025: Recovery or Further Disruption?

Looking ahead to 2025, the future of sunflower production in Ukraine remains uncertain, but several trends are beginning to emerge.

Firstly, much will depend on the geopolitical situation. Should the conflict in Ukraine persist, it is likely that sunflower production will continue to face significant disruptions, further tightening global supply. However, if there is a resolution or a significant de-escalation in conflict, Ukrainian farmers could begin to rebuild their agricultural capacity, and production levels could start to recover, albeit slowly.

Secondly, Ukrainian sunflower crushers may increasingly look toward processing alternative oilseeds, such as soybeans and rapeseed, as a way to maintain operations in the face of sunflower shortages. This diversification could become more prominent in the coming years, affecting the types of oil available on the global market and potentially easing some of the pressure on sunflower oil prices.

Additionally, climate change is expected to play an increasing role in agricultural production in Ukraine. Changes in weather patterns, such as droughts or irregular rainfall, could affect the ability of farmers to cultivate sunflowers and other oilseeds. Farmers may need to adopt more resilient agricultural practices to cope with these challenges, potentially altering the landscape of Ukraine's sunflower production.

Finally, the European Union is likely to continue efforts to diversify its sources of sunflower oil. While Ukraine will remain a key player in the market, the EU is expected to increase imports from other regions to reduce its reliance on a single supplier. This shift could stabilize the market somewhat, though it is unlikely to fully replace Ukraine's dominant position.

Courtesy: BBN Times

US canola production on the rise due to strong demand from biofuel sector:

Canola production in the USA is booming due to increasing demand from the domestic biofuel sector, according to a report by Germany's Union for Germany's Union for the Promotion of Plants and Protein (UFOP).

Dynamic growth in the US biofuel market was making canola cultivation increasingly attractive for farmers in the northern USA, the 26 September report said. "Canadian counterparts are also benefiting as the USA is a major market for both canola meal and oil," UFOP said.

According to the US Department of Agriculture (USDA), the canola planted area in the USA exceeded 1M ha for the first time in the 2024/25 season.

This represented a 13% increase from the previous year.

If yields remained consistent with the previous season, the USDA expected a record harvest of just over 2.1M tonnes, which would position the USA as a globally significant producer of canola and rapeseed.

All key canola-producing states in the USA have expanded their cultivation areas, with North Dakota accounting for 830,000ha, according to the report. Montana and Washington planted around 80,000ha, while Idaho and Minnesota planted around 38,000ha.

It was notable that canola-producing areas in North Dakota, Montana and Washington had all risen to record highs, the report said.

According to research by Agrarmarkt Informations-Gesellschaft, the growth of canola production in the USA is driven by dynamic demand for meal as feed for dairy production and for canola oil as a key feedstock for biofuel production.

In particular, the Renewable Fuel Standard (RFS) at the national level and the Low Carbon Fuel Standard (LCFS) in California, where more than 50% of transport fuels are now bio-based, had led to brisk demand and attractive prices for producers, the report said.

Despite the increase in canola output, US production could not keep pace with demand, UFOP said.

As a result, US imports of canola meal and oil – primarily from Canada – continued to increase steadily.

Courtesy: Oils & fats International

The Healthiest Cooking Oil Is Getting More Expensive—Here is Why:

Discover the challenges of olive oil production as climate change drives prices up. The rising cost of olive oil over the past few years has not gone unnoticed, especially for those who follow a Mediterranean diet, where it makes up the main source of fat. In fact, the global price of olive oil has more than doubled since 2021. 1 While there are many factors at play, the impacts of climate change are becoming increasingly apparent.

How Climate Change Is Challenging Olive Oil Production:

Olive oil trees are surprisingly resilient. They can withstand and adapt to harsh conditions and changes in their environment, including fires and floods. Take the olive tree of Vouves in Crete, Greece, as an example. The ancient tree is estimated to be more than 4,000 years old—and it produces olives to this day. That's an impressive display of resilience, yet, without intervention and ingenuity, climate change may prove devastating for this tree and the millions of hectares of olive trees across the Mediterranean—the location of some of the world's largest producing countries like Spain, Italy, Greece and Turkey.

According to Jessica Fanzo, a professor of climate and food at Columbia University, the most dramatic climate-related events impacting agriculture in the Mediterranean region include prolonged droughts, heat waves and wildfires. "Temperatures in Europe were 0.75°C warmer the past two years than a 1990 to 2020 average, putting increasing strain on agriculture production systems, including water needs. Global production of olive oil has decreased in the last few years due to some of these prolonged events," says Fanzo. "[Because] most olive oil is rain-fed, prolonged droughts make it much more difficult for the soil to retain water, putting stress on the trees." And it's this extreme stress that Fanzo attributes to the inability of some trees to fully mature—a trend with an, unfortunately, less than a positive outlook.

"When olive trees experience extreme heat, they drop fruit to preserve moisture and prioritize the tree's health," explains Cliff Little, president

of Corto Olive Oil. Olives that prematurely fall from trees are often harder and smaller, making the extraction process difficult and generally producing less and lower-quality oil. This catastrophic hit to production causes a rise in prices as farmers attempt to recover.

Warmer weather brings a host of other problems for olive farmers and their groves—namely bug infestations that either directly attack the fruits or introduce pathogens to trees. "While the more recent Bactrocera

oleae infestation relationship with a changing climate is still under investigation, it is an additional shock to the olive ag system," added Fanzo. These infestations, including the emerging Xylella fastidiosa, can bring about devastating effects in their host plants—tainting the oils, causing deficiencies in water, and crippling the tree's ability to absorb vital minerals. With warmer winters becoming more frequent, farmers have less of a reprieve from pestilent insects that otherwise tend to dissipate come colder temperatures.

How Olive Oil Producers Are Adapting to Climate Change:

Still, there's reason for farmers, and consumers, to be hopeful. Fanzo says that farmers will and are adapting. "Instituting efficient water management systems (water storage, soil moisture monitoring, etc.), considering newvarieties of crops that are more drought-tolerant, scaling conservation tillage practices and putting in cover crops will be key."

Berk Bahceci, founder and CEO at Heraclea, has already implemented modifications and advancements to his farming methods in Turkey in an attempt to impede the effects of climate change and develop a more sustainable model. "We have seen rising temperatures, less rain and longer periods of drought over the past five years, all of which have significantly impacted olive farming in general," says Bahceci. "To combat these climate shifts, we apply kaolinite clay to reduce water loss and focus on rainwater harvesting to support the ecosystem. Water is life—not just for irrigation but for building a healthy, thriving environment around our trees. By encouraging animals to graze, we manage weeds naturally and enrich the soil, ensuring our groves prosper without chemicals or artificial irrigation."

In San Joaquin County, California, where the climate closely mirrors that of in the Mediterranean, olive oil farmers are facing a similar situation. "One of the biggest impacts of climate change in California is water availability," says Little. "[It's] one of California's most precious and endangered resources. Corto's olive groves use 100% drip irrigation and soil- and water moisture-monitoring probes to increase efficiency and reduce water evaporation." Additional sustainable initiatives at Corto include high- efficiency planting methods and the installation of solar panels to power operations. On another positive note, Little says that olive trees store more CO2 than the olive oil production process emits.

The Challenges Don't Stop at Climate Change:

It appears that olive oil producers may yet adapt to the effects of climate change, but there remain more issues to overcome. "While climate change is a major factor, unsustainable practices like monocropping and excessive use of herbicides and pesticides worsen land degradation," says Bahceci. "High-density olive farms, particularly in Spain, exploit limited water resources and contribute to the global strain on agricultural ecosystems." Also hampered by unethical practices, including rampant fraud and theft, the olive oil industry has a long way to go.

