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Butters - Organic and Cosmetic

Trade News

Important Figures

Chemistry & Nutritional Qualities of Cottonseed oil

Health News

Cajeput Essential Oil

Young Minds

Members' Page

Oil Technologists' Association of India (North Zone)

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OIL TECHNOLOGISTS' ASSOCIATION OF INDIA (North Zone)

Editor's desk.....

The terms butter, oil and fat have become generic, as opposed to their use to describe chemical structures. The difference between the terms is defined by a physical, not a chemical property. Specifically the salient property is the titre point. Fats have a titre point of over 40.5ºC, while oils have a titre point of less than 40.5ºC and butters have a titre below 40.5ºC but above 20ºC.

Naturally occurring butters (NOB) include shea butter, coco butter and mango butter etc. These materials are native in plants and are butters due to the composition of the oil extracted from the plant. Unlike oils, which are liquid because they have a high iodine value, these butters have a low iodine value. This lower level of unsaturation (IodineValue) results in compositions that are solid at room temperature.

These butters tend to be expensive and may not give the range of cosmetic properties desired by the formulator. This has resulted in the modification of oils to make soft solids at ambient temperatures, resulting in naturally derived butters (NDB) or cosmetic vegetable butters, where natural oils are modified to form a solid. Cosmetic vegetable butters are fatty substances that have the same properties as vegetable oils. But unlike vegetable oils in liquid or fluid form at room temperature, cosmetic butters are solid and creamy fats.

The common factors shared by all butters include their high emollience and their versatility, which allow them to be used in a wide range of ways:- - massage, moisturizing, wound healing, for protecting various parts of the body : hair, face, hands and feet.

Now-a-days, most body butters are packed with essential omega-3 fatty acids that soothe inflamed skin apart from keeping it moisturized. Shea butter is one of the most used ingredients in body butters that keep the skin nourished and moisturized for a long time.,

The increasing use of cosmetic butters in developing an alternative ingredient for various cosmetic products, including lotions, creams, color cosmetics, soaps and toiletries, has boosted its popularity among consumers over the past decades.

Yours truly
C.S. Joshi
Editor

Editor's desk.....

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(North Zone)

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Contents

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BUTTERS - ORGANIC AND COSMETIC

A B S T R A C T S

Natural cosmetic butters are derived from the extracts of natural sources such as Seeds / kernels, beans, and nuts. However, Butters are thicker than creams and lotions, because they do not contain water. Their fatty acid profile gives them their solid consistency at room temperature. When added to natural product formulations and emulsions, butters are known to contribute viscosity, stability, and sometimes hardness.

The quality of a butter can be determined by its aroma, method of extraction, consistency and rate of absorption, natural fatty acids and tocopherols, and sun protection factor (SPF), among other characteristics.

WHAT ARE BUTTERS?

Natural cosmetic butters are derived from the extracts of numerous natural sources including seeds/kernels, beans, and nuts. They can be applied to the preferred area directly or after being incorporated into spa, cosmetic, or massage formulations, such as lotions, creams, soaps, lip balms, or salves, among other natural products to which they can be added. Butters melt on contact with body heat, adding additional softness and smoothness to skin and hair to relieve dryness, roughness, breakage, and irritation.

These ideal emollients are composed of varying amounts of active ingredients, fatty acids, solids, and semi-solid fat oils; thus, each butter exhibits distinct activities by virtue of its unique anti-inflammatory, soothing, moisturizing, and antioxidant properties. When added to natural product formulations and emulsions, they are known to contribute viscosity, stability, and sometimes hardness.

COMPOSITION OF BUTTERS

Though not all the constituents listed below apply to all butter varieties, these are the main constituents in most varieties: **Essential Fatty Acids, Vitamins, Proteins, Minerals, Antioxidants, Polyphenols, Phytosterols,** and **Tocopherol.**

ESSENTIAL FATTY ACIDS are known to:

- Produce and maintain the skin's natural oil barrier
- Hydrate skin to promote a supple, youthful appearance
- Nourish cells and eliminate bodily toxins
- Protect skin by creating an antimicrobial barrier against harsh environmental elements
- Moisturize skin to prevent the premature signs of aging
- Reduce water loss through the skin's surface
- Enhance the texture and softness of skin and hair

VITAMINS are known to:

- Exhibit anti-aging properties
- Enhance texture and tone
- Fade and minimize the appearance of wrinkles and dark spots, such as under-eye circles
- Smooth roughness
- Strengthen and tighten skin's protective outer layer to lock in moisture and protect against irritants

- Protect against the harsh effects of UV radiation, such as redness, swelling, and dryness
- Nourish and thicken hair
- Reduce inflammation of the scalp, thereby preventing hair loss

PROTEINS are known to:

- Repair and generate new tissues and cells
- Slow the onset of the premature signs of aging, such as wrinkles and thinning hair
- Contribute to the body's immunity and to the strength and development of muscles

MINERALS are known to:

- Protect against the stresses and harsh effects of environmental elements
- Promote exfoliation
- Balance and regulate oil production and moisture levels, especially for oily and sensitive skin and hair
- Exhibit antioxidant properties
- Tighten and smooth for a youthful appearance
- Promote the growth of stronger hair that is thicker, hydrated, and lustrous

ANTIOXIDANTS are known to:

- Boost circulation as well as cell metabolism, thereby calming inflammation
- Tighten and tone the skin to prevent the appearance of wrinkles, blemishes, and scars
- Plump out skin to smooth the look of fine lines and to blend in the newly developed skin
- Improve the health of damaged skin by encouraging the growth of new cells for a rejuvenated look
- Strengthen hair and maintain its health to prevent hair loss

POLYPHENOLS are known to:

- Exhibit antioxidant activity
- Increase hair growth
- Show anti-aging properties, especially by reducing effects of UV-related damage
- Exhibit photoprotective properties that help guard against UV radiation, harmful bacteria, oxidative stress, and harsh environmental conditions
- Facilitate the renewal of skin cells
- Prevent the breakdown of collagen, thereby restoring skin elasticity
- Increase moisture levels for smoother skin and hair

PHYTOSTEROLS are known to:

- Maintain cell structure, repair skin, and promote cell regeneration
- Facilitate healing of dermatitis, eczema, psoriasis, scars, sunburn, wind chapping, and wounds
- Exhibit photoprotective properties / reduce photosensitivity
- Facilitate skin cell metabolism and collagen production

- Exhibit anti-inflammatory properties
- Prevent itching and irritation
- Boost immunity
- Reduce hair loss and increase hair growth

TOCOPHEROL is known to:

- Protect skin and hair against pollutants and harmful UV radiation
- Tighten skin for a firmer look that diminishes signs of aging
- Show natural preservative properties in skin care cosmetics and formulations
- Moisturize and condition
- Exhibit anti-inflammatory activity, which slows the look of aging
- Facilitate the faster healing of wounds

EXTRACTING BUTTERS

Natural cosmetic body butters are blends of various oils that are made from beans, nuts, or seeds/kernels. The two main components of a butter are the **minerals** from their natural ingredients and the **oils** that carry the minerals to the areas of application. The combination of minerals and oils creates a barrier against harsh elemental factors that have drying effects. Butters typically do not contain water. If butters contained water, they would be emulsions, which are commonly known as "lotions." A lack of water content also prevents the butters from needing synthetic chemicals to work as preservatives. The resultant texture of a butter can vary from soft and whipped, to semi-solid, to hard and solid.

CONTRAINDICATIONS FOR BUTTERS

Cosmetic butters should not be ingested and should not be stored within the reach of children, in case of accidental ingestion. Before the application of any butter, a patch test should be conducted on the inner arm or other generally insensitive area of skin, using a pea size amount of the butter to check for sensitivities. An absence of an allergic response within 48 hours indicates that the butter is safe to use.

Some butters may have adverse effects on skin that is prone to sensitivities, such as acne, as they tend to have a thicker, heavier, oilier, and longer-lasting finish on the skin compared to other emollients. Accordingly, body butters are best suited to skin that is dry, chapped, or broken. Individuals with allergies to the natural sources from which butters are derived are at a higher risk of developing an allergy to the butters themselves and should avoid their use. For example, individuals with nut allergies should avoid using butters sourced from nuts.

Potential side effects of cosmetic butters include skin irritation, hives, itching, rashes, swelling, and adult acne. In the event of an allergic reaction, discontinue use of the product and see a doctor, pharmacist, or allergist immediately for a health assessment and appropriate remedial action. To prevent these side effects, consult with a medical professional prior to use.

QUALITY OF BUTTERS

Organic butters are most commonly perceived to be of the highest quality, but even these will eventually go rancid over time. The quality of a butter can be determined by the following factors: **Aroma, Method of Extraction, Consistency and Rate of Absorption, Natural Fatty Acids and Tocopherols, and Sun Protection Factor (SPF),** among other characteristics.

AROMA Typically, butters are either odorless or they have mild, distinctive aromas that are faintly nutty, sweet, and/or characteristic of the plant material from which they are derived.

METHOD OF EXTRACTION The ideal butter for use in natural products is a Raw, Organic, Unrefined butter. Butters that are unrefined will have been filtered to eliminate dust or small particles (with few exceptions) without compromising the oil's nutrients, vitamins, and fatty acids. Conversely, many cosmetic formulations require butters that are odorless so as not to interfere with the scents of the fragrance/essential oils that are added. For this purpose, Refined/Deodorized butters would be suitable.

CONSISTENCY AND ABSORPTION The consistency of various butters can be either thick or thin (hard or soft). The choice of either viscosity is a matter of personal preference. The intention behind using the butter will also be a determining factor in preference for consistency. For example, a light butter with fast absorption and an absence of a greasy residue would be a high-quality butter for oily skin or hair, as it would penetrate the skin and hair quickly without clogging pores. On the other hand, a rich, thick, deeply moisturizing butter is of better quality for treating severely dry and damaged skin or hair.

NATURAL FATTY ACIDS AND TOCOPHEROLS Butters contain beneficial and restorative fatty acids that lend the butters their nourishing and moisturizing properties. These are the constituents that offer regenerative and stimulating properties to promote the look and feel of younger, fresher, and healthier hair and skin. Tocopherols, such as natural Vitamin E, act as natural preservatives. Some butters have a high nutrient content but are too rich to use on their own or their scents are too overpowering. In these situations, they can be diluted in other emollients (e.g. Richer butters can be combined with lighter, odorless natural products). To customize and create the ideal butter, several butters can be blended to also change or combine their therapeutic properties before application.

SUN PROTECTION FACTOR (SPF) Some butters are naturally comprised of components, such as particular minerals, that offer protection against the sun's UVB radiation. By reflecting or scattering UV rays, they prevent the rays from penetrating and burning the skin. When skin is damaged due to overexposure to the sun, this leads to premature signs of aging, such as wrinkles, fine lines, dark spots, and a leathery texture to the skin. Although it is not advisable to use cosmetic butters as replacements for other sun-protective agents, they can be used in combination with other products as part of a larger strategy to prevent photodamage.

STORING BUTTERS

Butters that are high in unsaturated fatty acid content will generally have a shorter shelf life and can last up to 6 months, whereas butters with a longer shelf life can last for at least 1-2 years. Natural cosmetic butters should be stored in the same manner as carrier oils; to maintain a butter's quality and maximize its shelf life, it should be kept in an airtight container in a cool, dark place. Butters with natural antioxidant properties, such as those with high Vitamin E content, have longer shelf lives, as these constituents either prevent oxidation or slow down the process.