Courtesy: eating well

IMPORTANT FIGURES

Table 1: India Oilseeds and Products Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24
Production			
Oilseed, Cottonseed	10,316	11,166	10,783
Oilseed, Peanut	8,700	6,300	6,000
Oilseed, Rapeseed	11,100	11,200	11,600
Oilseed, Soybean	11,889	12,411	11,875
Oilseed, Sunflowerseed	140	215	112
Other	1,021	1,022	1,021
Total	43,166	42,314	41,391
Domestic Consumption			
Meal, Cottonseed	4,238	4,443	4,409
Meal, Rapeseed	4,375	4,350	4,600
Meal, Soybean	6,273	6,625	7,075
Other	2,348	2,176	2,069
Total	17,234	17,594	18,153
SME			
Meal, Cottonseed	3,434	3,600	3,573
Meal, Rapeseed	3,113	3,095	3,273
Meal, Soybean	5,873	6,225	6,625
Other	2,177	2,021	1,903
Total	14,597	14,941	15,373
Food Use Dom. Cons.			
Oil, Cottonseed	1,250	1,315	1,290
Oil, Palm	7,800	8,300	8,340
Oil, Peanut	1,185	1,050	995
Oil, Rapeseed	3,700	3,600	3,900
Oil, Soybean	5,825	5,400	5,175
Oil, Sunflowerseed	1,900	2,750	3,525
Other	375	400	410
Total	22,035	22,815	23,635
Domestic Consumption			
Oil, Cottonseed	1,295	1,361	1,345
Oil, Palm	8,150	8,900	8,990
Oil, Peanut	1,195	1,060	1,005
Oil, Rapeseed	3,780	3,680	3,980
Oil, Soybean	5,825	5,400	5,175
Oil, Sunflowerseed	1,900	2,750	3,525
Other	674	710	730
Total	22,819	23,861	24,750
Imports			
Oil, Cottonseed	4	1	0
Oil, Palm	8,004	10,045	8,886
Oil, Peanut	0	0	0
Oil, Rapeseed	34	6	6
Oil, Soybean	4,231	3,968	3,308
Oil, Sunflowerseed	1,956	2,988	3,516
Other	80	111	131
Total	14,309	17,119	15,847

SME - 44 Percent Protein Soybean Meal Equivalent

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

Million Metric Tons

	2021/22	2022/23	2023/24
Production			
Oil, Coconut	3.73	3.72	3.88
Oil, Cottonseed	4.53	4.56	4.74
Oil, Olive	3.30	2.53	2.44
Oil, Palm	73.28	76.75	76.09
Oil, Palm Kernel	8.24	8.75	8.60
Oil, Peanut	6.41	6.19	6.00
Oil, Rapeseed	29.15	33.25	34.33
Oil, Soybean	60.00	60.68	64.00
Oil, Sunflowerseed	19.68	21.71	22.13
Total	208.31	218.14	222.19
Imports			
Oil, Coconut	2.23	1.95	2.18
Oil, Cottonseed	0.13	0.09	0.08
Oil, Olive	1.19	1.09	1.11
Oil, Palm	41.33	46.18	41.84
Oil, Palm Kernel	2.54	2.68	2.71
Oil, Peanut	0.29	0.39	0.34
Oil, Rapeseed	5.11	6.90	7.50
Oil, Soybean	11.65	11.09	10.54
Oil, Sunflowerseed	9.72	12.62	13.86
Total	74.19	82.98	80.16
Exports			
Oil, Coconut	2.28	2.03	2.40
Oil, Cottonseed	0.10	0.08	0.05
Oil, Olive	1.35	1.21	1.17
Oil, Palm	43.91	49.35	44.38
Oil, Palm Kernel	2.78	2.97	3.09
Oil, Peanut	0.35	0.35	0.37
Oil, Rapeseed	5.21	6.54	7.51
Oil, Soybean	12.44	11.74	11.81
Oil, Sunflowerseed	11.22	14.31	15.34
Total	79.64	88.58	86.12
Domestic Consumption			
Oil, Coconut	3.56	3.67	3.65
Oil, Cottonseed	4.58	4.57	4.73
Oil, Olive	3.02	2.58	2.51
Oil, Palm	69.13	73.36	74.62
Oil, Palm Kernel	8.04	8.48	8.22
Oil, Peanut	6.31	6.21	6.03
Oil, Rapeseed	30.16	32.70	34.29
Oil, Soybean	59.84	59.48	62.88
Oil, Sunflowerseed	17.52	19.55	20.96
Total	202.17	210.59	217.88
Ending Stocks			
Oil, Coconut	0.91	0.89	0.90
Oil, Cottonseed	0.16	0.16	0.19
Oil, Olive	0.71	0.53	0.41
Oil, Palm	16.73	16.94	15.87
Oil, Palm Kernel	0.96	0.94	0.94
Oil, Peanut	0.36	0.39	0.33
Oil, Rapeseed	2.52	3.43	3.45
Oil, Soybean	5.32	5.87	5.72
Oil, Sunflowerseed	2.77	3.23	2.92
Total	30.44	32.37	30.73

Totals may not add due to rounding

Table 03: Major Oilseeds: World Supply and Distribution (Country View)

Million Metric Tons

	2021/22	2022/23	2023/24
Production			
Brazil	135.18	166.92	160.30
United States	131.32	125.75	122.16
China	61.24	66.87	66.92
Argentina	49.88	31.45	54.24
India	43.17	42.31	41.39
Other	189.90	204.01	212.38
Total	610.69	637.31	657.40
Imports			
China	93.19	111.71	119.13
European Union	22.68	22.34	20.61
Mexico	7.64	8.14	7.87
Argentina	3.84	9.06	7.79
Japan	5.78	5.49	5.41
Turkey	3.68	4.02	3.71
Egypt	4.61	2.00	3.33
Thailand	3.34	3.34	3.53
Pakistan	2.19	1.34	1.87
Indonesia	2.80	2.70	3.06
Other	27.94	27.90	28.35
Total	177.68	198.05	204.66
Exports			
Brazil	79.46	95.95	104.55
United States	59.55	54.77	47.49
Canada	9.58	12.22	11.64
Argentina	3.99	5.12	6.13
Paraguay	2.28	6.50	8.00
Australia	6.31	6.98	6.62
Ukraine	5.71	8.37	7.28
Other	12.33	11.85	13.84
Total	179.21	201.78	205.53
Crush			
China	125.15	134.00	137.20
United States	63.87	64.16	66.23
Brazil	54.87	57.54	59.43
European Union	47.91	48.25	48.29
Argentina	42.79	34.58	40.58
India	32.20	34.78	35.63
Russia	21.20	24.50	25.55
Ukraine	12.50	15.68	18.55
Indonesia	12.50	13.25	12.59
Canada	10.40	11.73	12.69
Mexico	7.43	8.13	7.70
Pakistan	5.33	3.69	5.03
Turkey	5.34	6.03	5.18
Malaysia	4.91	5.08	5.38
Egypt	4.64	2.35	3.39
Other	58.51	60.25	60.03
Total	509.54	524.00	543.44
Ending Stocks			
China	28.24	36.71	48.35
Brazil	27.49	36.98	29.93
Argentina	24.77	18.34	25.38
United States	9.14	8.85	10.81
European Union	3.05	3.48	3.90
Other	22.88	18.62	17.69
Total	115.57	122.98	136.06

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

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

Million Metric Tons

	2021/22	2022/23	2023/24
Production			
Indonesia	47.78	51.10	48.81
China	27.28	30.41	31.06
Malaysia	20.22	20.59	22.03
European Union	18.80	18.33	18.48
United States	13.05	13.18	13.59
Brazil	11.50	11.94	12.57
Argentina	9.36	7.84	9.04
Other	60.33	64.75	66.63
Total	208.31	218.14	222.19
Imports			
India	14.31	17.12	15.85
China	7.13	11.38	9.14
European Union	9.77	9.16	9.36
United States	5.26	6.27	6.87
Pakistan	2.99	3.35	3.11
Bangladesh	2.03	2.29	2.25
Turkey	2.42	2.75	2.41
Egypt	1.71	1.64	1.81
Iran	1.45	1.76	1.34
Mexico	1.31	1.18	1.22
Other	25.80	26.08	26.81
Total	74.19	82.98	80.16
Exports			
Indonesia	24.27	30.25	24.46
Malaysia	16.82	16.64	17.82
Argentina	5.85	5.33	6.80
Russia	4.79	6.07	6.45
Ukraine	4.87	5.99	7.04
Canada	2.74	3.17	3.60
European Union	3.28	3.67	3.27
Other	17.04	17.47	16.69
Total	79.64	88.58	86.12
Domestic Consumption			
China	36.87	39.46	40.44
Indonesia	21.43	23.23	24.90
India	22.82	23.86	24.75
European Union	24.54	24.40	24.22
United States	17.27	19.27	20.14
Brazil	9.58	10.16	12.31
Malaysia	4.65	5.40	5.26
Pakistan	4.19	4.34	4.25
Russia	3.60	3.70	3.80
Bangladesh	3.11	3.11	3.06
Mexico	3.06	3.17	3.13
Thailand	2.97	2.98	2.97
Nigeria	2.57	2.66	2.71
Turkey	2.51	2.65	2.69
Argentina	3.30	2.35	2.37
Other	39.72	39.85	40.90
Total	202.17	210.59	217.88
Ending Stocks			
Indonesia	7.96	5.64	5.24
India	2.02	4.37	4.63
Malaysia	2.82	2.87	2.56
China	1.60	3.76	3.35
European Union	2.67	2.09	2.44
Other	13.38	13.64	12.50
Total	30.44	32.37	30.73

Major Vegetable Oils includes Coconut, Cottonseed, Olive, Palm, Palm Kernel, Peanut, Rapeseed, Soybean, and Sunflowerseed oil.