TYPES OF BUTTERS

Butters can be categorized by their solidity, which ranges from **Hard** to **Soft.**

SOLIDITY	BUTTER	PROPERTIES
Hard	Suggestions... • Cocoa – Pure Prime Pressed/Crude • Babassu – Refined • Murumuru – Refined • Sal Seed – Refined • Shea – Crude – Ghana • Cupuacu – Ultra Refined	This type of butter (is)... • Firm • Does not melt easily on skin contact • Not easily absorbed • Brittle • Similar to wax in texture • Needs to be chopped rather than scooped • Requires more exertion to be rubbed in, compared to a typical emollient with a soft, creamy texture • Will not dehydrate skin • Does not require preservatives to stop disintegration
Semi-Hard/ Medium	Suggestions... • Kokum – Refined • Cocoa – Organic • Cocoa – Ultra Refined – Deodorized • Shea Organic – Crude – Ghana • Shea Organic – Refined – Ghana	This type of butter (is)... • Not hard, not soft • Softer than Cocoa Butter • Melts on skin contact • Slightly firm texture
Semi-Soft	Suggestions... • Shea – Refined – Deodorized – Ghana	This type of butter (is)... • Softer than Cocoa - Pure Prime Pressed/Crude and Mango • Firmer than Soy
Soft	Suggestions... • Shea • Shea – Ultra Refined • Soy • Mango – Ultra Refined • Cocoa • Tucuma – Refined • Ucuuba	This type of butter (is)... • Spreadable • Melts quickly and readily on skin contact • Smooth and creamy

BUTTER PRICES

Butter prices depend on the types of plants from which they are derived, whether the plants are endemic or exotic, their botanical names, their therapeutic values, whether they undergo organic processing, the quantity being purchased, and the supplier it is purchased from.

USES & BENEFITS OF BUTTERS

Butters each have distinct combinations of properties that make them unique in form and function. The common factors shared by all butters includes their high emollience and their versatility, which allows them all to be used in a wide range of ways – massage, cleansing, softening, soothing, moisturizing, wound healing, protecting – on various parts of the body – hair, face, hands, and feet.

All butters can be applied to the skin directly or in blends to address issues of dryness, rashes, peeling, blemishes, wrinkles, itching, blistering, wound healing, cracking, roughness, stinging sensations, inflammation, aching, and fatigue, among other conditions. Butters are reputed to promote skin and hair health while contributing rejuvenating and regenerative properties.

For direct application to the skin, the ideal time to use butters for optimal absorption is when skin is damp after a shower. Additionally, butters can be applied to skin just before sleeping, as the length of the sleep cycle will allow the butter to penetrate into the skin more effectively for better hydration. Most natural butters melt on skin contact and will be absorbed quickly into the deep layers. Often concentrated, butters do not need to be applied in large amounts. Rather, it is best to begin by smoothing a pea-size amount of body butter across the preferred area of skin before gradually applying the same amount to other areas.

Natural butters can be added to cosmetic formulations as a base for moisturizers, or they can be added to other body butters to add more luxurious moisture. To ensure that they have been thoroughly incorporated, they should be vigorously stirred into formulations rather than simply shaking their containers, as butters have thicker consistencies than creams; thus, the additional essential oils and carrier oils should be folded into the butters just as cake batter is folded in on itself for optimal mixing. The recommended usage rate is 30 drops of essential oil and 5% carrier oils per 100 ml (3.40 oz.) of body butter base.

When the butters being used have strong scents, it is recommended that their Refined varieties be used to prevent the final product's scent from being overpowered by their natural fragrances. Otherwise, Unrefined varieties are recommended for their beneficial constituents. Butters are already suitable for most, if not all, skin types; however, with the addition of a few drops of carrier oils and/or essential oils, they can be further customized to individual preference.

A GUIDE FOR USING BUTTERS

Cosmetic butters may be used in several inventive ways; however, the comparison chart below highlights the more common types of butters and suggests ways in which they can be used on a regular basis.

BUTTER TYPE/ MAIN CONSTITUENT	BENEFITS	BUTTERS
Nut Butter	This type of butter is reputed to (be)... • Hydrate thirsty skin • Reduce the appearance of blemishes, scars, and cellulite • Soothe acne, eczema, insect bites, sunburn, frostbite • Soften and smooth the skin • Condition hair to leave it soft and lustrous • Ideal for any skin type • Boost skin's collagen production and elasticity • Ideal for use in face masks • Ideal for use on any skin type • Have a wide range of uses, including skin care, dry rash care, massage creams, and sun protection	Look for... • Shea
Seed Butter/ Kernel	This type of butter is reputed to (be)... • Moisturizing without being greasy • Promote the look of plump and firm skin • Facilitate the regeneration of skin • Rejuvenate the skin by reducing the signs of aging, such as wrinkles and fine lines • Ideal for use on dry, itchy, flaky skin • Offer skin protection against the harsh effects of environmental elements such as UV radiation • Soothe skin afflicted with irritation caused by bites, stings, blisters, and rashes • Have antioxidant effects • Balance skin's oil production • Stimulate hair growth • Ideal for use on all skin types, especially oily skin	Look for... • Mango • Babassu – Refined • Kokum • Ucuuba • Cupuacu • Murumuru • Sal Seed • Tucuma
Bean Butter	This type of butter is reputed to (be)... • Nourish, soften, and moisturize skin • Reduce discoloration and even out skin tone • Protect skin against the harsh effects of environmental elements	Look for... • Cocoa • Soy

ABSORPTION RATES OF BUTTERS

ABSORPTION RATE	FINISH ON SKIN	BUTTERS
Fast	These butters... Are light, soft and quickly absorbed by skin but leave a smooth, silky finish.Skin will feel moisturized rather than greasy.These butters are ideal for use as/in cleansers.	Suggestions... • Kokum – Refined • Cocoa • Cocoa Organic • Cupuacu – Ultra Refined • Shea – Crude (Ghana) • Shea – Crude (Ghana) Organic • Shea Organic – Refined (Ghana • Shea – Refined – Deodorized (Ghana) • Shea – Ultra Refined • Tucuma – Refined
Average	These butters... Leave a silky feeling on the skin	Suggestions... • Mango – Ultra Refined • Soy • Cocoa – Ultra Refined – Deodorized • Murumuru – Refined • Sal Seed
Slow	These butters...Tend to feel heavy on the skin. They may leave a thick and oily moisturizing barrier on the skin and are not recommended for those with skin sensitivities such as acne. Alternatively, some may leave the skin feeling velvety without the greasy residue (e.g. Babassu, Shea) These butters are all absorbed by the skin eventually.	Suggestions... • Cocoa – Pure Prime Pressed – Crude • Babassu – Refined • Shea • Ucuuba

WHERE TO BUY BUTTERS

Natural cosmetic butters can be purchased just about anywhere - at health food stores, grocery stores, cosmetics shops, online through the website of a preferred vendor, and directly from essential oil companies. When purchasing, it is a good idea to consider the purpose of using the butter and the grade required for the intended purpose. Reputable companies that distribute quality butters are highly recommended.

Compiled by:

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India's EV wave is the future but biofuels are changing the game now:-

Rising crude oil import bills have pushed the Indian government to look for other alternatives fuel sources such as Ethanol and Biodiesel. On our journey to majority electrification, biofuels are a legitimate way to a more sustainable fuel industry. Currently, the transport sector, railways and aviation are the major end-users of bio diesel in India. As per a FY2021 quarterly update, India's biodiesel market demand stood at 0.17 million tonnes despite major setbacks due to the pandemic induced disruption in supply chains.

The report predicted a healthy growth of 8.60 per cent CAGR until 2030, with a forecasted demand set to reach 0.26 million tonnes.

Initiation of the 2019 National Policy on Biofuels and the Food Safety and Standards Authority of India's (FSSAI) Repurposed Used Cooking Oil (RUCO) project have further encouraged legacy players and startups alike to jump on the bandwagon. With India's primary energy demand set to double by 2040, the use of alternative fuels such as Biodiesel is bound to grow as well. These fuels also help reduce the environmental impact as the end product is 95 per cent carbon-free on average. Used cooking oil, anima'- fats, imported crude vegetable oils and Jatropha seeds are used to produce alternative fuels such as Biodiesel.

But with India only contributing to 1 per cent of the global biofuel production, alternative fuels are still a niche in our country. That is where the Central Government is providing support to domestic players such as Mumbai-based UCO aggregator, Aris Bioenergy, to invest and tap into the market's potential. 'Since 2018 we are developing the aggregation system in Maharashtra and a few other states such as Karnataka, Telangana and Gujarat. We are aggregating feedstock such as UCO and supplying them to refineries that are converting it into biodiesel. These refineries are recognised by the FSSAI to produce biodiesel from UCO. We are also in a joint venture with Green Fuels UK to build twenty biodiesel refineries in India. Our first conversion plant will come up in Khopoli which will use UCO and other feedstock from Maharashtra to make.

Indonesia Energy Ministry plans B40 Biodiesel Road text next Months.

The world's largest palm oil producer mandated that biodiesel sold in the country be blended with 30% of palm-based biodiesel to cut its energy imports and increase consumption of palm oil - the feedstock to the fuel.

JAKARTA: Indonesia's energy ministry plans to begin road tests for a biodiesel programme using 40% palm based bio- content (B40) in February, a senior government official said on Monday.

The energy ministry plans to tests two types of B40 blending, one using 30% fatty

acid methyl ether (FAME) and 10% distilled palm methyl ester (DPME), and another using 30% FAME and 10% palm based diesel known as green diesel.

The use of B40 must be followed by quality improvement, of both biodiesel and diesel oil," said Dadan Kusdiana, the ministry director- general of renewable energy.

Kusdiana said the road test would take around five months and the decision on mandatory B40 implementation would be taken after the tests were completed.

The government had planned to launch the B40 programme from 2021 to 2022,

but the high price of the vegetable oil has made it too costly. The Indonesian Palm Oil Association (GAPKI) expected B40 to be delayed beyond this year.

Brand Battles: Locals Vs the Giants

The Indian consumer market is seeing a dynamic shift, with the resurgence of local brands as formidable challengers to industry giants like Tata, Britannia, HUL and Nestle. Data from Kantar's Brand Footprint report showcases local brands like Sargam, Vidisha and Bhagwati making remarkable leaps in consumer brand rankings, shaking up the nearly $180 billion FMCG market. Karnataka-based brand Teju Masala, for example, has grown 65% in one year. But, what are these local brands doing differently? Should the biggies be threatened?

Source: Indian Express

Cheap Sunflower oil from Russia, Ukraine rattles Palm Oil Market

A flood of cheap sunflower oil from Russia and Ukraine is putting downward pressure on palm oil prices as the two top producers take advantage of currency depreciation to grab a larger share of the edible oils market. Last Year Palm oil prices soared after Russia's invasion of Ukraine disrupted sunflower oil supplies from the Black Sea region.

Now, sunflower oil, which typically commands a hefty premium, is cheaper than soybean oil and holding a negligible premium over palm oil, said CEO of Dubai-based trader Glentech Group.

"Aggressive selling of sun flower oil from Black Sea region is putting pressure on palm oil and other edible oils," he said.

Crude sunflower oil is offered at $895 a metric ton including cost, insurance and freight (CIF) to India for October shipments, compared with $850 for crude palm oil. A year ago, sunflower oil held a premium of over $400 per ton over palm oil, compared to $45 now.

Russia has been harvesting a record sunflower seed crop of more than 17 million tons and farmers are aggressively selling seeds, said a leading Russian edible oil refiner who declined to be identified.

Since crushing has gained momentum, sunflower oil exports are likely to rise this year to 4.5 million tons from last year's 3.7 million tons, the refiner said.

In dollar terms, prices have come down in the last three months but Russian farmers are still getting decent returns because of the Rouble's depreciation, he added.

The Russian currency has lost more than 38% against the U.S. dollar this year.

Ukraine, which was struggling to ship sunflower oil after Russia withdrew from the Black Sea grain deal, has also been aggressively selling sunflower seeds, said a Ukrainian exporter.

"Ukraine neighbours are processing imported seeds and exporting oil," he said.

Ukraine's central bank devalued the hryvnia currency by 25% against the U.S. dollar in July 2022.

The United States Department of Agriculture (USDA) predicts Ukraine's sunflower seed crop will reach 14 million tons, up from 12.2 million a year earlier but below the 17.5 million tons harvested in the 2021/22 season.

The European Union's production could rise to 10.6 million tons from 9.2 million tons, the USDA estimated.

Indonesia and Malaysia lead in palm oil exports, with Argentina, Brazil, and the United States the top soy bean oil sellers.

India, the biggest importer of both palm oil and sun flower oil, could import a record 3.2 million tons of sunflower oil in the new marketing year starting from Nov. 1 but its palm oil imports could fall 8% to 9 million tons, said managing partner at GGN Research, an edible oil trader and broker.

Usually India imports around 200,000 tons of sunflower oil per month, but in the last few months it is making purchases of more than 300,000 tons, he said.

Unlike palm oil, sunflower oil availability is limited, with stocks expected to be depleted in the December quarter due to aggressive selling, said a Singapore-based dealer with a global trading house, adding that could push its premium above $150 per ton in near future.

Palm oil prices this week fell to their lowest level in 3-1/2 months as stocks in Malaysia hit an 11-month high.

Source : Economic Times

Comeback of biogas in new-age of renewable energy

Biogas is not a bygone. In fact it may soon be the game changer to disrupt LPG and natural gas usage. Even as startups are setting up biogas plants, conglomerates like Reliance Industries and Adani Group are betting thousands of crores on this segment. With the world's largest manufacturing facility for biogas plant set up in Pune by global social enterprise Sistema Bio, Host Kalpana Pathak explores how India's oldest answer to fuel problems is finally getting the push.

Source : Indian express

IMPORTANT FIGURES

Table 1: Canola Production, Supply, and Distribution

Canola, Oilseeds Oilseed, Rapeseed	Aug-21		Aug-22		Aug-23	
Canada	**USDA Official**	**New Post**	**USDA Official**	**New Post**	**USDA Official**	**New Post**
Area Harvested	8,946	8,946	8,600	8,596		8,640
Beginning Stocks	1,776	1,776	875	865		700
Production	13,752	13,752	19,000	18,174		18,300
MY Imports	105	105	125	100		100
Total Supply	15,633	15,633	20,000	19,139		19,100
MY Exports	5,233	5,249	8,400	8,400		8,300
Crush	8,555	8,555	10,000	9,500		9,500
Food Use Dom. Cons.	0	0	0	0		0
Feed Waste Dom. Cons.	970	964	450	539		550
Total Dom. Cons.	9,525	9,519	10,450	10,039		10,050
Ending Stocks	875	865	1,150	700		750
Total Distribution	15,633	15,633	20,000	19,139		19,100
Yield	1.54	1.54	2.21	2.11		2.12
(1000 HA) ,(1000 MT) ,(MT/HA)						
Canola Seed Trade - MY 2022/2023						

Table 2: MY Year-to-Date (August to January) Exports of Canola Seed

Partner Country	Tons (,000)			% Share			% Change 21/22 to 22/23
	20/21	21/22	22/23	20/21	21/22	22/23	
World	6,148	3,427	4,028	100%	100%	100%	18%
China	1,449	857	1,987	24%	25%	49%	132%
Mexico	602	650	676	10%	19%	17%	4%
Japan	1,169	860	631	19%	25%	16%	-27%
Pakistan	447	64	267	7%	2%	7%	319%
France	633	359	123	10%	10%	3%	-66%
United Arab Emirates	645	307	122	10%	9%	3%	-60%
United States	176	147	95	3%	4%	2%	-35%

Figure 1: Provincial Share of National Canola Area Planted

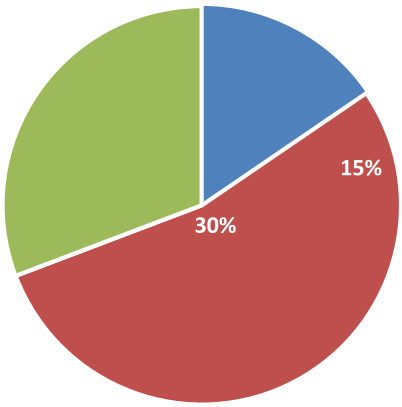
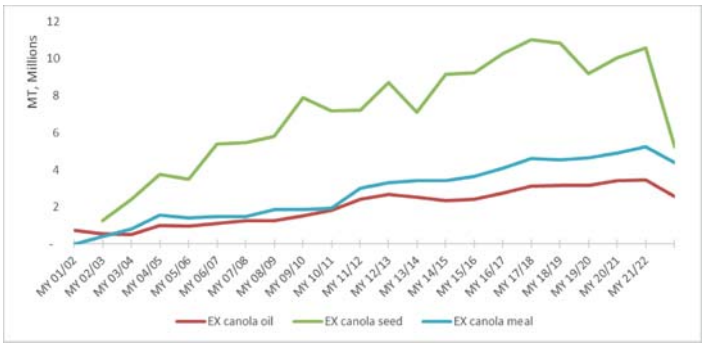


Figure 2: Exports of Canola Seed, Oil, and Meal



Canola Seed Trade – MY 2023/2024

Ending stocks are forecast to increase marginally year-over-year on higher supplies but remain significantly below the five-year average (2017 to 2021) of 2.6 million MT, due to the significant impact that the 2021 drought had on canola supplies. f orecast to be marginally lower than a year prior on strong domestic demand for processing, strong export demand, and low beginning stocks due to the 2021 drought.

Canola Seed Storage Stocks

Exports are forecast to fall marginally due to lower exportable suppliers driven by lower beginning year stocks. Assuming average growing conditions in oilseed-growing regions of the world, Canada's canola seed sector is expected to Source: Statistics Canada; prepared by FAS/Ottawa continue to face strong competition from U.S. and Brazilian oilseeds, and now Australian canola, as well.

Table 3: Canola Oil Production, Supply, and Demand

Oil, Canola Market Begin Year	2021/2022 Aug-21		2022/2023 Aug-22		2023/2024 Aug-22	
Canada	**USDA Official**	**Post**	**USDA Official**	**Post**	**USDA Official**	**Post**
Crush	8,555	8,555	10,000	9,500		9,500
Extr. Rate, 999.9999	0.42	0.42	0.44	0.42		0.43
Beginning Stocks	551	103	545	74		90
Production	3,573	3,572	4,350	3,940		4,066
MY Imports	19	19	20	20		19
Total Supply	4,143	3,694	4,915	4,034		4,175
MY Exports	2,573	2,573	3,250	2,900		3,040
Industrial Dom. Cons.	325	340	340	340		340
Food Use Dom. Cons.	700	707	755	704		704
Feed Waste Dom. Cons.	-	0	0	0		0
Total Dom. Cons.	1,025	1,047	1,095	1,044		1,044
Ending Stocks	545	74	570	90		91
Total Distribution	4,143	3,694	4,915	4,034		4,175
(1000 HA), (1000 MT), (MT/HA)						

Table 4: Marketing Year Canola Oil Exports (August to July), '000, MT

Partner	08/2019 - 07/2020	08/2020 - 07/2021	08/2021 - 07/2022	08/2019 - 07/2020 % Share	08/2020 - 07/2021 % Share	08/2021 - 07/2022 % Share
World	3,429	3,448	2,573	100	100	100
United States	1,852	1,793	1,920	54.0	52.0	74.6
China	970	1,192	246	28.3	34.6	9.6
Mexico	101	160	183	3.0	4.7	7.1
South Korea	143	154	95	4.2	4.5	3.7
Chile	150	94	71	4.4	2.7	2.8
Japan	46	14	20	1.3	0.4	0.8

Data source: Trade Data Monitor, LLC; Prepared by FAS/Ottawa

Table 5: Canola Oil Exports Year-to-Date (August to January), '000, MT

Partner	08/2019 - 01/2020	08/2020 - 01/2021	08/2021 - 01/2022	08/2022 - 08/2022 - 01/2023	01/2023 % Share
World	939	1,675	1,257	1,473	100
United States	472	821	956	1,154	78.3
China	49	639	102	152	10.3
Mexico	84	71	77	80	5.4
South Korea	86	72	48	48	3.3
Chile	24	42	46	15	1.0
Japan	4	11	9	12	0.9

Data source: Trade Data Monitor, LLC; Prepared by FAS/Ottawa

Table 6: Canola Meal Production, Supply, and Distribution

Meal, Canola Market Begin Year	2021/2022 Aug-21		2022/2023 Aug-22		2023/2024 Aug-22	
Canada	**USDA Official**	**New Post**	**USDA Official**	**New Post**	**USDA Official**	**New Post**
Crush	8,555	8,555	10,000	9,500		9,500
Extr. Rate	0.60	0.5952	0.56	0.5950		0.5755
Beginning Stocks	125	94	183	153		120
Production	5,092	5,092	5,600	5,653		5,467
MY Imports	11	11	8	10		10
Total Supply	5,228	5,197	5,791	5,816		5,597
MY Exports	4,395	4,398	4,950	5,000		4,800
Industrial Dom. Cons.	0	0	0	0		0
Food Use Dom. Cons.	0	0	0	0		0
Feed Waste Dom. Cons.	650	646	680	696		677
Total Dom. Cons.	650	646	680	696		677
Ending Stocks	183	153	161	120		120
Total Distribution	5,228	5,197	5,791	5,816		5,597
(1000 MT), (PERCENT)						

Table 7: Canola Meal Exports

Partner	08/2019 - 07/2020	08/2020 - 07/2021	08/2021 - 07/2022	08/2019 - 07/2020 % Share	08/2020 - 07/2021 % Share	08/2021 - 07/2022 % Share
World	**4,904**	**5,261**	**4,398**	**100**	**100**	**100**
United States	**3,466**	**3,581**	**2,920**	**70.7**	**68.1**	**66.4**
China	**1,417**	**1,577**	**1,469**	**28.9**	**30.0**	**33.4**
Mexico	**9**	**21**	**8**	**0.2**	**0.4**	**0.2**

Data source: Trade Data Monitor, LLC; Prepared by FAS/Ottawa

Chemistry & Nutritional Qualities of Cottonseed oil

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INTRODUCTION

As evident from the name cottonseed oil is derived from cotton plant. The oil is extracted from cottonseeds which has around 18-20% oil content. Cotton has long been known as nature's unique food and fiber plant. It produces both food for man and feed for animals in addition to a highly versatile fiber for clothing, home furnishing, and industrial use.