Table 05: Minor Vegetable Oils: World Supply and Distribution

Thousand Metric Tons

	Marketing Year	Oil, Peanut	Oil, Cottonseed	Oil, Olive
		2023/24	2023/24	2023/24
Production				
China	(Oct-Sep)	3,136	1,164	9
India	(Oct-Sep)	1,123	1,355	nr
Turkey	(Nov-Oct)	7	193	215
United States	(Aug-Jul)	96	163	12
European Union	(Oct-Sep)	13	24	1,549
Other		1,622	1,838	654
World Total		5,997	4,737	2,439
Imports				
China	(Oct-Sep)	247	0	23
India	(Oct-Sep)	0	0	nr
Turkey	(Nov-Oct)	0	2	53
United States	(Aug-Jul)	17	1	386
European Union	(Oct-Sep)	45	9	230
Other		30	64	419
World Total		339	76	1,111
Exports				
China	(Oct-Sep)	10	6	0
India	(Oct-Sep)	195	1	nr
Turkey	(Nov-Oct)	0	8	106
United States	(Aug-Jul)	6	10	9
European Union	(Oct-Sep)	7	1	687
Other		152	25	368
World Total		370	51	1,170
Domestic Consumption				
China	(Oct-Sep)	3,373	1,158	32
India	(Oct-Sep)	1,005	1,345	nr
Turkey	(Nov-Oct)	7	190	185
United States	(Aug-Jul)	115	154	389
European Union	(Oct-Sep)	50	32	1,115
Other		1,478	1,847	786
World Total		6,028	4,726	2,507
Ending Stocks				
China	(Oct-Sep)	0	0	0
India	(Oct-Sep)	187	46	nr
Turkey	(Nov-Oct)	0	13	99
United States	(Aug-Jul)	8	23	0
European Union	(Oct-Sep)	4	0	181
Other		132	109	127
World Total		331	191	407

Table 06: Soybeans: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24
Production			
Brazil	130,500	162,000	154,500
United States	121,504	116,221	113,273
Argentina	43,900	25,000	48,210
China	16,395	20,284	20,840
Paraguay	4,183	10,250	11,000
India	11,889	12,411	11,875
Russia	4,760	5,996	6,800
Other	27,407	26,198	29,861
Total	360,538	378,360	396,359
Imports			
China	90,297	104,500	112,000
European Union	14,545	13,127	13,461
Argentina	3,839	9,059	7,787
Mexico	6,397	6,451	6,456
Egypt	4,566	1,993	3,321
Thailand	3,243	3,238	3,428
Turkey	2,949	2,888	3,252
Japan	3,455	3,332	3,099
Taiwan	2,622	2,559	2,577
Vietnam	1,839	1,858	2,265
Other	21,011	19,504	20,766
Total	154,763	168,509	178,412
Exports			
Brazil	79,063	95,530	104,191
United States	58,570	53,864	46,266
Argentina	2,861	4,185	5,114
Paraguay	2,273	6,495	7,987
Canada	4,289	4,240	4,850
Other	7,372	7,541	9,427
Total	154,428	171,855	177,835
Crush			
China	90,000	96,000	99,000
United States	59,980	60,199	62,196
Brazil	50,767	53,409	54,405
Argentina	38,825	30,318	36,583
European Union	15,400	14,300	14,500
India	8,500	10,300	11,300
Mexico	6,350	6,650	6,530
Russia	4,900	5,400	5,900
Egypt	4,500	2,200	3,250
Bolivia	3,100	3,300	2,600
Paraguay	2,200	3,450	3,000
Iran	2,500	3,000	2,700
Thailand	2,500	2,100	2,400
Ukraine	1,300	1,500	1,800
Turkey	1,800	1,700	2,300
Other	23,818	21,765	22,710
Total	316,440	315,591	331,174
Ending Stocks			
China	25,146	32,340	43,310
Brazil	27,386	36,801	29,722
Argentina	23,691	16,997	24,047
United States	7,468	7,190	9,319
European Union	1,572	1,259	1,283
Other	8,267	7,195	7,391
Total	93,530	101,782	115,072

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

Table 07: Soybean Meal: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24
Production			
China	71,280	76,032	78,408
United States	47,005	47,621	49,084
Brazil	39,091	41,488	41,859
Argentina	30,287	23,648	28,535
European Union	12,166	11,297	11,455
India	6,800	8,240	9,040
Mexico	5,020	5,255	5,159
Other	36,323	34,599	36,447
Total	247,972	248,180	259,987
Imports			
European Union	16,536	15,997	16,537
Vietnam	5,531	4,724	6,027
Indonesia	5,535	5,434	5,055
Philippines	2,897	2,824	2,967
Iran	1,362	1,185	2,985
Thailand	3,077	3,141	2,770
Mexico	1,827	1,670	1,935
United Kingdom	2,015	1,762	1,976
Colombia	1,831	1,603	1,585
Ecuador	1,775	1,771	1,891
Other	24,887	23,137	25,859
Total	67,273	63,248	69,587
Exports			
Argentina	26,589	20,764	24,891
Brazil	20,207	21,334	22,722
United States	12,303	13,196	14,564
Bolivia	2,167	2,155	1,509
Paraguay	1,270	1,992	1,683
Other	6,303	7,618	8,776
Total	68,839	67,059	74,145
Domestic Consumption			
China	71,100	75,050	77,150
United States	35,323	34,946	35,068
European Union	27,742	26,742	26,942
Brazil	19,700	20,000	20,000
Vietnam	6,235	5,785	6,640
Mexico	6,875	6,930	7,080
India	6,273	6,625	7,075
Indonesia	5,550	5,580	5,200
Iran	3,500	3,550	4,810
Thailand	4,900	4,750	4,575
Russia	3,500	3,650	3,900
Egypt	3,700	2,700	3,000
Argentina	3,325	3,450	3,500
Japan	3,610	3,550	3,521
Philippines	2,950	2,930	3,000
Other	41,551	40,663	43,441
Total	245,834	246,901	254,902
Ending Stocks			
Brazil	3,657	3,817	2,972
Argentina	2,797	2,298	2,443
China	710	937	794
European Union	658	473	871
Vietnam	426	261	678
Other	8,435	6,365	6,920
Total	16,683	14,151	14,678

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

Table 08: Soybean Oil: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24
Production			
China	16,128	18,240	18,810
United States	11,864	11,897	12,289
Brazil	10,153	10,580	11,055
Argentina	7,664	5,991	7,251
European Union	2,926	2,717	2,755
India	1,530	1,854	2,034
Mexico	1,171	1,227	1,205
Other	8,564	8,177	8,596
Total	60,000	60,683	63,995
Imports			
India	4,231	3,968	3,308
Bangladesh	689	681	575
European Union	458	623	586
Morocco	659	640	593
Peru	471	535	560
Canada	63	147	573
Algeria	530	490	485
Korea, South	392	353	447
Colombia	317	242	317
China	291	395	381
Other	3,545	3,017	2,717
Total	11,646	11,091	10,542
Exports			
Argentina	4,873	4,137	5,533
Brazil	2,409	2,686	1,352
European Union	970	915	662
Russia	665	750	760
Ukraine	235	277	345
Bolivia	526	620	392
Paraguay	371	523	497
Other	2,391	1,834	2,269
Total	12,440	11,742	11,810
Domestic Consumption			
China	17,100	17,900	18,900
United States	11,262	12,070	12,317
Brazil	7,700	8,300	10,200
India	5,825	5,400	5,175
European Union	2,305	2,405	2,630
Argentina	2,650	1,660	1,770
Mexico	1,300	1,305	1,270
Bangladesh	1,100	965	935
Egypt	960	560	510
Algeria	750	750	765
Iran	850	900	725
Canada	240	320	685
Morocco	630	630	600
Korea, South	600	565	600
Pakistan	525	315	265
Other	6,045	5,438	5,534
Total	59,842	59,483	62,881
Ending Stocks			
India	186	597	748
China	387	1,011	1,198
United States	903	729	703
European Union	552	572	621
Argentina	526	720	670
Other	2,767	2,241	1,776
Total	5,321	5,870	5,716