Cottonseed oil dominated the world edible oil market just before world war II, when its position was superseded by soybean oil due to the rapid increase in cultivation of the soybeans. Cottonseed has been America's original vegetable oil & dominated the US market for almost 100 years, until the 1940's. While crushing of cottonseed for its oil was documented in the early Hindu medical books, and small crushing took place in European plants during the first part of the nineteenth century, it was the invention of the cotton gin by Eli Whitney in 1794, and the need to deal with the cottonseed left over after the fiber has been removed, that spurred innovations in oil crushing. CSO is practically synonymous with those pioneering years of the oilseed industry, which included the introduction of the first vacuum deodorized CSO by Wesson in 1899.

Global cottonseed output is estimated around 35 million tons in the recent past. Major producers of cottonseed dominate the oil sector with China, US, India, Pakistan and Brazil leading the pack. Cotton is an important fiber crop of global significance and is grown in tropical and subtropical regions of more than eighty countries. Cotton is primarily cultivated for its lint or fiber, in other words, lint is the main product of cotton crop. Now, cotton seed oil is also widely used for human consumption. Thus, cotton has become a fiber cum oil yielding crop. Its seeds also contains 20-25% protein

Economic History

The by-product of cotton processing, cottonseed was considered virtually worthless before the late 19th century. While cotton production expanded throughout the 17th, 18th, and mid 19th centuries, a largely worthless stock of cottonseed grew.[1] Although some of the seed was used for planting, fertilizer, and animal feed, the majority was left to rot or was illegally dumped into rivers.

In the 1820s and 1830s Europe experienced fats and oils shortages due to rapid population expansion during the Industrial Revolution and the English blockade during the Napoleonic Wars. The increased demand for fats and oils, coupled with a decreasing supply caused prices to rise sharply. Consequently, many Europeans could not afford to buy the fats and oils they had used for cooking and for lighting. Many United States entrepreneurs tried to take advantage of the increasing European demand for oils and America's increasingly large supply of cottonseed by crushing the seed for oil. But separating the seed hull from the seed meat proved difficult and most of these ventures failed within a few years. This problem was resolved in 1857, when William Fee invented a huller, which effectively separated the tough hulls from the meats of cottonseed. With this new invention, cottonseed oil began to be used for illumination purposes in lamps to supplement increasingly expensive whale oil and lard. But by 1859, this use came to end as the petroleum industry emerged.

Cottonseed oil then began to be used illegally to fortify animal fats and lards. Initially, meat packers secretly added cottonseed oil to the pure fats, but this practice was uncovered in 1884. Armor and Company, an American meatpacking and food processing company, sought to corner the lard

market and realized that it had purchased more lard than the existing hog population could have produced. A congressional investigation followed, and legislation was passed that required products fortified with cottonseed oil to be labeled as ‘‘lard compound. Similarly, cottonseed oil was often blended with olive oil. Once the practice was exposed, many countries put import tariffs on American olive oil and Italy banned the product completely in 1883. Both of these regulatory schemes depressed cottonseed oil sales and exports, once again creating an oversupply of cottonseed oil, which decreased its value.

It was cottonseeds depressed value that lead a newly formed Procter & Gamble to utilize its oil. The Panic of 1837 caused the two brothers-in-law to merge their candlestick and soap manufacturing businesses in an effort to minimize costs and weather the bear market. Looking for a replacement for expensive animal fats in production, the brothers finally settled on cottonseed oil. Procter & Gamble cornered the cottonseed oil market to circumvent the meat packer’s monopoly on the price. But as electricity emerged, the demand for candles decreased. Procter and Gamble then found an edible use for cottonseed oil. Through patented technology, the brothers were able to hydrogenate cottonseed oil and develop a substance that closely resembled lard. In 1911, Procter & Gamble launched an aggressive marketing campaign to publicize its new product, Crisco, a vegetable shortening that could be used in place of lard. Crisco placed ads in major newspapers advertising that the product was “easier on digestion...a healthier alternative to cooking with animal fats ... and more economical than butter. The company also gave away free cookbooks, with every recipe calling for Crisco. By the 1920s the company developed cookbooks for specific ethnicities in their native tongues. Additionally, Crisco starting airing radio cooking programs. Similarly, in 1899 David Wesson, a food chemist, developed deodorized cottonseed oil, Wesson Oil. Wesson Oil also was marketed heavily and became quite popular too.

Over the next 30 years cottonseed oil became the pre-eminent oil in the United States. Crisco and Wesson oil became direct substitutes for lard and other more expensive oils in baking, frying, sautéing, and salad dressings. But by World War Two cottonseed oil shortages forced the utilization of another direct substitute, soybean oil. By 1944, soybean oil production outranked cottonseed oil production due to cottonseed shortages and soybean oil costs falling below that of cottonseed oil. By 1950, soybean oil replaced cottonseed oil in the use of shortenings like Crisco due to soybeans comparatively low price. Prices for cottonseed were also increased by the replacement of cotton acreage by corn and soybeans, a trend fueled in large part by the boom in demand for corn syrup and ethanol. Cottonseed oil and production continued to decline throughout the mid and late 20th century.

In the mid to late 2000s, the consumer trend of avoiding trans-fats, and mandatory labeling of trans-fats in some jurisdictions, sparked an increase in the consumption of cottonseed oil, with some health experts and public healh agencies recommending it as a healthy oil. Crisco and other producers have been able to reformulate cottonseed oil so it contains little to no trans-fats. Still, some health experts claim that cottonseed oil’s high ratio of polyunsaturated fats to monounsaturated fats and processed nature make it unhealthy.

Indian Situation

India’s cottonseed production is around 35% of its cotton output. Cottonseed is crushed for oil while rest goes to feed. Major producers of cotton in the country are Maharashtra, Uttar Pradesh, Punjab, Haryana, Rajasthan, Madhya Pradesh, Tamil Nadu, Andhra Pradesh & Karnataka. Nearly 95 % of cotton production is from these 9 states. Cotton is one of the most important commercial crops of India and is the single largest natural source of fiber. It plays a dominant role in its agrarian and industrial economy as the backbone of textile industry, which consumes 70% of the country’s total fiber produced. Cotton production plays a vital role in Indian economy, providing employment for more than one million farmers and employees in the domestic textile industry. But, textiles are only the part of this great

cotton story. The often-ignored fact is that the cotton plant produces more food for man and feed for animals than fiber. All elements of cotton seed as it is often considered as "Golden Goose": linters, kernels and hulls are used in various consumer products, delicious food and nutritious feed for animals.

Cottonseed oil

Cottonseed contains hull and kernel. The hulls produce fiber and linters. The kernel contains oil, protein, carbohydrate and other constituents such as vitamins, minerals, phospholipids, sterols etc. Cottonseed oil is extracted from cottonseed kernel. Refined and deodorized cottonseed oil is considered as one of the purest cooking medium available. An additional benefit that accures from Cottonseed oil is its high level of antioxidants – tocopherols.

Composition

The oil is among the most unsaturated edible oils. The fatty acid profile of cottonseed oil consists of 65-70% unsaturated fatty acids (18-20% monounsaturated and 50-52% polyunsaturated), 26-28% saturated fatty acids. When it is fully hydrogenated, its profile is 945 saturated fat and 2% unsaturated fatty acids (1.55 monounsaturated & 0.5% polyunsaturated). Cottonseed oil need not be hydrogenated to higher melting point for many a cooking purposed as is required in case of some of the more polyunsaturated oils.

Cottonseed oil comparison to other vegetable oils

Oil	Saturated Fatty acids *	Monounsaturated fatty acids *	Poly unsaturated fatty acids			Oleic acid Omega 9
			Total poly *	Linolenic acid Omega 3	Linoleic acid Omega 6	
Non Hydrogenated						
Canola (rapeseed)	7.365	63.276	28.142			
Coconut	91	6	3		2	6
Corn	12.948	27.576	54.677	1	58	28
Cottonseed	25.9	17.8	51.9	1	54	19
Flaxseed	6-9	10-22	68-89	56-71	12-18	10-22
Olive	14	72	14			
Palm	49.3	37	9.3	-	10	40
Peanut	16.9	46.2	32	-	32	48
Safflower	8	15	75			
Safflower high oleic	7.5	75.2	12.8			
Soybean	15.6	22.78	57.74	7	54	24
Sunflower <60% linoleic	10.1	45.4	40.1	0.2	39.8	45.3
Sunflower >70% oleic	9.6	83.7	3.8			
Fully hydrogenated						
Cottonseed	93	1.53	0.587		0.287	
Palm	47.5	40.6	7.5			
Soybean	21	73.7	0.4	0.096		
* all values in this column are from the USDA Nutrient data base						

Name of the species	Extent of variability in fatty acids			
	Palmitic acid %	Stearic acid %	Oleic acid %	Linoleic acid %
G. arboreum	23.1-25.9	2.3-3.4	20.8-6.3	41.1-50.6
G. herbaceum	20.5-23.4	3.2-4.4	17.5-20.8	51.3-55.1
G. hirsutum	23.1-28.0	2.4-3.4	14.7-20.9	47.6-55.4
G. barbadense	24.4-25.5	2.6-3.0	18.7-19.7	50.0-51.7
G. arboreum	8.9-21.2	1.1-2.9	16.5-30.7	30.3-59.3
G. hirsutum	8.83-24.4	1.2-4.5	10.3-30.2	20.6-58.0

Source: Central Institute for cotton research, Nagpur, CICR technical Bulletin No. 25

A lot of variability has been witnessed in fatty acid profile of the oil extracted from six Indian cotton species & can well be helpful in developing lines with high polyunsaturated and monounsaturated fatty acid content through breeding techniques.

Triglyceride Composition

Since linoleic, oleic, and palmitic acid account for over 90% of the fatty acids in cottonseed oil, most of the triglycerides contain some combination of these fatty acids. The following table lists the possible combination of composition and position of saturated (mostly palmitic), oleic and linoleic acids in cottonseed oil triglycerides. These ten types of triglycerides account for 92% of the total triglycerides found. The predominant type is SLL (a saturated fatty acid, linoleic acid, and linoleic acid in the 1,2, and 3 positions respectively), which account for over 22 mole percent of the triglyceride molecules.

The amounts and the types of fatty acids and the inter and intrapositional distribution result in various triglyceride forms which contribute to the various functional properties of cottonseed oil.

A pair of unique fatty acids belonging to the chemical group of cyclopropenes are common in plants of the family malvaceae, which includes cotton. These two fatty acids are sterculic and malvalic acid and are generally referred to by their collective name of cyclopropenoid fatty acids (CPFA). The physiological activity of sterculic acid

Table: triglyceride composition (Mole %) of cottonseed oil

Fatty acid pattern	Number of double bonds	Mole %
SOS	1	4.5
SOO	2	4.8
SLS	2	12.4
SOL	3	9.4
SLO	3	8.4
OOL	4	4.1
SLL	4	22.5
OLL	5	6.4
LOL	5	6.5
LLL	6	13.0
Other		8.0
Total		100

S = Saturated, O = Oleic, L = Linoleic.

is reported to be greater than that of malvalic acid. The ratio of malvalic acid to sterulic acid in cottonseed oil is usually about three to one.

The processing step responsible for the greatest inactivation of CPFA in refined cottonseed oil relative to crude cottonseed oil is deodourization.

Gossypol in Cottonseeds

Gossypol is the most important pigment present in cottonseed and create enormous problem of seed processing and utilization of cottonseed by products. There is considerable variations in gossypol content from variety to variety within the same species. Gossypol is in the free state in the whole seed and on cooking of cottonseeds form "bound gossypol" as a result of gossypol combining with either free amino or free carboxy groups of cottonseed protein. Bound gossypol decreases the nutritive value of protein and availability of lysine, an essential amino acid. The following table shows mean gossypol content and the range of gossypol in different gossypium species.

Table : Mean gossypol content and the range of gossypol in different gossypium species. 9% free gossypol)

Species	Seed	Kernel
G.arboreum	0.69 (0.30-1.25)	1.31 90.65-2.38)
G. herbaceum	0.77 (0.43-1.09)	1.44 (0.82-1.96)
G. hirsutum	0.77 (0.42-1.25)	1.39 (0.73-2.35)
G. barbadense	1.11 90. 73-1.49)	1.78 (1.22-2.35)

Source: Central Institute for cotton research, Nagpur, CICR technical Bulletin No. 25

Since gossypol and its chemically related compounds are strong pigments, it is the objective of the oil refinerto remove as much of the coloring compounds, including gossypol as possible. In the crude oil, they give a strong red to brown color characteristic of crude cottonseed oil. Caustic refining and bleaching are the two steps that reduce the color of crude oil. Removal of these coloring pigments leaves only a varying degree of a light yellow or amber color to refined cottonseed oil.

The level of gossypol in refined cottonseed oil is almost completely eliminated by refining. In a paper published by Yabe,Y et.al in Journal of Food Hygiene, Japan 25:264 (1984), development of a High performance liquid chromatographic procedure for determining gossypol in oil has been reported and they have observed that no gossypol was detectable in commercially edible cottonseed oil where the limits of detection were 1 ppm.

Genetic Engineering of cotton plant to remove gossypol

Research. at Texas A&M University in the US have reported that they have found a way to genetically engineer the cotton plant to remove gossypol from its seeds and therefore render cottonseed protein safe for consumption by humans, monogastric animals & fish.

Upto now the high concentration of gossypol in cottonseed and cottonseed meal meant that it could only be fed to ruminant animals such as cattle and sheep, which have digestive systems containing bacteria that break down the gossypol so that it is non toxic. The researchers have expressed that if free of toxins, the cottonseed protein could be fed to undernourished people. Alternatively, the non toxic meal could be used as feed for chickens, pigs or fish. The team said that it had modified cotton plant so that only the seed had reduced gossypol levels, while the rest of the plant retained normal levels of the toxin, so that it remained resistant to insect pests. Gossypol levels in the seed have been reduced to 200 parts per million, compared with the limit of 450 parts per million declared by the US Food and drug Administration to be safe (the World health organization put the limit at 600 ppm).

Different grades of Cottonseed oil

The first Indian Standard for Cottonseed oil was IS;543-1954, which was later revised in 1966 & then in 1968 as IS:543:1968 which describes the standard values of four grades each of expressed oil & solvent extracted oil.

Characteristics	Expressed oil				Solvent extracted oil			
	Refined grade	Grade IA (washed)	Grade IB (washed)	Grade 2 (raw)	Refined grade	Semi refined (raw)	Grade IB	Grade 2 (raw)
Moisture & insolubles % by wt.	0.10	0.10	0.10	0.25	0.10	0.25	0.75	1.5
Lovibond color (Y+10R), not deeper than								
a. Original oil	10	25	35	-	14	35	-	-
b. bleached oil	-	8	15	-	-	15	-	-
Refractive index at 40 ^{0}C	1.4630 to 1.4660							
Sp. Gravity at 30 ^{0}C	0.910 to 0.920							
Saponification value	190 - 198							
Iodine value	98 - 110							
Unsaponifiable %	1.5	1.5	1.5	20	1.5	1.5	2	2.5
Flash point, Pensky-Martens (Closed, 0 ^{0}C, min.					250	125	100	90

Functional properties of Cottonseed oil

Cottonseed oil Flavor: Cottonseed oil is well known for its bland, slightly nutty taste. For this reason, when used with certain foods, cottonseed oil is often used as the standard against which other oils are compared for odor & flavor. It has been reported by Fitch et.al., in 1987 that the popularity of beef tallow for its flavor contribution to French fries has increased the use of tallow-cottonseed oil blends because cottonseed oil facilitates handling characteristics of the higher melting tallow, raises the proportion of unsaturates and its mild taste enhances the tallow flavor. Certain products which have the potential for remaining on store shelves for little long duration are fried in an oil with high resistance to oxidation to prevent the development of off-flavors. Cottonseed oil that has been hydrogenated to an IV of 70-75 is ideal for these kinds of products.

Effect of Storage on Cottonseed oil quality: Cottonseed oil seems to hold up well under varying storage conditions. In a study conducted by Bauman and Whitten in 1970, the oil samples were held for up to two years at six different temperatures ranging from 55 ^{0}F to 110 ^{0}F. Every three months, samples of the oils were compared by a taste panel. It was found that, although the oils seemed to decrease slightly in quality with time, there was no clear cut indication that warmer storage temperatures were more detrimental to quality. The differences in flavor score were slight, and the variation in individual scores by the panel members were great enough that the apparent decreases with time were assumed not to be important. The researchers concluded that the quality of the cottonseed salad oils in the test had not been seriously affected by either time or temperature of storage during the two year period. It may be that the level of antioxidants naturally present in cottonseed oil was partially accountable for this observation.

Mayonnaise: Mayonnaise is defined by the Food & Drug Administration to be a semisolid food prepared with at least 65% vegetable oil, plus egg yolk or whole eggs, vinegar, lemon or lime juice and seasonings. Since mayonnaise usually contains

at least 80% oil, the quality of the oil used used is important to the flavor & stability of the emulsion. If an oil used that has not been winterized, the formation of crystals during refrigeration will break the emulsion, causing the oil fraction to separate from the other ingredients. Winterized cottonseed oil is an excellent oil for use in mayonnaise.

Flavor: Cottonseed oil enhances the natural taste of foods, rather than contributing its flavor. Cottonseed oil is well known for the nutty buttery flavor it develops when exposed to heat and light. Unlike other oils, cottonseed oil does not experience undesirable flavor reversion. Cottonseed oil has long been the gold standard oil in potato chip production for its ability to enhance the flavor of potatoes. The neutral taste of Cottonseed oil makes it perfect for frying seafood and oriental foods, like stability and neutral flavor make it an ideal frying oil. Cottonseed oil has been popular in India, Japan & Korea & is increasingly being rediscovered as an ideal cooking oil in the United States.

Cocoa Butter substitutes: Cocoa butter is obtained from cocoa beans is a unique material used in confectionery manufacturing. The researchers have investigated the use of cottonseed oil as Cocoa butter substitute. The stearin fraction removed from cottonseed oil during winterization has an iodine value of about 72. Selective hydrogenation of this stearin to an IV of 28-42 and fractional crystallization produces a fat with approximately 2/3 of its triglycerides as 1,3 disaturated molecules. The fats with higher melting points could be processed to a hardness equivalent to that of cocoa butter. Cottonseed oil stearin appears to be an adequate replacement for cocoa butter in many respects. The characteristics of hydrogenated cottonseed oil stearin as a substitute for cocoa butter is given in table below.

Table: Comparison of simulated cocoa butter made from hydrogenated cottonseed oil stearin with cocoa butter.

	Hydrogenated stearin fraction of cottonseed oil	Cocoa butter
Palmitate (%)	58.0	24.4
Stearate (%)	1.0	35.4
Monoene (%)	37.6	38.1
Trans acids (%)	7.2	-
Melting point (^{0}C)	30-40	34-35

Margarines & Shortenings : The suitability of oils for use in margarine & shortening formulations are dependent on its ability to crystallize in beta prime form. The ability of a fat or oil to form beta prime crystals is dependent on several factors : (1) the amount of palmitic acid in the fat, (2) the distribution and position of both palmitic and stearic acids on the triglyceride molecule, (3) the degree of hydrogenation or hardness of a fat, (beta prime crystallization increases with the degree of hydrogenation), and (4) the degree of randomization of a fat. Beta prime crystals are typical of randomized fats. The importance of position and distribution of palmitic acid is seen when comparing cottonseed oil to lard. Even though each of these fats contain about 23% palmitate, beta prime is characteristic of cottonseed oil while beta is characteristic of lard. This is due to the fact that palmitate predominates at the 1 and 3 position in cottonseed oil triglycerides and predominates in the 2 position in lard.

able : Classification of oils & fats according to crystal habit.

BETA	BETA PRIME
Soybean	Cottonseed
Safflower	Palm
Sunflower	Tallow
sesame	Menhaden
Peanut	Whale
Corn	Rapeseed
Olive	Modified lard
Coconut	Butter oil
Palm kernel	
Lard	
Cocoa butter	

The ability of cottonseed oil and cottonseed stearin to form beta prime crystals allows for the specific use of the stearine in hardened products. The beta prime crystalline structure results in desirable shortening properties including good aeration, smooth appearance and excellent creaming properties. The beta form may result in plastic shortening that have a grainy or waxy texture that may cause a loss of various functional properties, especially creaming ability. As a result, some vegetable oils require blending with beta prime hard fats at a minimum level of 5%, or with 20% of an oil that forms beta prime crystals. In addition, this fat must have a higher melting point than the other component oils in order for the entire fat to crystallize in the stable beta prime form. Thus vegetable oils which produce beta crystals such as sunflower, safflower, and canola require blending with a beta prime crystal forming oil or hard fat in the preparation of plastic shortening. One way to achieve this is by blending these oils with fully hydrogenated cottonseed steadiness.

Cottonseed oil Extraction as a unique practice Among Oilseeds

Although there are many common steps in the extraction of all oil seeds, the removal of cotton linters from the outer hull of cottonseed makes the extraction of cottonseed unique. No other oilseed has this kind of material on the hull and the equipment used to remove the linters is specific only for this operation.

In the first step of processing, seeds are cleaned to remove any leaves or other material. After cleaning, the linters are removed. The delinting machines employ the principle of the cotton gin. Seed may be run through the delinting machinesonce, in which case the linters produced are known as mill-run. Most mills run the seed through twice and produce first cut and second cut linters. First cut consists of the longer, more resilient fibers, while second cuts are made up of short fibers or fuzz.

After the linters are removed the protective tough hull which surrounds the cottonseed kernel is removed. After separation, hulls are ready for marketing. The kernels or meats are now ready for oil extraction.

Some cottonseed processing plants using solvent extraction employ a combination of screw pressing followed by solvent extraction that is known as the prepress process. Here cooked flakes are first put through screw presses under medium pressure. This step reduces the oil content from 33-35% down to 18-20%. The partially defatted residue is then subjected to solvent extraction to remove the remainder of the oil. Residual oil remaining in the meal from this process is about 1% or less.

Nutritional Qualities

The benefits of cottonseed oil are found mainly in what it lacks — saturated fat and flavor. Cottonseed oil is made by extracting the oil from cotton plant seeds. This vegetable oil is used as an ingredient in many processed foods, salad dressings and condiments, and is also used for cooking. According

to the USDA, cottonseed oil is a premium food oil, valued because it does not add additional flavor to food.