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

Table 09: Palm Oil: World Supply and Distribution

Thousand Metric Tons

	2021/22	2022/23	2023/24
Production			
Indonesia	42,000	45,000	43,000
Malaysia	18,152	18,389	19,710
Thailand	3,376	3,321	3,274
Colombia	1,762	1,853	1,875
Nigeria	1,400	1,400	1,500
Other	6,585	6,784	6,733
Total	73,275	76,747	76,092
Imports			
India	8,004	10,045	8,886
China	4,387	6,190	4,377
European Union	5,015	4,564	3,820
Pakistan	2,792	3,107	2,998
United States	1,588	1,887	1,864
Bangladesh	1,339	1,610	1,676
Vietnam	995	1,112	1,071
Egypt	1,155	1,052	1,171
Kenya	789	848	875
Philippines	1,154	892	1,083
Other	14,114	14,870	14,017
Total	41,332	46,177	41,838
Exports			
Indonesia	22,321	28,077	22,273
Malaysia	15,527	15,355	16,530
Thailand	971	902	878
Papua New Guinea	834	813	669
Guatemala	792	883	620
Other	3,461	3,324	3,407
Total	43,906	49,354	44,377
Domestic Consumption			
Indonesia	17,425	19,125	21,075
India	8,150	8,900	8,990
China	5,100	5,400	5,000
Malaysia	3,300	3,975	3,667
Pakistan	2,845	3,095	2,995
European Union	4,900	4,400	3,830
Thailand	2,335	2,485	2,485
Nigeria	1,715	1,790	1,840
United States	1,561	1,875	1,894
Bangladesh	1,470	1,600	1,575
Colombia	1,380	1,500	1,555
Egypt	1,175	1,060	1,160
Philippines	1,270	1,000	1,040
Vietnam	927	1,037	1,007
Brazil	840	825	920
Other	14,740	15,295	15,591
Total	69,133	73,362	74,624
Ending Stocks			
Indonesia	7,309	5,107	4,760
Malaysia	2,318	2,312	2,014
India	972	2,419	2,615
Colombia	826	856	842
China	420	1,181	546
Other	4,887	5,065	5,092
Total	16,732	16,940	15,869

Table 10: Rapeseed and Products: World Supply and Distribution

Thousand Metric Tons

		Meal, Rapeseed	Oil, Rapeseed	Oilseed, Rapeseed
	Marketing Year	2023/24	2023/24	2023/24
Production				
China	(Oct-Sep)	11,684	7,722	15,800
India	(Oct-Sep)	6,219	3,975	11,600
Canada	(Aug-Jul)	6,408	4,706	19,464
Japan	(Oct-Sep)	1,188	910	4
European Union	(Jul-Jun)	13,908	10,248	20,431
Other		9,714	6,766	22,675
World Total		49,121	34,327	89,974
Imports				
China	(Oct-Sep)	2,842	2,039	5,486
India	(Oct-Sep)	17	6	0
Canada	(Aug-Jul)	3	19	276
Japan	(Oct-Sep)	5	8	2,117
European Union	(Jul-Jun)	823	463	5,457
Other		6,224	4,963	4,924
World Total		9,914	7,498	18,260
Exports				
China	(Oct-Sep)	7	21	0
India	(Oct-Sep)	1,609	10	0
Canada	(Aug-Jul)	5,636	3,444	6,747
Japan	(Oct-Sep)	0	4	0
European Union	(Jul-Jun)	869	747	534
Other		1,998	3,287	11,410
World Total		10,119	7,513	18,691
Domestic Consumption				
China	(Oct-Sep)	14,519	9,700	20,675
India	(Oct-Sep)	4,600	3,980	11,650
Canada	(Aug-Jul)	740	1,250	11,628
Japan	(Oct-Sep)	1,126	911	2,116
European Union	(Jul-Jun)	13,900	9,950	25,150
Other		13,827	8,497	17,337
World Total		48,712	34,288	88,556
Ending Stocks				
China	(Oct-Sep)	0	1,609	4,784
India	(Oct-Sep)	224	393	569
Canada	(Aug-Jul)	169	550	3,231
Japan	(Oct-Sep)	83	30	187
European Union	(Jul-Jun)	393	305	1,938
Other		601	565	1,244
World Total		1,470	3,452	11,953

Table 11: Sunflowerseed and Products: World Supply and Distribution

Thousand Metric Tons

		Oilseed, Sunflowerseed	Meal, Sunflowerseed	Oil, Sunflowerseed
	Marketing Year	2023/24	2023/24	2023/24
Production				
Argentina	(Mar-Feb)	3,895	1,687	1,673
Russia	(Sep-Aug)	17,100	6,780	6,815
Turkey	(Sep-Aug)	1,550	872	696
Ukraine	(Sep-Aug)	15,500	6,484	6,751
European Union	(Oct-Sep)	10,051	4,973	3,887
Other		7,845	2,453	2,304
World Total		55,941	23,249	22,126
Imports				
Argentina	(Mar-Feb)	1	0	0
Russia	(Sep-Aug)	65	5	1
Turkey	(Sep-Aug)	328	1,312	1,491
Ukraine	(Sep-Aug)	20	13	1
European Union	(Oct-Sep)	828	3,156	2,965
Other		1,296	5,584	9,405
World Total		2,538	10,070	13,863
Exports				
Argentina	(Mar-Feb)	73	1,156	1,198
Russia	(Sep-Aug)	375	2,650	4,400
Turkey	(Sep-Aug)	102	45	1,189
Ukraine	(Sep-Aug)	314	4,653	6,264
European Union	(Oct-Sep)	447	956	990
Other		1,397	759	1,296
World Total		2,708	10,219	15,337
Domestic Consumption				
Argentina	(Mar-Feb)	4,087	615	562
Russia	(Sep-Aug)	16,980	4,125	2,525
Turkey	(Sep-Aug)	1,802	2,175	1,440
Ukraine	(Sep-Aug)	15,875	1,525	430
European Union	(Oct-Sep)	10,250	7,060	5,413
Other		7,690	7,304	10,588
World Total		56,684	22,804	20,958
Ending Stocks				
Argentina	(Mar-Feb)	820	208	244
Russia	(Sep-Aug)	717	407	237
Turkey	(Sep-Aug)	142	187	169
Ukraine	(Sep-Aug)	176	566	134
European Union	(Oct-Sep)	563	424	741
Other		789	313	1,395
World Total		3,207	2,105	2,920

METROLOGY: A CRITICAL ELEMENT FOR MAINTAINING QUALITY STANDARDS IN FOOD & OIL INDUSTRY

Y.P. Singh, Ph.D. (Physics),CEO –Metrology Group

1. Quality Infrastructure and its Importance:

1.1 What is Quality Infrastructure ?

- Quality Infrastructure is a system contributing to governmental policy objectives in areas including industrial development, trade competitiveness in global markets, efficient use of natural and human resources, food safety, health, etc.

- "The system comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the

quality, safety and environmental soundness of goods, services and processes."

Note: "Quality Infrastructure" is also known as the "Standards and Conformance Infrastructure".

1.2 Why is Quality Infrastructure Important?

- Quality Infrastructure impacts our daily lives, such as
  - the safety of our food,
  - the accuracy of our alarm clocks,
  - household gas or electricity meters,
  - safety measures in factories.
  - complex technologies and industrial processes that drive economic growth, productivity and innovation.
  - Everyday's commercial transactions
  - and international trade could not take place without support of a quality,infrastructure (metrology, standards, accreditation and conformity assessment).

1.3 Quality Infrastructure Inputs Outputs

1. Metrology
   - Member of CIPM, OIML
   - Signatories to CIPM MRA
   - Calibration and Measurement Capabilities (CMC) issued and Recognized
   - Key and Supplementary Comparisons by NPL (NPL and Accredited Calibration Labs)
2. Accreditation
   - Membership of: IAF, ILAC
   - Signatories to: MLA, MRA
   - Regional Agreements
   - Total Accredited Bodies (TAB) by National Accreditation Bodies (NABL and all Accredited Laboratories)
3. Standardization
   - Member of ISO, IEC, ITU
   - Participation in the ISO Committees
   - Participation in Technical Committees
   - •Number of Standards by country (Local and International) (BIS with all Manufacturers & Test Labs)
4. Certification
   - Accredited Certification Bodies
   - Conformity Assessment
   - Number of ISO 9001 Certifications issued

(QCI, NABL, NABCB, BIS, CPCB),QI: Quality Infrastructure

2. Metrology:

"Metrology is the Science of Measurement, embracing both experimental and theoretical determinations at any level of uncertainty in any field of science and technology" - BIPM

Correct measurements and a system of agreed measuring units are not only essential for scientific and technological advances, but also for business innovation, manufacturing, for fair trade in goods and services and for economic prosperity.

It also helps to build consumer confidence and trust in what way it is used to support the quality of life.

2.1 Subfields of Metrology

Scientific Metrology-

Scientific Metrology is concerned with the establishment of units of measurement, the development of new measurement methods, the realization of measurement standards, and the transfer of traceability from these standards to users in a society. Scientific metrology activities include:

- establishing the framework for the internationally accepted units of measurement - the International System of Units (SI);
- disseminating from the peak measurement standards within an economy to users in government, science, technology, industry and the user community.