Polyunsaturated Fat

Cottonseed oil is a dietary source of polyunsaturated fat, a healthy type of fat. Not all fat is bad for you. Doctors suggest limiting consumption of saturated fats, which can clog arteries and raise cholesterol levels. But unsaturated fats have the opposite effect, lowering your risk of developing heart disease and reducing the amount of low-density lipoprotein, or bad cholesterol, in your blood. In a study published in the December 2005 issue of the "Journal of the American Dietetic Association," Dr. Darla Daniel and colleagues reported that cottonseed oil provides a healthier alternative to more commonly used fats for deep frying.

Vitamin E

Cottonseed oil is a dietary source of vitamin E, an important nutrient that helps form red blood cells. Vitamin E also helps the body make better use of vitamin K. Just 1 tbsp. of cottonseed oil has 4.8 mg of vitamin E, or 32 percent of the USDA recommended daily allowance. Cottonseed oil has the highest amount of Vitamin E as compared to other vegetable oils with the exception of almond oil and wheat germ oil.

Various tocopherol isomers that act as naturally occurring antioxidants are found in cottonseeds. Alpha tocopherol is best known as vitamin E. gama tocopherol has greater effectiveness as an antioxidant but less vitamin activity. Crude cottonseed oil contains about 1000 ppm tocopherols, but upto one third can be lost during refining.

Tumor control

Cottonseed oil contains a natural compound called gossypol. Researchers are examining the relationship between gossypol and certain types of cancer. In a study published in the November 2004 issue of "Clinical Cancer Research," Dr. Christopher Oliver found that gossypol inhibited the growth of cancerous head and neck tumors. This research is especially promising because surgery is typically the only treatment for people suffering from these types of cancer.

High-oleic and high-stearic cottonseed oils: nutritionally improved cooking oils developed using gene silencing.

Liu Q: Singh S; Green A

J. Am. Coll Nutr;

Gene technology and plant breeding are combining to provide powerful means for modifying the composition of oilseeds to improve their nutritional value and provide the functional properties required for various food oil applications. Major alterations in the proportions of individual fatty acids have been achieved in a range of oilseeds using conventional selection, induced mutation and, more recently, post-transcriptional gene silencing (PTGS). In particular, a number of high-oleic oils have been developed in order to provide high-stability cooking oils. These oils provide the opportunity to replace the current widespread use of saturated fats and hydrogenated oils that contribute significantly to increased risk of cardiovascular disease due to the effect of saturated and trans-fatty acids on elevating LDL cholesterol in the bloodstream. Similarly, oils with increased stearic acid content are being developed to enable the production of solid fats without the need for hydrogenation. The authors have applied hpRNA-mediated PTGS in cotton to down-regulate key fatty acid desaturase genes and develop nutritionally-improved high-oleic (HO) and high-stearic (HS) cottonseed oils (CSOs). Silencing of the ghFAD2-1 delta12-desaturase gene raised oleic acid content from 13% to 78% and silencing of the ghSAD-1 delta9-desaturase gene substantially increased stearic acid from the normal level of 2% to as high as 40%. Additionally, palmitic acid was significantly lowered from 26% to 15% in both HO and HS lines. Intercrossing the HS and HO lines resulted in a wide

range of unique intermediate combinations of palmitic, stearic, oleic and linoleic contents.

Source: CSIRO Plant Industry, Canberra, ACT, Australia.

Twenty facts About Cottonseed oil:

1. Cottonseed oil is extracted from cottonseeds. Cotton has long been known as natures unique food and fiber plant. It produces both food for humans and feed for animals in addition to a highly versatile fiber for clothing.

2. Cottonseed has been a part of the American diet for well over a century. Until the 1940's, It was the major vegetable oil produced in the united States, Now, with annual production averaging more than 1 billion pounds, cottonseed oil ranks third in volume behind soyabean and corn oil representing about 5-6% of the total domestic fat and oil supply.

3. Cottonseed oil has many food applications. As a salad oil, it is used in mayonnaise, salad dressings, sauces, and marinades. As a cooking oil, it is used for frying in both commercial and home cooking. As a shortening or margarine, it is ideal for baked goods and cake icings.

4. Cottonseed oil is primarily used in the US as a salad or cooking oil. About 56% is consumed in that category while about 36% goes into baking and frying fats, and a small amount into margarine and other uses. In India also, the oil find application in commercial frying & is preferred oil for home frying & cooking.

5. Cottonseed oil has a mild, nut like taste. It is generally clear with a light golden color, but like most oils, the degree of color depends upon the amount of refining. Clear colorless oils are not necessarily better oils, but may have been refined more severely.

6. Cottonseed oil is often used as the yardstick for measuring flavor and odor qualities in other oils.

7. Cottonseed oil is one of the few oils considered acceptable for reducing saturated fat intake.

8. Cottonseed oil is among the most unsaturated oils. Others include safflower, corn, soybean, canola and sunflower seed oils.

9. Cottonseed oil has a 2:1 ratio of polyunsaturated to saturated fatty acids. Its fatty acid profile generally consists of 70% unsaturated fatty acids including 18-22% monounsaturated (Oleic), and 50-52% polyunsaturated (linoleic) and 26-28% saturated (primarily palmitic and stearic)

10. Cottonseed oil is rich in tocopherols. These natural antioxidants, which have varying degrees of vitamin E activity, also contribute to its stability giving products that contain it a long shelf life.

11. Cottonseed oil is described by scientists as being naturally hydrogenated because of the levels of oleic, palmitic, and stearic acids which it contains. These make it a stable frying oil without the need for additional processing or the formation of trans fatty acids.

12. Cottonseed oil does not have to be as fully hydrogenated for many purposes as some of the more polyunsaturated oils. When it is partially hydrogenated, however, its monounsaturated fatty acids actually increase. When hydrogenated to a typical iodine value of about 80, for example, its fatty acid profile shifts to 50% monounsaturated, 21% polyunsaturated, and 29% saturates as well within current diet/ health guidelines.

13. Like all major food crops, cottonseed production is regulated by food protection agencies of the federal government and cottonseed oil meets the government's strict standards for purity.

14. Refined and deodorized cottonseed oil is one of the purest food products available. Few foods can be as highly cleaned and refined, and still maintain their nutritional quality.

15. Cottonseed oil is a favorite for salad oil, mayonnaise, salad dressing, and similar products because of its flavor stability.

16. Cottonseed oil's light, non oily consistency and high smoke point make it most desirable for cooking, frying & other oriental dishes as well as for frying fish.

17. Unlike some oils, cottonseed oil does not deteriorate or revert rapidly in flavor when used at high temperatures.

18. In addition to oil, many products from cottonseed are part of our daily life. Cellulose and cellulose derivative s from from cottonseed linter fiber are used as food ingredients.

19. Cottonseed oil can be found as an ingredient in many food products.

20. Because cottonseed oil is America's original vegetable oil, it has been the standard to which other oils are compared.

Cottonseed oil – cooking tips

Storage: It is wise to only buy a container size that one will use over a couple of months. Store oil in tightly sealed container in a cool, dark location.

Cooking temperature: Do not allow the oil to exceed 193 ^{0}C during frying, and preferably a temperature of about 182 ^{0}c should be maintained. On the other hand, if the temperature is is too low, the food will have a greasy or oily texture.

Avoid copper: Another important tip is to avoid the use of copper . Even the minutest particles of copper will cause the oil to deteriorate rapidly. This is true for all fats and oils.

Minimize exposure to ultraviolet (UV) light: Ultraviolet light will catalyze the degradation of triglycerides. UV light attacks double bonds in the unsaturated fatty acids producing by-products, which can act as pro-oxidant material. These can lead to undesirable off-flavor and can compromise shelf life.

Filter regularly: particulates from fried foods can darken oil, contribute bitter flavor to food, impede hear transfer, and ruin the appearance of food.

A superfood that works on weight loss, lowers sugar and improves heart health: Why buckwheat flour or kootu ka atta should be your new staple?

It contains notable amounts of fibre, protein, vitamins (B-complex vitamins like niacin, folate and riboflavin), and minerals (magnesium, manganese, and phosphorus). All of these are important for overall well-being, says.

In recent years, there has been a growing interest in alternative flours and grains due to their low carbohydrate and low sugar benefits. One such flour that has gained popularity is buckwheat flour, known as **kootu ka atta** in some regions. And it is slowly beginning to have wider acceptability than just being seen as a fasting food.

While buckwheat is not a millet but a seed, its nutrient-dense properties make it a superfood that can shield you against non-communicable diseases. It belongs to the Polygonaceae family and is botanically related to sorrel and rhubarb.

Rich in Nutrients

Buckwheat flour is packed with essential nutrients. It's an excellent source of complex carbohydrates that delay digestion, extend satiety, slow down glucose release and provide sustained energy throughout the day. Additionally, it contains notable amounts of fibre, protein, vitamins (B-complex vitamins like niacin, folate, and riboflavin), and minerals (magnesium, manganese, and phosphorus). These nutrients are vital for maintaining overall health.

High in Antioxidants

Buckwheat flour contains various bioactive compounds, including rutin, quercetin and tannins, which possess strong antioxidant properties. These antioxidants help combat oxidative stress, reducing the risk of chronic diseases and promoting overall well-being.

Blood Sugar Regulation

Buckwheat flour has a lower glycemic index compared to traditional wheat flours. This means it has a gentler impact on blood sugar levels, making it a favourable choice for individuals with diabetes or those looking to maintain steady energy levels throughout the day.

Cardiovascular Health

The rutin in buckwheat is known to promote cardiovascular health by strengthening blood vessels and reducing the risk of heart-related issues. The presence of magnesium also contributes to maintaining healthy blood pressure.

Digestive Health

Buckwheat flour's high fibre content aids digestion and promotes gut health. The soluble fibre acts as a prebiotic, nourishing beneficial gut bacteria and supporting a healthy microbiome.

Helps in weight loss

Kuttu ka atta is dense in proteins but doesn't contain calories. Hence, it is digested easier, is gluten free and, therefore, sits on the stomach easily than the commonly used wheat flour. What's more, it improves absorption of other nutrients and boosts metabolism, which means faster fat burns.

Incorporating Buckwheat Flour into the Daily Diet

Now that people understand the science behind the nutritional benefits of buckwheat flour, let's explore how to incorporate it into the daily diet:

Buckwheat Pancakes: Replace traditional pancake mix with buckwheat flour to create a delicious and

nutritious breakfast. Top with fresh berries and a drizzle of honey for added flavour.

Buckwheat Porridge: Make a creamy breakfast porridge by cooking buckwheat groats or buckwheat flour with your choice of milk or water. Add your favourite fruits, nuts and a pinch of cinnamon for extra taste.

Buckwheat Noodles (Soba): Soba noodles, made from buckwheat flour, are a staple in Japanese cuisine. Use them in stir-fries or cold noodle salads for a unique and healt

Buckwheat Bread: Prepare home-made buckwheat bread or use buckwheat flour as part of the flour blend in your bread recipes. It adds a delightful nutty flavour to your loaves.

Buckwheat Flour in Baking: Replace a portion of all-purpose flour in baking recipes with buckwheat flour. This works well for muffins, cookies and even brownies.

Buckwheat as a Side Dish: Use cooked buckwheat as a side dish, similar to rice or quinoa. It pairs wonderfully with vegetables, meats, or a drizzle of olive oil and herbs.

Source: The Indian Express

ROLE OF SATURATED FATS IN HUMAN DIET

According to the World Health Organization (WHO), "existing evidence suggests that the intake of fatty acids is a major determinant of the serum lipid and lipoprotein profile." When measured through blood tests their values can determine a person's risk for cardiovascular disease (CVD). Numerous epidemiological studies associate high amounts of total cholesterol and triglycerides with the disease. There are aspects if saturated fats really contribute to chronic disease. When researchers dig into the data to determine the effect of individual SFA on serum profiles they find that there are differences. Cholesterol and triglyceride levels can go up or down for fatty acids like, Lauric (C12:0), Myristic (C14:0) or Palmitic acid (16:0) while studies show Stearic acid (18:0) has no effect. This SFA specific variation of serum lipid profiles.

Further analyses of research findings has also confirmed the health benefits of unsaturated fatty acids. The fate of saturated fats, however, still awaits consensus. When there is increased PUFA and MUFA in a diet that still contained SFA instead of replacing it with a mixture of carbohydrates. It is specified that partially replacing SFA with PUFA had a greater effect on lowering LDL cholesterol and triglycerides. When SFA intake remained below 10% of a subject's total energy intake, the individual maintained a desirable serum profile.

Courtesy:- AOCS

THE IMPACT OF CARBS AND FATS ON LONGEVITY

When it came to carbohydrate consumption, the researchers found that, in the study cohort, men who got fewer than 40% of their daily calories from carbohydrates were at a significantly higher risk of all-cause mortality.

For women, by contrast, those who got more than 65% of their calories from carbohydrates were at a higher all-cause mortality risk.

The researchers found no appreciable difference between the effect of consuming minimally processed carbohydrates versus refined carbohydrates.

Regarding dietary fat, men who got more than 35% of their calories from any kind of fat were at a higher risk of cancer and cardiovascular mortality.

In men, when the quality of fat intake was examined, no clear association was observed for saturated fat intake. However, consuming less unsaturated fat was associated with a higher risk of all-cause and cancer-related mortality.

For women, consuming more fats — particularly saturated fats — decreased their risk of all-cause and cancer mortality.

Love coffee? 5 reasons why you must incorporate it into your skincare regime

1. Antioxidant properties: Coffee is rich in antioxidants, such as chlorogenic acid, which can help combat free radicals inthe skin that can cause premature ageing and damage to the skin.

2. Anti-inflammatory: Cofee contains anti-inflammatory properties that can soothe irritated skin and reduce redness and swelling

3. Caffeine: Caffine in coffee, can constrict blood vessels, reducing puffiness and redness. It is often used in eye creams to reduce under-eye bags and dark circles

4. Exfoliation: The coarse texture of coffee grounds can be used as anatural exfoliant to remove dead skin cells, leaving the skin smoother and brighter

5. Improved circulation: When used in scrubs or masks, coffee can stimulate blood flow, promoting healthier, more radiant skin.

Courtesy:- MID_DAY

Salmons to sprouts, non-vegetarians to vegans, includ these omega-3 rich foods in your diet

Omega-3 fatty acids which come in different forms to suit various dietary preferences, are vital for overall health. Non-vegetarians can opt for salmons, while vegetarians can choose flaxseeds, walnuts, hemp seeds, or Brussels sprouts, and vegans have options like spinach, soybean oil, among others.

Flaxseeds are rich in Alpha-linolenic acid (ALA), a plant-based Omega-3 fatty acid. ALA has anti-inflammatory properties and supports heart health

While seasonal changes can lead to dry, itchy skin and a dull complexion, these symptoms also indicate a deficiency in omega-3 fatty acids. Often found in fish oil, Omega-3 fatty acids offer numerous health benefits. They mainly originate from the sea, particularly in the form of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These crucial fats are essential for a healthy heart, proper brain function, and overall wellness.

Often called omega-3s, these fatty acids are special fats found in foods like flaxseeds and fish, and they're also present in dietary supplements like fish oil. Researchers mainly study three types of omega-3s: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). ALA has 18 carbon atoms, while EPA and DHA are called long-chain omega-3s because EPA has 20 carbons, and DHA has 22. While ALA can be found in plant oils like flaxseed, soybean, and canola oils, DHA and EPA are found in fish, fish oils, and krill oils. It is important to note that they are originally made by tiny algae, and not by the fish themselves. When fish eat tiny plants called phytoplankton, which in turn consumed by these microalgae, they store the omega-3s in their bodies.

The good news is that Omega-3 fatty acids come in different forms to suit various dietary preferences, making them accessible and beneficial whether you are a non-vegetarian, vegetarian, or even a vegan.

Non-vegetarian options:

Salmon: Regular consumption of salmon is linked to a reduced risk of heart disease and cognitive decline. Salmon is famous for its rich content of EPA and DHA, two of the most beneficial Omega-3 fatty acids.

Mackerel: Similar to salmon, mackerel provides ample amounts of both EPA and DHA. Including mackerel in your diet can improve cardiovascular health.

Sardines: Sardines are abundant in EPA and DHA, making them a ompact nutritional powerhouse. Consuming sardines can help lower triglyceride levels and reduce inflammation.

Regular consumption of soaked walnuts has been associated with improved cholesterol levels.

Cod liver oil: Cod liver oil offers highly concentrated levels of EPA and DHA and is often used as a supplement to support heart and brain health.

Herring: Herring provides a substantial dose of EPA and DHA, contributing to reduced risk of irregular heart rhythms.

Vegetarian delights:

Flaxseeds: These small powerhouses are rich in Alpha-linolenic acid (ALA), a plant-based Omega-3 fatty acid. ALA has anti-inflammatory properties and supports heart health.

Chia seeds: From salads to soups and snacks, chia seeds offer versatility in cooking and baking. They are also an excellent source of ALA, promoting heart health.

Walnuts: Your favourite walnut brownie is a delightful way to consume these nuts rich in ALA Omega-3s. Regular consumption of soaked walnuts has been associated with improved cholesterol levels.

Hemp seeds: Whether in smoothies, bars, muffins, or pancakes, hemp seeds offer a hearty dose of ALA, reducing inflammation and promoting brain health.

Brussels sprouts: Though modest, Brussels sprouts contain a noteworthy amount of ALA and can help reduce the risk of chronic diseases.

Vegan options:

Pumpkin seeds: Pumpkin seeds provide a dose of ALA Omega-3s in a convenient snack form, lowering the risk of heart disease.

Spinach: This popular green contains ALA and offers various nutritional benefits.

Soybean oil: Soybean oil contains plant-based Omega-3 fatty acid

ALA. While not as concentrated as some other sources, it contributes to Omega-3 intake and is favourable for both vegetarians and vegans.

Mustard seeds: These seeds are another source of ALA and can be incorporated into dressings, sauces, and marinades to add a dash of Omega-3 to your diet.

Fenugreek seeds: Fenugreek seeds, known as ‘methi dana,’ are rich in ALA, making them a valuable plant-based source of Omega-3 fatty acids, often used in various culinary dishes.

Source: Economics Times

CAJEPUT ESSENTIAL OIL

Indroduction

Cajeput essential oil boasts a fresh, camphoraceous aroma with a hint of fruity undertones. It is known for its antiseptic, anti-inflammatory, and analgesic properties, making it a valuable ingredient in various medicinal and cosmetic products. Cajeput oil is used in the treatment of respiratory conditions, skin infections, muscle aches, and as an insect repellent.

Cajeput is a word that is used to refer to the aromatic oil derived from the leaves of the cajeput tree. It is commonly used in traditional medicine and aromatherapy for its therapeutic properties. The term “cajeput” originates from the Malay word “kayu putih,” which translates to “white wood” in English. The oil has a fresh, camphoraceous scent and is often used topically for its soothing and antiseptic properties. It can also be inhaled for its respiratory benefits. Overall, cajeput oil is a versatile and beneficial substance that is well-regarded in the field of natural remedies.

Melaleuca leucadendra is widespread in northern Australia, Southeast Asia, New Guinea and the Torres Strait Islands. It is a tree, sometimes growing to more than 20 m (70 ft) with a trunk covered with thick, white, papery bark and weeping thinner branches. It has a long flowering season, can flower at almost any time of the year and is often grown as a tree in parks and on roadsides. It was the first melaleuca to be described and was described from a specimen growing in Indonesia.s

Cajeput oil is extracted via steam distillation from the fresh leaves and twigs of the cajeput. Cajeput oil exerts significant therapeutic properties, which makes Cajeput oil useful in aromatherapy and other medicinal applications.Cajeput oil has been used as a natural remedy for colds, headaches, throat infections, and various skin conditions.

Botanical Name: ***Melaleuca Cajeputi, Melaleuca leucadendra,***

Family: *Myrtaceae*

INCI Name : Melaleuca Cajuputi (Cajeput) Oil

Harvesting and Processing

Cajeput trees are typically found in tropical regions with well-drained soil and abundant sunlight. These trees can reach heights of up to 30 meters and have slender, flexible branches with dense foliage. They are known for their ability to thrive in challenging environments and are often cultivated in plain area.

Cajeput trees are usually harvested when they are 3 to 4 years old and have reached their peak oil production. The leaves, young twigs, and terminal shoots are carefully collected by experienced harvesters. Specialized techniques ensure minimal damage to the tree and maximum oil yield.

Once harvested, the plant material undergoes a distillation process to extract the precious essential oil. Steam distillation is commonly used, where steam is passed through the plant material, causing the oil glands to rupture and release the aromatic compounds. The steam and oil vapor are then condensed and separated, resulting in the valuable cajeput essential oil.

Handling and storage of cajeput Oil

Storage: Keep in tightly closed container in a cool and dry place, protected from light. When stored for more than 24 months, quality should be checked before use.

Precautions for safe handling: Maintain good occupational and personal hygiene.

Conditions for safe storage, including any incompatibilities: Sealed containers in a cool dark place. Check quality before use.

Chemical Composition(percentage)

The main components of the M.cauputi essential oil included eucalyptol (27.512), gamma terpinene (8.59), terpenolene (9.047), beta-eudesmene (3.359), alpha - terpineol (4.108), 1R-alpha-pinene (2.158), cayophyllene (6.48) and alpha- caryophyllene (3.50).

PHYSICAL and CHEMICAL PROPERTIES of CAJEPUT OIL:

Appearance:	at 20°C Clear liquid
Density:	0.92 g/mL at 25 °C (lit.)
Color:	from pale yellow to greenish
Odor:	Fresh, mint, champhoraceous Optical Rotation: (°) -4 / 0
Density:	at 20°C (G/ML)) 0,890 - 0,935
Refractive Index:	ND20 1,4610 - 1,4720
Flashpoint:	(°C) 40
Solubility:	Insoluble in water Moleclar
Weight:	170.33
Odor:	fresh, robust, fruity, and camphor-like Assay(%)
Cineole:	55-65%
Color & Odor:	Colorless to pale yellow @22C with eucalyptus like, camphoraceous odor

Benefits and Uses

Like other essential oils, cajeput oil isn't regulated by the Food and Drug Administration (FDA). It's important to carefully weigh any purported benefits of cajeput with the available research. Here's what we know so far.