Triple Point of Water Measurement

@ FARE Labs

TPW : 273.16 K (0.01 C)

CMC : ± 1 mK (± 0.0009 °C) NPL CMC: (± 0.0002 °C)

Primary Standard of Temperature International System (SI) of Units Base Quantities with Denoted Units

International System (SI) of Units Base Quantities with Denoted Units

S.No. Quantity Symbol Fundamental Constant

1. Mass Kilogram, kg Planck's constant, h= 6.62607015×10"34 Js
2. Length Metre, m Velocity of Light, c = 2.99,792,458x108
3. Time Second, s Transition period, = 91,92,631,770 per second
4. Temperature Kelvin, K Boltzmann Constant, k = 1.380649×10"23 J K"1
5. Optical Radiation Candela, Cd Frequency, Kcd = 540×1012 Hz
6. Electrical Current Ampere, A Electronic Charge, e=1.602176634×10-19
7. Amount of Substance Mole, mole Avogadro Number, NA = 6.022 140 76 × 1023

Legal Metrology-

Legal Metrology is concerned with assurance of correctness of measurements and measuring instruments to comply with laws and regulations. It has influence on the transparency of trade, on law enforcement, on health, on safety and the environment.

Its work protects traders, consumers, public safety and the environment and is critical to fair trade.

OIML is the international organization for Legal Metrology has developed a worldwide technical structure that provides its Members with metrological guidelines for the elaboration of national and regional requirements.

Industrial Metrology-

Industrial Metrology

- Industrial metrology is concerned with the application of measurement to manufacturing and other processes and their use in society, ensuring the suitability of measuring instruments, their calibration and quality control.

- Industries require a varied range of instruments and measurement standards depending upon the accuracy and precision level required for the production.
- Accurate calibration is frequently required to match every item to fit in so produced as per required specifications.

International Bureau of Weights & Measures-

- The Convention to "assure the international unification and improvement of the metric system" and its annexed regulations (commonly known as the "Metre Convention"), was signed on 20 May 1875, and amended in 1921.
- The International Bureau of Weights and Measures (BIPM) is an international organization established by the Metre Convention, through which Member States act together on matters related to measurement science and measurement standards through International System of Units (SI).
- In 1999, the national metrology institutes of 38-Member States of the BIPM representatives signed a Mutual Recognition Arrangement (CIPM MRA) for national measurement standards for calibration and measurement certificates issued by NMIs. The CIPM MRA has now been signed by 48 Member States and covers a further 122 institutes designated by the signatory bodies.

CIPM: CCM, CCT, CCL, CCU, CCTF, CCAUV, CCEM, CCQM, CCPR, CCRI etc.

National Metrology Institutes (NMI) (Current Member States 130 countries.) -

NPL-UK

KRISS-Korea NIST-USA

PTB-Germany NPL India NMIJ-Japan

LNE -France CEM -Spain METAS-Switzerland NIM -China CENAM-Mexico VINIIM -Russia NMIA - Australia INRiM -Italy VINIIM -Russia NIMT - Thailand NML-Taiwan NML -PHILIPINES

NMC -Singapore NIMSA -S. Africa SASO -Saudi Ara. MUSSD -Sri Lanka INTI -Argentina MSL -New Zealand BSTI -Bangladesh DFM -Denmark COM - Poland NBSM -Nepal NIS -Egypt SNTRI -Sweden

NPSL -Pakistan INMETRO -Brazil NMAS -Norway KIMLIPI -Indonesia SIRIM -Malaysia CMSITRI - Taiwan DST -Vietnam TUME -Turkey UNBS - Uganda

SIRDC -Zimbabwe ZBS -Zambia TBS -Tanzania USMC -Ukraine NMI -Netherlands SBS -Seychelles SIM -Slovak Rep. MIRS -Slovenia GBS -Grenada WMO -Kenya ACSMC -Kazakhstan JSM -Jordan GSB -Ghana EIM -Greece NOM (OMH) -Hungary

NRC-Canada

KRISS Korea NIST -USA

CSIR- National Physical Laboratory

CSIR-National Physical Laboratory is designated as the National Metrology (Measurement) Institute (NMI) of India. It is the Custodian of the National Standards of all Physical Measurements by the act of Parliament.

All physical measurements in the country are traceable to NPL by comparison directly or indirectly through unbroken chain of calibration by accredited Laboratories as per the International standard currently, ISO/IEC 17025:2017 assessed by the National Accreditation Board for Testing & Calibration Laboratories (NABL)

3. How can you Calibrate a Gas Chromatograph for accurate measurements?

External Calibration of GC Internal Calibration of GC

Internal calibration is a more advanced and accurate method of calibrating a GC. It involves adding a known amount of an internal standard to each sample and standard solution before injecting them into the GC. The internal standard is a compound that is similar to the analytes of interest but does not interfere with their separation or detection. The GC will generate a signal for both the analytes and the internal standard. By dividing the signal of each analyte by the signal of the internal standard, you can obtain a normalized ratio that is independent of variations in injection volume, flow rate, or instrument performance. By plotting the ratio versus the concentration, you can obtain a calibration curve that shows the relationship between them. You can then use this curve to calculate the concentration of unknown samples based on their ratio.

Internal calibration is a valuable tool for GC-MS analysis, as it compensates for variations in sample injection, chromatographic separation, and mass spectrometric detection that can otherwise affect signal intensity and cause quantification errors. It also reduces the effect of matrix effects, such as ion suppression or enhancement, which can alter the response of your analyte and internal standards differently.

Furthermore, internal calibration simplifies the preparation of standard solutions, as you only need to add the same amount of internal standard to each solution. This can lead to improved precision and reproducibility of results, as you can use the same internal standard for multiple analyses and compare the relative signal within each analysis.

What are the Benefits of Internal Calibration?-

Factors affecting Calibration

Calibration of a GC can be affected by several factors

- Quality and purity of the standard solutions and the internal standard,
- Accuracy and precision of the injection system,
- Stability and reproducibility of the GC system, and
- Linearity and sensitivity of the calibration curve.
- To ensure accuracy, one should use Certified Reference Materials (CRM) which are calibrated against the Standard Reference Materials (SRM) and use a suitable syringe or auto-sampler to inject each solution with minimal variation or loss.
- It is important to check and maintain the GC components regularly and follow manufacturer's instructions.

Calibration Frequency of GC-

The frequency of calibration for a GC depends on various factors, as follows -

- The type and purpose of the analysis,
- The performance and usage of the GC,
- Calibration should occur whenever any drift or deviation in the signal is observed,
- Performing any maintenance or troubleshooting on the GC system.
- One should calibrate GC at regular intervals based on the frequency and duration of the analysis or the number of samples processed.
- Recommended to calibrate a GC before starting a new analysis or changing any parameters or components of the GC system.
- Any regulatory or quality requirements.

Verification of Calibration-

Calibration verification is the process of confirming that the calibration of a GC is still valid and reliable, which involves injecting a known standard or quality control sample into the GC and comparing the result with the expected value. If the result is within the acceptable range or tolerance, the calibration is verified; otherwise, it should be repeated or corrected. Calibration verification should be done after completing a calibration or correction, at regular intervals during analysis or between batches of samples, and whenever you suspect any problem or error in the GC system or results re-calibration is performed.

Importance of Calibration in Food Equipment & their Manufacturing-

Calibration plays a major role in avoiding the production of inaccurate parts, so the advantages of calibration for your machinery and measuring equipment cannot be overstated. There are several facets of calibration in manufacturing but in general, calibration is important in these two key areas:

- Calibration for measuring equipment ensures that your quality control processes are accurate, and that you are not accepting parts that should be rejected.
- Calibration for manufacturing machines creates a more efficient process by ensuring that equipment is operating as expected. Improperly calibrated equipment will result in unpredictable manufacturing results and inaccurate products.

4. How does Metrology Support Trade?

- In trade between economies, a small error in measurement can have a huge impact on costs because this often involves the exchange of large sums of money for goods.
  - A measurement error of just 1% in the amount of natural gas consumed in the world in a year results in economic losses of billions of dollars.
  - Fuel dispensers at petrol stations are of an approved type and verified to make sure they deliver the correct amount of fuel to consumers.
- Consumer Protection

  Measurement, and goods packed by measure, has generally replaced number and simple measures as the basis of transaction for a wide range of consumer commodities and products. The increased consistency of these measurements, when adequately controlled, has significantly reduced disputation, and fraud and increased the efficiency of the marketplace.
- Reducing Technical Barriers to Trade
  - Due to the Metre Treaty for scientific metrology and the OIML Convention for legal metrology among nations, governments enable access to the global frameworks for mutual recognition and acceptance of national measurement standards and capabilities as well as national regulatory frameworks in measurement.
  - These frameworks have been established to reduce technical barriers to trade among the economies and thereby support participation by governments in international Free Trade Agreements for business and industry to participate effectively in global markets.

How does Metrology Support Trade?-

- Facilitating Global Trade

  Metrology facilitates fair trade by enabling harmonized documentary standards, consistent measurement standards and internationally accepted certificates.

  For example, it ensures that:

  Parts manufactured in one Economy fit into machines in another Economy;
  - A device tested and approved for use in one economy may also be sold and used in another economy, without further technical inspections.
  - A pre-packaged product labelled with a ‘1 kg’ weight in one economy contains the same quantity of product as in another economy.

How does Metrology Support Trade?-

- Control of Fraud

  The control of fraud in the marketplace by State inspection, stock control by measurements can also provide effective fraud control for individual businesses.
- Reduced Disputation and Transaction Costs

  Measurement was recognized as a provider of objective information. However, where the measurement process lacked transparency, between the trader and the purchaser in retail transactions, there was considerable scope for uncertainty, disputation, transaction costs and market inefficiency.

- Full Benefits for Commodity Exports

  Measurement through certification helps in the business for export commodities and provides objective information.

  How does Metrology Support Trade?- Metrological Parameters:

Thermal - (ITS-90 Fixed points, SPRT, TC, IRT, LIGT, Range from -196 to 3000)°C

Mechanical - (Mass, volume, density, viscosity, pressure, speed, force, torque)

Dimensional - (Length, height, gauge blocks, meter scales, sieves, calipers, CMM)

Fluid Flow - (Gas flow, ultrasonic liquid flow)

Electro-Technical - (AC/DC voltage, AC/DC current, resistance, frequency, High voltage, CT-PT, power, energy, magnetic flux, gauss meter, time, Calibrators, DMM)

Medical Metrology – (Medical instruments used at hospitals, pathology Labs and Test centers)

FARE Labs has established unique facilities in the metrology accredited as per ISO/IEC 17025: 2017 standard with best Calibration and Measurement Capabilities (CMC) for the traceability requirement of the accredited/Non-accredited Laboratories and user industries Metrology @ FARE Labs

Accreditation as per ISO/IEC 17025: 2017 – In the Testing & Calibration activities

Proficiency Testing Provider: Accreditation currently as per ISO/IEC 17043: 2023

- Follow the National Measurement Standards
- Keep all measurements Consistent and Independent
- Solve the problems of Infinite Regress

Conclusion: One Nation.One Standard

HEALTH NEWS

Bakers look for more from their fats and oils

Fats and oils provide a great deal of functionality, whether it's the shortening in a laminated pastry or the frying oil that cooks a donut. Removing partially hydrogenated oils was a major challenge nearly 10 years ago, but since then, functionality has come a long way. Today, customer and consumer demands have bakers looking for their fats and oils to do more than just provide structure and flavor.

"There are a lot of balls in the air these days trying to satisfy the market for our customers' products' functionality, and flavor is of the utmost importance to all," said Joe Loveshe, sales representative at Columbus Vegetable Oils. Those demands can be fat and oil solutions that are sustainably sourced, longer shelf life or reduced saturated fat content. And bakers are always interested in ways to save on costs. But bakers beware of going for these value-adds at the cost of their finished product quality. "As can be expected, bakers want it all," said Michelle Peitz, technical solutions and marketing, refined oils, ADM. "Multiple aspects of fats and oils make baked goods successful; ultimately, functionality must come first. We understand that building additional value-states into existing products can be extra challenging, as it often coincides with the need to uphold the

consumer's experience of a product they know and love." When bakers are seeking something a little extra from their fats and oils, there are several trends that stand out and align with other trends in the food industry. "Beyond functionality and flavor, some bakers are interested in nutritional aspects such as reducing or eliminating saturated fats; other bakers seek sustainability," said John J. Miller, chief executive officer, Patco Products. "In contrast, nearly all bakers are focused on sensory aspects such as odor, color and the texture imparted by a fat or oil system." Fats and oils, especially those derived from palm oil, are ingredients that can often be vulnerable to harmful sourcing practices, so sustainability is top of mind for bakers as they try to meet consumer and retailer demands as well as goals set forth by their own leadership teams.

"We are seeing an increased trend in consumers seeking products that contain sustainably sourced ingredients," said Ashley Beech, bakery applications development manager, Corbion. "Bakers can formulate using sustainably sourced oils such as RSPO (Roundtable for Sustainable Palm Oil) palm oils to meet this demand."

Nutrition is another aspect of fats, which have endured their time as the demonized macro nutrient on the block. These nutrition benefits can be increasing omega-3 fatty acid content or reducing saturates. "Specialty oils like algae oils can provide ingredient functionality as well as health benefits from the omega-3 fatty acids they contain," Beech said. Closely tied to this is the need for clean label, which can also include certifications like non-GMO and organic. "Some may require organic certification which typically involves expeller pressing the oil rather than chemically extracting the oil from the source," said John Neddersen, principal food scientist, IFF. "In addition, the refining, bleaching, deodorizing and winterizing steps are different for organic fats and oils versus conventionally made fats and oils." Winterized oil may be preferred in the winter months when the outside temperatures are colder, Neddersen explained. Winterization removes high-melting waxes and other components from an oil that can cause cloudiness as it's cooled. For improved product quality, bakers are looking for ingredients that extend the shelf life and quality of a finished product. Since fat is sensitive to oxidation, it makes sense that bakers would search for those ingredients that carry some shelf life extension capabilities. "When fats and oils oxidize, the rancid smell and taste will produce unpleasant sensory attributes that lower the quality of the baked goods," said Marie Shen, associate innovation scientist, Kemin Food Technologies. "Including preservatives like antioxidants can help bakers ensure product qualities like freshness and desirability are maintained."

Not only are bakers wanting their products to go further on the shelf, but consumers and retailers are also looking to reduce food waste. Shelf life directly impacts the bottom line of all involved in a food purchase, making it a priority for all. "Food waste has become a difficult challenge to manage," Shen explained. "For bakers and retailers, unpurchased food means lost sales. For consumers, wasted food equals wasted money, and in today's economic environment, consumers are buckling down on their finances, which could result in lost future purchases for bakers and retailers if the product doesn't hold up to their expectations." All of these value-adds, however, come at a price during a time when everyone wants to reduce their costs, particularly input costs like ingredients.

"Sustainable sourcing has been a consistent theme in the United States for a while," said Mike Hogberg, director, commodity procurement, Dawn Foods. "More recently with the price of oil having a step change function higher due to use in energy production (renewable diesel), bakers have sought oil that is lower cost in use." Cost isn't as straightforward as the price of an ingredient, however, as Peitz explained. Bakers must look at a variety of impacts on their ingredients in order to optimize their overall costs. "With fats and oils, it's helpful to understand how market influences might affect cost over time," she said. "Quality within the production facility is another factor. For example, we can help bakers understand quality in donut fryers and what it means for the overall life of their oils and finished products. ADM's scope goes above and beyond a finished product or single ingredient to assess all the other nuances that can impact

overall cost. We also optimize logistics, focusing on supply, delivery and how the customer receives it."

Courtesy: Baking & Snack

Insects provide essential fatty acids to other animals

Life, as we know it, relies on the balance of energy and essential nutrients. Omega-3 and omega-6 polyunsaturated fatty acids (PUFA), found in insects and arachnids, play a critical role in this equilibrium. These organisms are particularly crucial to birds, hedgehogs, and lizards, although the advantages hinge heavily on the kind of insects and spiders consumed. Insects with fatty acids You may be surprised to learn that aquatic insects like dragonflies or caddisflies are richer in omega-3 long-chain PUFA than their land-based counterparts. Why? The base of the food chain in aquatic ecosystems is algae that are rich in omega-3 LC-PUFA. Fatty acids pile up in food chains. Take mayflies, for instance, which consume the algae and are subsequently eaten by fish. The mayfly tends to contain more fatty acids than the algae it feeds on; However, the fish that preys on mayflies often has even more.

There are a plethora of studies on this topic, as well as those exploring how plant or algal biodiversity impacts the biomass in ecosystems.

Biodiversity, insects, and fatty acids Cornelia Twining is the leader of the Food Web Ecophysiology group at the aquatic research institute Eawag and a professor at ETH Zurich.

"Unfortunately, knowledge about how insect and arachnid biodiversity might influence the availability of fatty acids in a food

The web is rather scant," said Twining. She, alongside her colleagues, is working hard to bridge this knowledge gap.