Cajeput oil for your skin

Cajeput oil has primarily been established for being an antiseptic. Older research Trusted Source suggests it has antibacterial qualities, which could make the oil beneficial for minor cuts and scratches to help prevent infection. It may also have antifungal and antiviral effects on the skin.

Cajeput oil for hair

The medicinal qualities of cajeput oil are also promoted in hair care. Scalp care and hair growth may be two of these benefits. However, there's a lack of evidence proving that cajeput can treat hair loss or any scalp condition.

Other purported benefits

Cajeput oil is also promoted in various natural health outlets as helpful for the following conditions:

- muscle and joint pain
- toothaches
- sinusitis
- the common cold
- cough and other respiratory ailments
- anxiety and stress

How to use Cajeput oil

When properly diluted and tested for allergic reactions, cajeput oil may be safely used for your hair and skin. Don't take essential oils by mouth.

For skin care

Once you've conducted a patch test, you may apply diluted cajeput oil on a larger area of skin. You can apply it directly to minor wounds, scratches, and rashes. Another option is to add a few drops to an ounce of body lotion.

For hair

You can also use diluted cajeput oil for hair in the same way you would for skin application. Another option is to add several drops of the essential oil to your shampoo before massaging it into your scalp.

In aromatherapy

While directly inhaling cajeput oil from the bottle isn't advised, you may consider diffusing the oil for aromatherapy. You may find temporary relief from congestion and headaches, but it's unclear whether aromatherapy can have significant effects on pain and inflammation in this way.

Potential side effects

While considered natural, cajeput oil can still cause side effects similar to other types of essential oils. Symptoms may include:

(a) skin rash

(b) redness

(c) irritation

(d) burning

(d) hives

If using topically on your skin and hair, it's important to dilute cajeput with a carrier oil first. The National Association for Holistic Aromatherapy recommends the following for topical use: Start with three to six drops per ounce of carrier oil. If you don't have sensitive skin, you can gradually increase this amount up to 15 drops.

You should also conduct a patch test before using cajeput oil on your skin or hair. To do this, test a *diluted* portion of the oil on the inside of your elbow and wait up to 48 hours. If you develop an allergic reaction, discontinue use.

Use caution when using cajeput in aromatherapy. Avoid direct inhalation, as this oil is strong enough to possibly cause or worsen breathing problems. You should also keep in mind who else might be inhaling this oil. Some essential oils are dangerous for pregnant and breastfeeding women, children, and pets.

It's also possible for cajeput oil to cause drug interactions. If you currently take any prescription or over-the-counter medications, talk to a doctor before using cajeput.

Compiled by:

Dr. S. Adhikari

LAUGH AND LOUD

A methodologist's wife had twins. He was delighted. He rang the minister who was also delighted. "Bring them to church on Sunday and we'll baptize them," said the minister. "No," replied the statistician. "Baptize one. We'll keep the other as a control."

****

You Pb me to believe he's dead. I Zn he won't survive. Ba in the ground you fool, do you Zn he's still alive

****

Q: What is the name of the molecule CH2O?

A: Sea Water

****

Q: Why do chemists like nitrates so much?

A: They're cheaper than day rates.

****

Q: How does the failing chemistry student answer this exam question: "H2O is the formula for water. What is H2O4?"

A: "Washing, Cleaning and Drinking"

****

(Fe)male = male with iron added for greater strength, ductility and magnetism.

****

Science teacher tells his class, "Oxygen is a must for breathing and life. It was discovered in 1773." A blonde student responds, "Thank God I was born after 1773 Otherwise I would have died without it

****

Don't break anybody's heart; they only have 1. Break their bones; they have 206.

****

Q: How do astronomers organize a party?

A: They planet.

****

Q: What do you calla Fish that wears a bowtie ?

A: Sofishticated.

****

Q: How do you know is some one is using Microsoft Edge?

A: They tell you they are using Microsoft Edge.

****

Q: What do you call a snake that works for N A S A ?

A: An Astro - Noodle.

****

Q: - Why did the chicken go to the séance ?

A: - To get to the other side.

****

Q: - Why don't Aliens visit our solar system ?

A: - They read the reviews - just one star.

****

YOUNG MINDS

DEEP WARMING

by ANSHIKA DIWAKAR (3rd BTECH, OIL TECHNOLOGY)
H.B.T.U KANPUR

The continuous deteriorating conditions of the climate has been an topic of global concern, worldwide continuous changing climate conditions have resulted not only affecting the sustainability of diverse sectors of worldwide. But has also put the integrity and survival of many species at stake due to shift in optimum temperature ranges, thereby accelerating biodiversity loss by progressively changing the ecosystem.

As Quoted by Leonardo DiCaprio "Clean air and water, and a livable climate are inalienable human rights. And solving this crisis is not a question of politics. It is our moral obligation-if, admittedly, a daunting one."

Earth climate is inherently getting variable days by days some years are hot some being cold , the constant droughts , hurricanes natural disasters are a result of the global effect of combined harmful global warming being the reason for deep warming! Leading to cause abundant disturbance in the natural fundamental phenomenon's taking place. The planet's temperature is basically a function of the energy the earth absorbs from the sun and the energy earth emits to space as infrared radiation. Greenhouse gas concentrations have varied naturally in the past resulting in harming the environment and depleting the natural balance.

Despite the bleak vision of the future, there are reasons for optimist to hope due progress on cleaner sources of renewable energy, especially renewable energy sources including solar power, biomass, bioenergy, hydropower etc .

Scientific agreements about climate change started in the late 1980s , when the influence of human - caused warming began to rise above natural climate variability. By 1991, two-thirds of earth and atmospheric scientists surveyed for an early consensus study said that they accepted the idea of anthropogenic global warming. And by 1995, the Intergovernmental Panel on Climate Change, a famously conservative body that periodically takes stock of the state of scientific knowledge, concluded that "the balance of evidence suggests that there is a discernible human influence on global climate."

Given the steep price of incation , many economiost say that addressing climate change is a better deal . The challenge is that we need to reduce emissions now to avoid damages later, which might require big investments over next few decades .The fact that we are the only one who can prevent the damage and this is important to remember as we face up to the extremely urgent challenge of heating linked to fossil-fuel use and greenhouse gases. Global warming is just the beginning of our problems. It's a testing ground to see if we can manage an intelligent and coordinated response. If we can handle this challenge, we might be better prepared, more capable and resilient as a species to tackle an even harder one.

MEMBERS' PAGE

Dietary Fats, Oils and Cholesterol

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

You need a small amount of fat in your diet for healthy functioning. Oils and fats supply calories and essential fats and help your body absorb fat-soluble vitamins such as A, D, E and K. The type of fat is just as important for health as the total amount of fat consumed. That's why it's important to choose healthier unsaturated fats. Eating too much and the wrong kinds of fats, such as saturated and trans fats, may raise unhealthy LDL cholesterol and lower healthy HDL cholesterol. This imbalance can increase your risk of **high blood pressure**, hardening of the arteries (**atherosclerosis**), heart attack and stroke.

CHOLESTEROL:

- Cholesterol is the vital yet dangerous soapy looking yellow – white substance whose level in the blood stream is directly affected by richness of the diet.
- Despite its bad reputation, cholesterol is essential to Life : it is a building block of the outer membrane cells, and it is a principal ingredient in the digestive juice bile, in the fatty sheath that indicates nerves, and in sex Harmones and androgen.
- However, excessive cholesterol in the blood plasma can be dangerous and leads to Atherosclerosis.
- Although most of the cholesterol found in the body is produced in the Lever, 20% to 30% generally comes from the food we eat.
- **Bad cholesterol, LDL (Low Density Lipoprotein)** - the higher the level of LDL, the greater the risk of Atherosclerosis.
- **Good Cholesterol : HDL (High Density Lipoprotein**) – helps in removing Cholesterol from circulation and reducing the risk of heart disease.

HEART DISEASE & CHOLESTEROL:

- Heart Disease is directly linked to the level of Cholesterol in the blood.
- Lowering Cholesterol levels markedly reduces the incidence of Fatal Heart attacks.
- Researchers have established that 10% reduction in Cholesterol levels reduces the coronary heart diseases risk by 15 – 20 %.

CAUSES OF HIGHER CHOLESTREOL LEVELS:

- Cholesterol – rich foods as Eggs, Organ Meats and most cheeses can directly add to the level of potentially harmful LDL
- Saturated fats, such as Butter, Ghee, Bacon Beef, Whole Milk, coconut and Palm oils tend to raise LDL levels.

Saturated Fats which raise the Cholesterol Levels in the Blood:

Food Item	Cholesterol level %	Saturated Fat (Gms)
MEATS (3 OZ)		
- Beef Liver	372	2.5
- Veal	86	4.0
- Pork	80	3.2
- Chicken (dark meat)	82	2.7
- Chicken (light meat)	76	1.3
- One Egg	274	1.7
DAIRY FOODS (1 Cup; Cheeses 1 oz)		
- Ice Cream	59	8.9
- Whole Milk	33	5.1
- Butter (1tb sp.)	31	.1
- Yogurt (Low Fat)	11	1.8
OILS (1 tbsp .)		
- Coconut	0	11.8
- Palm	0	6.7
- Olive	0	1.8
- Corn	0	1.7
- safflower	0	1.2
FISH (3 oz.)		
- Oily Fish	59	1.2
- Lean Fish	59	0.3
- Shrimp (6 large)	48	0.2

POLY - UNSATURATED FATTY ACIDS (PUFA):

Linoleic Acid;- A poly unsaturated fatty a is the major and all important essential acid to reduce Cholesterol levels.

- Linoleic acid is present in varying percentages in all vegetable oils like Kardi, (Safflower), Sunflower, Corn, Mustard, Sesame (Til), Soybean Groundnut, Cottonseed etc.-
- Linoleic acid cleanses the vital arteries and prevents Cholesterol build up.

POLY – UNSATURATED FATTY ACIDS IN SOME EDIBLE OILS AND FATS

S.NO.	FAT OR OIL	PUFA CONTENT (gms per 100 gms.)
1	COCONUT OIL	2
2	COTTONSEED OIL	50
3	GHEE	4
4	GROUND NUT OIL	2
5	MAIZE OIL	45
6	MUSTARD OIL	25
7	OLIVE OIL	10
8	RICE BRAN OIL	35
9	SAFFLOWER OIL (KARDI OIL)	75
10	SESAME OIL	42
11	SOYBEAN OIL	55
12	VANASPATI	6

The visible fats that enter in the diet are fats, such as butter and ghee. Various vegetable oils and Vanaspati. Irrespective of the type, all fats and oils yield the same amount of energy.

For Judging whether Hydrogenated fat , Desi Ghee Butter, solid fats, is nutritious, the most important yardstick is to examine its digestibility. Hydrogenated fat since consists of 95% vegetable oils and 5% of sesame oil and also fortified with Vitamin A and D, the digestibility of these constituents is Important.

Colclusion

The intention is not to reduce total fat in the diet. Rather, it is to help reduce intakes of saturated fat, while encouraging foods that contain mostly unsaturated fat.

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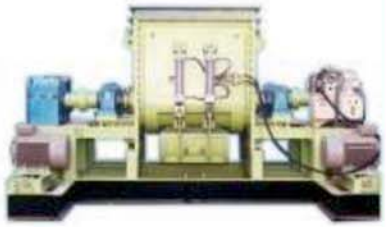

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