Land use and nutrient availability

Based on data including over half a million observations of approximately 7,600 insect and spider species across Switzerland, the research spanned 400 aquatic ecosystems and 300 terrestrial ecosystems. These ecosystems varied in terms of land usage, ranging from natural habitats such as meadows and forests to city-center sites and agricultural areas. "We were interested in how land use shapes energy and nutrient availability and whether there are key differences between aquatic and terrestrial ecosystems," said Ryan Shipley, researcher at the WSL institute for snow and avalanche research SLF and lead author on the study. "Land use change ranks among the most urgent global challenges, making it essential to understand how human activities impact fundamental ecosystem functions."

Fatty acid content in insects The data analysis showed that in the studied communities, a decrease in insect and spider biodiversity resulted in a decline in biomass and key fatty acids content.

"In terrestrial communities, we also see significant differences depending on land use," said Twining. Even when biodiversity is the same, insect and spider communities in a city park typically provide fewer omega-3 LC-PUFA than those in a forested area. "This is partly due to the different species composition of these populations, and partly because the biomass is smaller in urban areas: there are also fewer predators like spiders or large beetles, which accumulate LC-PUFA in terrestrial systems," explained Twining.

Land use and aquatic ecosystems

What came as a surprise to scientists was that the land use effect is much less pronounced in aquatic communities. On land, the differences are more stark if predators like spiders, such as those that accumulate high amounts of essential fatty acids, vanish from the ecosystem, the impact is substantial. "Yet, this does not imply that the diversity of aquatic insects is not equally important," Twining stresses.

Aquatic organisms are crucial sources of fatty acids for terrestrial food webs. In urban areas, where loss of insects and spiders is high due to increased human land use pressure, aquatic insects become an even more important source of essential fatty acids for birds, bats, or lizards. But these important "superfoods" are often tainted with pollutants in streams, rivers, and lakes.

Importance of protecting biodiversity

"Our study shows how important it is to protect biodiversity, especially in agricultural and urban areas, and to improve water quality in order to preserve food webs for ecosystem functioning," said Twining. The research contributes to the Blue-Green Biodiversity

Research Initiative – an Eawag-WSL collaboration focusing on biodiversity at the interface of aquatic and terrestrial ecosystems.

Funded by the ETH Board, the initiative reminds us why biodiversity is so crucial to the interconnectedness of our natural world. So, next time you swat away a persistent fly or squash a crawling spider, remember, they're an essential link in the food chain, providing valuable nutrients for a multitude of creatures, including ourselves.

Courtesy: Earth.com

Beer consumption alters red blood cell lipid composition

Scientists find that moderate beer consumption leads to distinct but mild changes in red blood cell membranes, highlighting the role of diet in shaping lipid composition and health impacts.

A study published in the journal Nutrients finds that moderate intake of both alcoholic and non-alcoholic beer is associated with distinct changes in red blood cell membrane lipid composition.

Background

Mature red blood cells (RBCs) or erythrocytes are specialized cells derived from hematopoietic stem cells in the bone marrow. Their biconcave discoid shape makes them highly flexible and facilitates their smooth circulation through tiny capillaries, delivering oxygen to all tissues. It has been postulated that the molecular composition of human RBC membranes plays a vital role in modulating their rheological properties. The membrane is composed of lipids, proteins, and carbohydrates. The lipid bilayer contains a mixture of different lipid classes, including neutral lipids, phospholipids, and glycosphingolipids.

The lipid composition of RBC membranes changes during their lifespan. Dietary Intake is considered one of the main contributing factors to this alteration. Existing evidence indicates that abnormalities in RBC membrane lipid composition are associated with the development of cardiovascular diseases, including hypertension, hypercholesterolemia, and acute coronary syndrome. Changes in RBC membrane fluidity due to lipid compositional alteration are believed to be responsible for these cardiovascular disorders. In this exploratory study, scientists investigated the effect of moderate alcoholic and non-alcoholic beer intake on the lipid composition of RBC membranes in healthy, overweight, and obesity class 1 individuals.

Study Design

The study was conducted on 36 healthy adults aged 40-60 years, all of whom were overweight or classified as obesity class 1. Participants were randomly assigned to the alcoholic beer group and the non-alcoholic beer group. Participants in each group underwent four weeks of moderate beer consumption (up to one drink per day for women and up to two drinks per day for men), followed by a washout period of 4 weeks. After the washout period, a second 4-week period followed, wherein the groups exchanged their respective interventions (alcoholic vs.non-alcoholic beer).

Blood samples were collected from the participants at different time points during the intervention periods to assess the lipid composition of RBC membranes.

Experimental protocol for the intervention study.

Important Observations

The baseline analysis of RBC membrane lipid composition identified phospholipids as the major lipid class, followed by neutral lipids, such as free cholesterol and fatty acids.

Among phospholipids, phosphatidylethanolamine was identified as the major subclass, followed by phosphatidylcholine, sphingomyelin, and phosphatidylserine.

Further analysis revealed that free cholesterol is one of the main structural components of RBC membranes.

A subgroup analysis comparing male and female participants, as well as overweight and obese participants, revealed that both gender and body mass index (BMI) have no significant impact on the RBC membrane lipid composition. However, women in the non-alcoholic beer group had a higher abundance of phosphatidylcholine, and obese participants in this group showed distinct lipid changes, such as increased sphingomyelin levels and free cholesterol/phospholipid ratios. Effect of Beer Intake on RBC Membrane Lipids Heat maps and correlation networks of changes in NL and PL subclasses after 4- weeks of dietary intervention with alcohol-free beer (A) or traditional beer (B). In the pairwise correlation map, red shows a negative correlation and blue a positive correlation. Correlation networks were constructed based on their Spearman correlation coefficient. In each network, colored nodes refer to different lipid species and lines link correlated pairs. Dotted line means negative association. Line means positive association. * Means statistically significant difference, p < 0.05. The intake of non-alcoholic beer for four weeks caused a significant increase in free cholesterol and fatty acids and a non-significant increase in phospholipids. Regarding the 4-week intake of alcoholic beer, a significant induction in free cholesterol, fatty acids, and phospholipids was observed.

A comparative analysis revealed that both alcoholic and non-alcoholic beer intake causes similar changes in RBC membrane lipid composition.

Although traditional beer contains higher levels of polyphenols, which may contribute to lipid changes, the comparative analysis revealed no significant differences between the two groups regarding the relative abundance of each phospholipid subclass. Similar to the baseline findings, no significant impact of gender and BMI on RBC membrane lipids was observed.

However, subgroup analyses indicated gender and BMI-based differences in specific lipid subclasses, particularly in the non-alcoholic beer group, where women and obese participants exhibited notable changes. A correlation analysis considering different subclasses of neutral lipids and phospholipids revealed that the correlations between lipids are more pronounced in the non-alcoholic beer group.

The analysis revealed several positive correlations between membrane lipids and circulating lipids in the non-alcoholic beer group. Specifically, positive correlations of membrane fatty acids and free cholesterol were observed with serum levels of total cholesterol and high-density lipoprotein-cholesterol (HDL-cholesterol). Moreover, a positive correlation was observed between membrane phospholipids and serum HDL.

Study Significance

The study finds that both alcoholic and non-alcoholic beer intake promotes distinct but mild changes in RBC membrane lipid composition. Although the study observed increases in membrane cholesterol, the researchers concluded that these changes had minimal impact on RBC membrane fluidity, as phospholipid levels remained relatively stable. Polyphenols, which are present in higher amounts in alcoholic beers, are known to modulate the metabolism of essential polyunsaturated fatty acids. The synergistic effects of alcohol and polyphenols might explain the more pronounced changes seen in the traditional beer group.

RBC membrane fluidity primarily depends on neutral lipid (mainly cholesterol) and phospholipid composition. An increased cholesterol content in the RBC membrane is known to impair the oxygen and carbon dioxide transport process and affect the cell's deformability. Despite increases in membrane cholesterol, the researchers found no significant effect on RBC fluidity.

Considering the findings of this exploratory study, scientists advise that future studies should consider integrative targeted and untargeted metabolomics and lipidomics in RBCs to more conclusively understand potential differences between the intervention groups.

Courtesy: News Medical

CARRIER ACTIVE OIL

ARGON OIL

Botanical Name : ***Lat. Argania spinosa***

Introduction:

The argan tree (Lat. Argania spinosa) is one of the oldest trees in the world and the only place in the world where it still grows is in Southwest Morocco, between Essaouira and Agadir. From its fruits, the argan oil is extracted. Around 25 million years ago, the argan tree developed into a specialist for desert-like, dry regions. Today, only 20 million trees are left in Southwest Morocco, while the argan tree has died out worldwide. Trials to establish the tree in other countries have remained unsuccessful. Its life expectancy is in the mid-200 years. Due to this fact, this last region with existing argan trees was declared by UNESCO as a biosphere reserve in 1998 and elevated to a World Cultural Heritage Site.

From 30 kilograms of argan fruits, around 4.5 kilograms of argan pits are extracted and then finally one liter of argan oil is produced.

Extraction Process (Step-by-Step) -

Morocco Argan oil is considered a relatively international product exported from Morocco, although different companies in Europe and North America distribute argan oil around the globe. Argan oil is non-refined vegetable oil, of the more well-known "virgin oil" type, is produced from the argan tree [Argania spinosa (L.) Skeels]. The argan tree is deemed to be an important forest species from both social and economic standpoints. Argan oil has rapidly emerged as an important product able to bring more income to the local population. In addition, it also has important environmental implications, owing to its ability to stand against desert progression. Currently, argan oil is mainly produced by women's cooperatives in Morocco using a semi-industrial mechanical extraction process.This allows the production of high-quality argan oil. Depending on the method used to prepare argan kernels,

two types of argan oil can be obtained: food or cosmetic grade.

Cosmetic argan oil is prepared from unroasted kernels, whereas food argan oil is achieved by cold pressing kernels roasted for a few minutes. Previously, the same oil was prepared exclusively by women according to a laborious ancestral process.Extraction technology has been evolved to obtain high-quality argan oil at a large scale.The extraction process and several accompanying parameters can influence the quality,stability, and purity of argan oil.

Argan oil extraction involves collecting argan fruit, sun-drying, peeling, cracking the hard nut to get kernels, and then processing those kernels into oil, with the key difference for food vs. cosmetic oil being roasting: food-grade oil uses roasted kernels (nutty flavor), while cosmetic oil uses unroasted ones (gold color). The kernels are ground into a paste (sometimes with water), pressed (manually or mechanically) to squeeze out the oil, and then filtered and settled.

Fruit Collection & Drying: Argan fruits are gathered and sun-dried to dry out the pulp.

Dehulling/Peeling: The fleshy outer layer is removed by hand to get to the hard argan nut.

Nut Cracking: The tough nut is cracked open (traditionally by stone) to release the kernels inside, which are then separated.

Kernel Preparation (Key Difference):

Food Oil: Kernels are lightly roasted for a few minutes to develop a nutty aroma and flavor, then cooled.

Cosmetic Oil: Kernels are used unroasted for a lighter, gold-colored oil.

Grinding/Milling: The kernels (roasted or unroasted) are ground into a paste, sometimes with a little water, using stone mills.

Pressing (Extraction): The paste is pressed (mechanically or manually) to extract the oil from the paste.

Separation & Filtration: The oil is separated from the solid residue through settling (decantation) and filtering to remove waxes and gums, resulting in pure oil.

Composition:

Argan oil is rich in unsaturated fatty acids (80%), principally oleic, linoleic acids 33.7%. The unsaponifiable fraction (1% of the oil constituents) of argan oil is mainly rich in antioxidant compounds such as tocopherols, which is present in a higher proportion compared to olive oil (637 mg/kg versus 258 mg/kg, resp.) and especially in its y-isoform (75%). Moreover, this nonglyceric fraction is rich in phenolic compounds, principally ferulic and syringic acids (3147 and 37 ¼ g/kg), which are absent in olive oil. Also, it is rich in some sterols such as schottenol (1420 mg/kg) and spinasterol (1150 mg/kg). These two families of sterols, known for their anticancer properties, are rarely encountered in other vegetable oils. Argan oil also contains a good amount of squalene (3140 mg kg) which is anti cancerous in nature. These compounds prevent oxidation, contributing to the stability of the oil.

Benefits of Argan oil:

Argan oil is used for edible as well as cosmetic purposes.It tastes like a smokier sesame oil and is exceptionally good for internal organs. Virgin argan oil is characterized by high levels of linoleic and oleic acids, tocopherols (especially y-tocopherol), and minor compounds such as sterols,carotenoids, and squalene.

The total antioxidant capacity of virgin argan oil is higher than that of other vegetable oils. Recent studies suggest that this edible oil, as a functional food, may play a role in disease prevention. In some studies it is found to have hypolipidemic, hypocholesterolemic, hypoglycemic, antihypertensive effects as well as a possible role in cancer prevention. Thus it helps in reducing the body resistance to insulin; helping treat diabetes, protect the body from cardiovascular inflammatory diseases.

Argan oil is known as one of the most effective natural treatments for most skin and hair conditions. Berber women in Southwest Morocco have relied on their beauty elixir for centuries.

They eat it, combine it with some honey and use it externally as a care product that virtually works wonders, and has multiple effects. The Berber women themselves are the best proof of this effect. Despite intense sunshine and extreme living conditions, they have youthful skin, firm fingernails and shiny hair.

Argan oil provides valuable micronutrients to combat cell damage, early signs of aging and has anti-neoplastic (anti-cancer) properties. It penetrates deeply and faster than most other oils. This is a natural bactericide, antioxidant, and has been effective in the treatment of dermatitis and skin cancer. Ferulic acid is the most abundant phenolic compound in argan oil, which prevents damage caused by ultraviolet light. Pure Argan oil is proven and observed benefits for hair, skin, and nails are extensive. It is helpful in -

Dry Skin: Nourishes and moisturizes dry, scaly, flaky skin and protects against infection.

Oily Skin: Regulates sebum production to keep the skin's natural oils at a healthy level. With regular use, the skin will no longer look or feel oily.

Irritated/Itchy Skin**:** Protects skin from allergens that may cause itchiness.

Acne: Controls overproduction of acne-causing sebum and soothes the inflammation brought about by acne; also prevents the ugly scars acne can leave behind.Aging Stimulates renewal of skin cells and boosts elasticity while smoothing wrinkles and lines.

Sun Damage: The oil is rich in antioxidants that protect cells from UV light.

Eczema and Psoriasis: Helps alleviate inflammatory symptoms associated with psoriasis. Also addresses immunity problems and allergies that trigger eczema symptoms.

Hair: Repairs damaged hair. Moisturizes instantly, and prevents split ends while restoring shine. Increases hair growth and helps control, cure, and prevent dry and itchy scalp.

Scalp: Keeps scalp healthy and well nourished. A few drops will protect against dandruff. Keeps the roots of the hair hydrated, protected, and well nourished.

Nails: Keeps nails strong and heals shine while easily resolving brittle nail problems.

Because of the above-mentioned qualities, Argan oil has emerged as one of the healthiest oils. It has sparked a lot of interest among cosmetic manufacturers and the food industry across the globe.

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

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 is 0K now

****

A little girl told her mother, "Mommy, today in school I was punished for something 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 am 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.

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MEMBERS' PAGE

WINTER SOLUTIONS

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

Winter is when we experience a cold and dry, chilly air in some parts of the country. This is also the time when your appetite increases, sometimes accompanied by a feeling of heaviness, grogginess and lethargy. Some people experience winter dryness, which affects their skin. Here are a few mantras for winter, which can help you enjoy the season, rather than dread it :

Drink Hot Water: Drinking hot water, something like six glasses, throughout the day, can be very helpful for the following people : those who are vata dominant, suffer from arthritis or high cholesterol, asthma, obesity or people who feel very cold despite being overweight. Drinking hot water helps them flush out the ama in their system. The ama is diluted, transported and flushed out through the kidneys and the liver. The result is an improvement in cholesterol, arthritis, weight and asthma.

Taking Warming Herbs : Herbs that have a piitaj action on the body are the ones h St suited for winter, such as ginger, garlic and peppercorn. These herbs can be combined with dalchini (cinnamon) and coriander seeds in different forms and consumed. The easiest way is to have soups with vegetables, herbs and spices.

Take Oils That Are Heating In Nature : We are all aware that certain oils are very heating in nature, like mustard and sesame seed oil. Such oils are not only good for cooking, but also for application on the body. One can eat sesame seeds on toast, and use mustard oil in cooking. Mustard seeds can also be roasted and lightly fried and then added to khichri or any dal. Similarly, one can apply such oils mixed with regular olive oil for massage purposes. In Ayurveda, this is called abhayanga and is most frequently done in winter. This massage is good for arthritis and is also part of many detoxifying treatments.

Avoid Fried Foods : Especially if one has asthma, arthritis or high cholesterol, as these conditions react very adversely to fried food, and therefore should be strictly avoided in winter. Eating fried food may even cause an asthma attack if eaten at night.

Eat Light Dinners : In winter, it is important that one eats well during the day, but eating heavy food late at night can be problematic specially for heart patients and asthmatics.

Don't Binge on Alcohol : This can be very dehydrating for the body and many people actually fall ill in winter because the body is unable to maintain its temperature. Alcohol dilates the blood vessels and very rapidly leads to a loss of heat from the body. One may feel warm initially because one is losing heat through the skin, but later, once the body heat from the core is lost, the body temperature may dip, causing illness.

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